Chronicle's

SSC CGL
Combined Graduate Level Exam

MATHEMATICS

TCS PYQ Practice Book

75 SETs

2021-2023 Solved Papers

■ Previous years' solved question papers with detailed conceptual explanations

■ Promotes clear understanding of the answers without any external help

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Mathematics

PYQ Solved Papers

- ☑ The questions in this book have been explained in such a way that you can understand the answers along with the concepts in detail without any external help.

- ☑ In the past few years, SSC conducted all its examinations in the CBT (Computer Based Test) format.

- ☑ In these examinations, questions are not repeated, but the nature and pattern of the questions remain more or less the same.

- ☑ This observation is based on a careful analysis of the questions that have been asked in the past three years.

- ☑ Accordingly, in this book, solutions of three previous years question (PYQ) papers have been given.

Editor
N.N. Ojha

Solved by

Chandan Singh
Selected in Airforce

Kundan Kumar
Selected in CISF

Sanyog Kumar
Chronicle Editorial Team

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1. If the measure of one angle of a right triangle is 30° more than the measure of the smallest angle, then the measure of the smallest angle is:
   (a) 90°
   (b) 60°
   (c) 30°
   (d) 75°

2. How many of the following numbers are divisible by 3 but NOT by 9?
   5826, 5964, 6039, 6336, 6489, 6564, 6867 and 6960.
   (a) 5
   (b) 3
   (c) 4
   (d) 6

3. The distribution of monthly expenditure of Ramesh on various items is shown in the following pie chart.
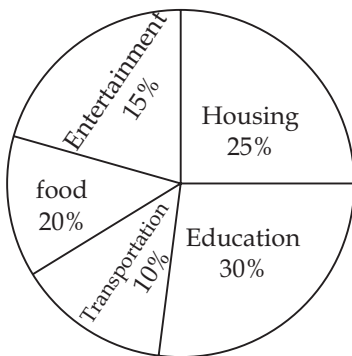
   If the monthly income of Ramesh is ₹ 45,000, then find his total monthly expenditure (in ₹) on housing and transportation.
   (a) 16,800
   (b) 15,750
   (c) 11,250
   (d) 13,500

4. The sum of the cubes of two given natural numbers is 9728, while the sum of the two given numbers is 32. What is the positive difference between the cubes of the two given numbers?
   (a) 6272
   (b) 5832
   (c) 4662
   (d) 7904

5. A circular are whose radius is 4 cm makes an angle 45° at the centre. Find the perimeter of the sector formed.
   $\left(\text{Use } \pi = \dfrac{22}{7} \right)$
   (a) $\dfrac{78}{7}$ cm
   (b) $\dfrac{72}{7}$ cm
   (c) $\dfrac{74}{7}$ cm
   (d) $\dfrac{76}{7}$ cm

6. Which number among 11368, 11638, 11863 and 12638 is divisible by 11?
   (a) 11368
   (b) 12638
   (c) 11638
   (d) 11863

7. The curved surface area of a right circular cylinder of height 56 cm is 1408 cm². Find the diameter of the base of the cylinder.
   (a) 8m
   (b) 0.04m
   (c) 0.08m
   (d) 0.008m

8. Select the correct statement about the properties of a triangle.
   (a) The sum of two sides may be equal to the third side
   (b) The sum of two sides is always equal to the third side
   (c) The sum of two sides is always greater than the third side
   (d) The sum of two sides is always less than the third side

9. Sara can finish a work in 18 days and Tara can complete the same work in 15 days. Tara worked for 10 days and left the job. In how many days can Sara finish the remaining work alone?
   (a) 6
   (b) 7
   (c) 8
   (d) 5

10. If $\left(x + \dfrac{1}{x} \right) = 6$, and x > 1, find the value of $\left(x^2 - \dfrac{1}{x^2} \right)$
    (a) $18\sqrt{2}$
    (b) $30\sqrt{2}$
    (c) $24\sqrt{2}$
    (d) $12\sqrt{10}$

11. The third proportional to 7 and 63 is:
    (a) 576
    (b) 567
    (c) 441
    (d) 625

12. 40 men can complete a work in 30 days. However, if 10 men leave the group, how many days will the group take to complete the work?
    (a) 40
    (b) 35
    (c) 45
    (d) 50

13. If the cost price of 28 oranges is equal to selling price of 24 oranges, then the profit percentage is:
    (a) $16\dfrac{2}{3}\%$
    (b) $16\dfrac{1}{3}\%$
    (c) $18\dfrac{2}{3}\%$
    (d) $18\dfrac{1}{3}\%$

14. A 252 m long train is running at a speed of 125 km/h. What is the time (in seconds) in which it will pass a man who starts from the engine running at the speed of 17 km/h in the same direction as that of the train?
    (a) 7.6
    (b) 8
    (c) 8.4
    (d) 6.4

15. If $\tan^4 \theta + \tan^2 \theta = 1$, what is the value of $11 (\cos^4 \theta + \cos^2 \theta)$
    (a) – 11
    (b) 8
    (c) 0
    (d) 11

16. Evaluate the following:
    $$\sqrt{2 + \sqrt{2 + \sqrt{2 + 2\cos 8\theta}}}$$
    (a) $2\cos \theta$
    (b) $2\cos 2\theta$
    (c) $\sin 2\theta$
    (d) $\cos 2\theta$

17. Simplify the following expression.
    $$\dfrac{7.35 \times 7.35 - 2.25 \times 2.25}{0.24}$$
    (a) 204
    (b) 320
    (c) 225
    (d) 304

18. Avinash's monthly salary is ₹50,000 and his monthly expenditure is ₹18,000. Radha's monthly salary is ₹60,000 and her monthly expenditure is ₹24,000. Find the ratio of Radha's savings to Avinash's saving's
    (a) 9 : 8
    (b) 9 : 7
    (c) 6 : 5
    (d) 8 : 7

19. A can finish a job in 8 hours and B can finish the same job in 12 hours independently. If they work simultaneously, in how many hours can they do the same job?
    (a) 4.8
    (b) 3.7
    (c) 4.5
    (d) 3.2

20. The following pie charts show the data of the number of appeared and passed students of class 12 in sections, A, B, C, D and E.
    Appeared students = 1800
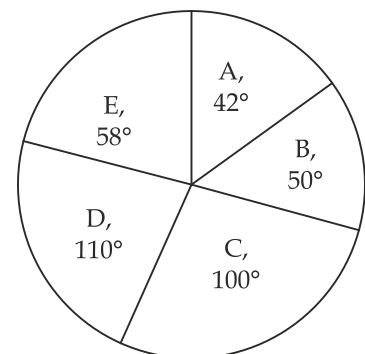
1. The simple interest on an amount for 6 years at 4% p.a. is ₹ 7,500 less than the simple interest on the same amount for 11 years. Find the amount
   - (a) ₹ 38,000
   - (b) ₹ 37,500
   - (c) ₹ 37,000
   - (d) ₹ 38,500

2. A laptop is sold for ₹ 54,000 after giving a discount of 20%. What is the list price (in ₹) of the laptop?
   - (a) 69,500
   - (b) 67,500
   - (c) 70,000
   - (d) 64,800

3. If $x^2 - \dfrac{1}{x^2} = 4\sqrt{2}$, what is the value of $x^4 - \dfrac{1}{x^4}$?
   - (a) $16\sqrt{2}$
   - (b) $8\sqrt{2}$
   - (c) $24\sqrt{2}$
   - (d) $32\sqrt{2}$

4. P, Q and R can complete a piece of work in 9, 12 and 18 days, respectively. Working together, how much work can they complete in one day?
   - (a) $\dfrac{2}{3}$
   - (b) $\dfrac{1}{2}$
   - (c) $\dfrac{1}{3}$
   - (d) $\dfrac{1}{4}$

5. Ram and Ramesh can do a work in 12 days, Ramesh and Somesh in 15 days and Somesh and Ram in 10 days. If Ram, Ramesh and Somesh work together, in how many days will they complete the work?
   - (a) 10
   - (b) 8
   - (c) 12
   - (d) 6

6. A certain distance is covered by a person at a certain speed. If another person covers 25% of the distance in triple the time, the ratio of the speed of the first person to that of the second person is:
   - (a) 1 : 6
   - (b) 1 : 12
   - (c) 6 : 1
   - (d) 12 : 1

7. A dishonest dealer sells articles at 15% loss on cost price but uses the weight of 20 g instead of 25 g. What is his profit or loss percentage?
   - (a) 6.25% Profit
   - (b) 6.50% Profit
   - (c) 7.55% Loss
   - (d) 5.25% Loss

8. If in acute angled triangle ABC, AL, BM, and CN are the three altitudes of triangle ABC, then which of the following statements will be true?
   - (a) AL + BM + CN = AB + BC + CA
   - (b) AL + BM = AB + BC
   - (c) AL + BM + CN > AB + BC + CA
   - (d) AL + BM + CN < AB + BC + CA

9. Study the given pie-chart carefully and answer the following question. What amount (in ₹) of the fund is acquired by the school from internal sources?

   The entire fund that school gets from different sources is equal to ₹10 lakh
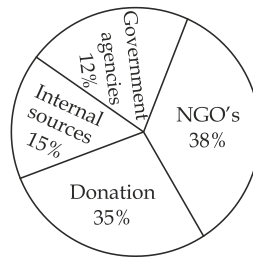
   Source of funds in School
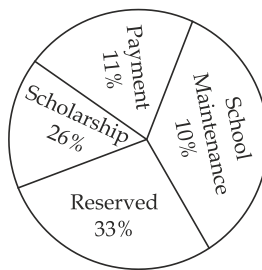
   Use of funds by school
   - (a) 1,45,000
   - (b) 1,50,000
   - (c) 1,32,000
   - (d) 1,60,000

10. If $3x = \sec A$ and $\dfrac{3}{x} = \tan A$ then $9\left(x^2 - \dfrac{1}{x^2}\right)$ is _____
    - (a) 3
    - (b) 9
    - (c) 1
    - (d) $\dfrac{1}{9}$

11. Angle subtended by the largest chord of the circle to a point on the same circle measures:
    - (a) < 90°
    - (b) 180°
    - (c) > 90°
    - (d) 90°

12. Simplify the given expression:
    $$\frac{[120 \times 120 \times 120 - 100 \times 100 \times 100]}{[120 \times 120 + 120 \times 100 + 100 \times 100]}$$
    - (a) 20
    - (b) 25
    - (c) 10
    - (d) 15

13. A, B and C can do a piece of work in 20, 30 and 60 days, respectively. In how many days can A do the work if he is assisted by both B and C on every third day?
    - (a) 10
    - (b) 15
    - (c) 12
    - (d) 18

14. Soham's initial expenditure and savings were in the ratio of 5 : 3. His income increases by 25%. If his initial savings were ₹ 4,500, find his income (in ₹) after the increment.
    - (a) 16,000
    - (b) 15,000
    - (c) 9,375
    - (d) 12,000

15. If $(a + b + c) = 14$. and $(a^3 + b^3 + c^3 - 3abc) = 98$, find the value of $(a^2 + b^2 + c^2)$.
    - (a) 70
    - (b) 64
    - (c) 68
    - (d) 72

16. ABC is a triangle and D is a point on the side BC. If BC = 16 cm, BD = 11 cm and $\angle ADC = \angle BAC$, then the length of AC is equal to:
    - (a) $4\sqrt{5}$ cm
    - (b) 4 cm
    - (c) $3\sqrt{5}$ cm
    - (d) 5 cm

17. A 6-digit number has digits as consecutive natural numbers. The number is always divisible by _____.
    - (a) 4
    - (b) 5
    - (c) 2
    - (d) 3

18. Benny can do a piece of work in 24 days. Chethan and David can do the same work individually in 36 and 48 days, respectively. All of them begin the work together. However, Benny leaves the work 4 days before the completion of work and Chethan leaves the work 10 days before the completion of the work. David worked till the end and completed the work. Find the number of days in which the work was completed.

1. The difference between the cubes of two given natural numbers is 6272, while the positive difference between the two given numbers is 8. What is the sum of the cubes of the two given numbers?
   - (a) 9728
   - (b) 9684
   - (c) 8000
   - (d) 9600

2. If the price of petrol is increased by 81%, by what percentage should the consumption of petrol be decreased by the consumer if the expenditure on petrol remains unchanged? (Correct to two decimal places)
   - (a) 40.45%
   - (b) 41.25%
   - (c) 43.12%
   - (d) 44.75%

3. If $2x + 3y = 16$ and $xy = 9$, then find $8x^3 + 27y^3$
   - (a) 1980
   - (b) 2980
   - (c) 1504
   - (d) 2189

4. In the following figure, O is the centre of the circle. Its two chords AB and CD intersect each other at point P inside the circle. If AB = 18 cm, PB = 6 cm and CP = 4 cm, then find the measure of PD.
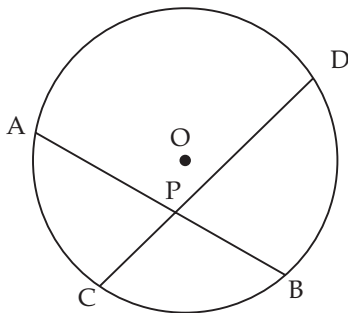
   - (a) 14 cm
   - (b) 18 cm
   - (c) 16 cm
   - (d) 20 cm

5. If $x + y = 25$ and $xy = 20$, then find the value of $x^3 + y^3$.
   - (a) 13152
   - (b) 13125
   - (c) 14125
   - (d) 14152

6. Sohan and Amit started a car race from the same point in the same direction and at the same time on a circular track of length 1125 m with speeds of 36 km/h and 54 km/h, respectively. After how much time (in seconds) will they meet for the first time since the start of the race?
   - (a) 220
   - (b) 215
   - (c) 210
   - (d) 225

7. Which of the following is the smallest 5-digits number that is exactly divisible by 526?
   - (a) 10520
   - (b) 11046
   - (c) 10516
   - (d) 10426

8. Two motorists start together to travel to a certain destination, one at the speed of 4 km/h and the other at the speed of 6 km/h. Find the distance travelled by them (in km) if the motorist travelling at 4 km/h arrives half an hour after the other motorist.
   - (a) 8
   - (b) 5
   - (c) 6
   - (d) 4

9. If $A + B = 90°$ and $\sin A = \dfrac{3}{5}$, then the value of tan B is _____.
   - (a) $\dfrac{4}{3}$
   - (b) $\dfrac{5}{4}$
   - (c) $\dfrac{3}{4}$
   - (d) $\dfrac{5}{3}$

10. Study the graph carefully.

    Wheat imports (in thousand tonnes)
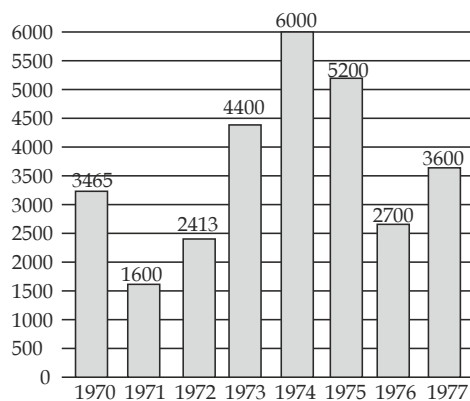
    The imports in 1974 were approximately how many times that of the years 1971?
    - (a) 3.75
    - (b) 3
    - (c) 2.5
    - (d) 3.5

11. The following data shows the number of boys and girls in class VII, class VIII, Class IX, and class X of a school. Study the data and answer the question.
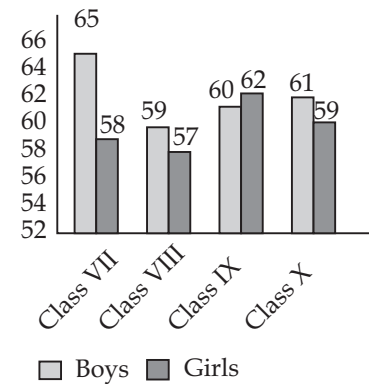
    ☐ Boys ■ Girls

    Which class has the maximum number of students.
    - (a) Class VII
    - (b) Class IX
    - (c) Class X
    - (d) Class VIII

12. Ashok and Anil undertake to do a piece of work for ₹ 4,500. Ashok alone could do the work in the 8 days and Anil in 12 days. With the assistance of Amar, they finished the work in 4 days. What is the share of Amar?
    - (a) ₹ 1,500
    - (b) ₹ 750
    - (c) ₹ 2,250
    - (d) ₹ 2,500

13. In the figure, AB = AD = 9 cm and AC = AE = 13 cm and BC = 15 cm. Find ED?
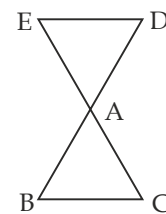
    - (a) 18 cm
    - (b) 16 cm
    - (c) 14 cm
    - (d) 15 cm

14. Given $\theta_1 + \theta_2 = \dfrac{\pi}{2}$ an $\sin \theta_1 = \dfrac{1}{2}$, find the value of θ_2.
    - (a) $\dfrac{\pi}{4}$
    - (b) $\dfrac{\pi}{2}$
    - (c) $\dfrac{\pi}{3}$
    - (d) π

15. Find the simple interest on ₹ 27000 at $14\dfrac{2}{3}\%$ per annum for 8 months.
    - (a) ₹ 2,600
    - (b) ₹ 2,630
    - (c) ₹ 2,610
    - (d) ₹ 2,640

1. In 1 km linear race, P beats Q by 120 metres or 30 sec. What is the time taken by P to cover the race?
   (a) 220 sec
   (b) 250 sec
   (c) 235 sec
   (d) 240 sec

2. Find the value of the given expression $14 \div 7 \times 1 + 3 - [18 - \{15 - (7 - 7 - 2)\}]$
   (a) 5
   (b) 6
   (c) 4
   (d) 3

3. Triangle ABC is circumscribed around circle D. Segments AQ, BR and SC measure 13, 10.5 and 6 cm, respectively. The perimeter of triangle ABC is:
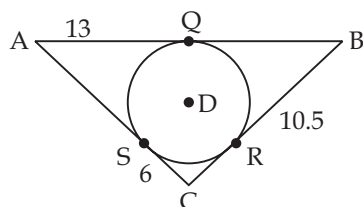
   (a) 29.5 cm
   (b) 59 cm
   (c) 108 cm
   (d) 15 cm

4. Study the graph carefully.

   Wheat imports (in thousand tonnes)
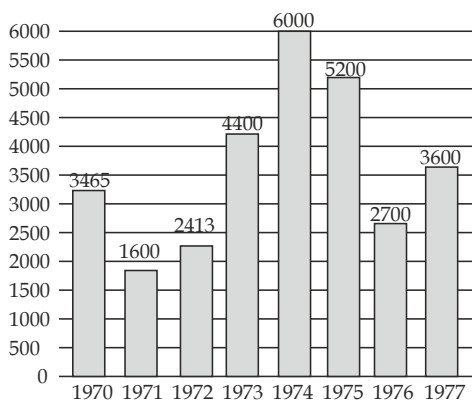
   The decrease in imports in 1976 was what percent of the imports in 1975?
   (a) 48.07%
   (b) 49%
   (c) 48%
   (d) 50%

5. $(a + b + c) = 14$, and $(a^3 + b^3 + c^3 - 3abc) = 98$, find the value of $(ab + bc + ca)$.
   (a) 60
   (b) 64
   (c) 65
   (d) 63

6. If A = 22.5°, what is the value of $(10\sqrt{2}\sin 2A - 7\sqrt{2}\cos 2A + 9\tan 2A)$?
   (a) 12
   (b) 15
   (c) 10
   (d) 6

7. The sum of the cubes of two given natural numbers is 9728, while the sum of the two given numbers is 32. What is the product of the two given numbers?
   (a) 160
   (b) 320
   (c) 240
   (d) 200

8. The force (in pound-force) needed to keep a car from skidding on a curve varies directly with the weight of the car (in pounds) and the square of its speed (in miles per hour [mph]) and inversely with the radius (in feet) of the curve. Suppose 6125 poundforce is required to keep a 2750 pound car, travelling at a speed of 35 mph, from skidding on a curve of radius 550 feet. How much pound-force is then required to keep a 3600 pound car, travelling at a speed of 50 mph, from skidding on a curve of radius 750 feet?
   (a) 11960
   (b) 12150
   (c) 12240
   (d) 12000

9. In the figure, PT is a tangent. If TP = 12 cm, PB = x + 7 cm and PA = x cm, then find the value of x.
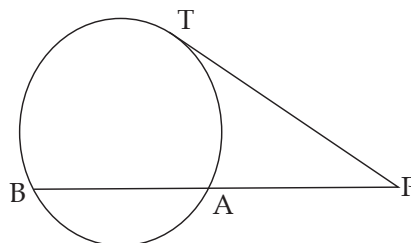
   (a) 9
   (b) 6
   (c) 7
   (d) 5

10. Study the given table and answer the question that follows. The tables shows the marks distribution among the student in a class.

Marks	No of Students
Less than 10	2
Less than 20	5
Less than 30	6
Less than 40	8
Less than 50	10

   How many students scored more than 40 marls?
   (a) 2
   (b) 4
   (c) 5
   (d) 3

11. A sum of money at simple interest amounts to ₹ 1,200 in 3 years and to ₹ 1,350 in 4 years. The sum is:
    (a) ₹ 650
    (b) ₹ 850
    (c) ₹ 450
    (d) ₹ 750

12. What smallest positive number should be subtracted from 2 and 3 so that 4 is the third proportion to them?
    (a) 1
    (b) 2
    (c) 4
    (d) 3

13. Find the value of x in the given figure TP (tangent on point T) = 15 cm, PB = 2x + 3 cm, PA = 9 cm.
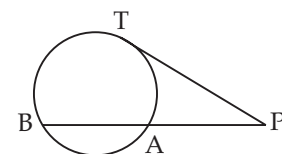
    (a) 21 cm
    (b) 18 cm
    (c) 15 cm
    (d) 11 cm

14. Ram bought a cell phone and paid 30% less than its original price. He sold it at 50% profit on the price he had paid. The percentage of profit earned by Ram on the original price was:
    (a) 25%
    (b) 50%
    (c) 15%
    (d) 5%

15. In an examination of 7 papers of 100 marks each, there were 3 Mathematics papers, 2 English papers and 2 Hindi papers. D gets average marks of 45, 55 and 60 in mathematics, English and Hindi, respectively. What are the average marks per paper?

1. If a 7-storey building has a 28 m long shadow, the number of storeys of the building whose shadow is 48 m long is:
   (a) 14
   (b) 24
   (c) 16
   (d) 12

2. 10 women take 16 days to complete a work which can be completed by 6 men in 8 days. 12 men started working and after 2 days 6 men left, and 5 women joined them. In how many days will the work be completed?
   (a) $\dfrac{3}{2}$
   (b) $\dfrac{16}{5}$
   (c) $\dfrac{5}{2}$
   (d) $\dfrac{26}{5}$

3. What is the present worth of ₹1,100 due in 2 years at 5% simple interest per annum?
   (a) ₹3,000
   (b) ₹2,000
   (c) ₹1,000
   (d) ₹1,500

4. If $\cos x + \sec x = \dfrac{7}{2\sqrt{3}}$, then the value of $\cos^2 x + \sec^2 x$ will be _____.
   (a) $\dfrac{15}{12}$
   (b) $\dfrac{10}{12}$
   (c) $\dfrac{25}{10}$
   (d) $\dfrac{25}{12}$

5. Find the value of $\dfrac{\cos^2 15° - \sin^2 15°}{\cos^2 145° + \sin^2 145°}$
   (a) $\dfrac{1}{\sqrt{3}}$
   (b) $\dfrac{1}{1-\sqrt{3}}$
   (c) $\dfrac{\sqrt{3}}{2}$
   (d) $\dfrac{2}{\sqrt{3}}$

6. Find the area of an equilateral triangle whose sides are 16 cm each.
   (a) $60\sqrt{3}$ cm^2
   (b) $62\sqrt{3}$ cm^2
   (c) $64\sqrt{3}$ cm^2
   (d) $66\sqrt{3}$ cm^2

7. When a number is divided by 45, the remainder is 21. What will be the remainder when the number is divided by 15?
   (a) 6
   (b) 5
   (c) 3
   (d) 0

8. If $\tan A = \dfrac{3}{8}$, then the value of $\dfrac{3\sin A + 2\cos A}{3\sin A - 2\cos A}$ is:
   (a) $-\dfrac{13}{25}$
   (b) $-\dfrac{25}{7}$
   (c) $\dfrac{25}{8}$
   (d) $\dfrac{13}{21}$

9. Rajdhani Express train of length 108 m is running at the speed of 128 km/h. Another train of length 148 m is standing at the station. In what time will the Rajdhani Express cross the other train?
   (a) 8 seconds
   (b) 7.5 seconds
   (c) 9 seconds
   (d) 7.2 seconds

10. The value of $\dfrac{2}{3} - \dfrac{5}{6} \times \dfrac{4}{5} \div \dfrac{4}{3} + \dfrac{1}{2}$ is:
    (a) $\dfrac{2}{3}$
    (b) $\dfrac{2}{5}$
    (c) $-\dfrac{11}{60}$
    (d) 0

11. $\tan 4384° + \cot 6814° = ?$
    (a) −1
    (b) 2
    (c) 0
    (d) 1

12. The marked price of an article is 40% above its cost price. If its selling price is $73\dfrac{1}{2}\%$ of the marked price, then the percentage profit is:
    (a) 2.9%
    (b) 2.7%
    (c) 2.6%
    (d) 2.5%

13. The following graph shows the number of illiterates in different states of a country in the year 2021.

    Total illiterates in 4 states = 4,50,000

    Number of illiterates in different states in 2014

    What is the percentage of the total number of illiterates in A, B and C to the illiterates in D in 2021?
    (a) 126.78%
    (b) 127.27%
    (c) 150.57%
    (d) 110.24%

14. In a triangle ABC, the three angles are x, y and y + 10. Also, 2x − 4y = 20°. Which type of triangle is ABC?
    (a) Equilateral
    (b) Obtuse
    (c) Acute
    (d) Right-angled

15. X, Y and Z can complete a work in 5 days, 15 days and 30 days, respectively. In how days can the work be completed if X is assisted by Y and Z together, on every second day?
    (a) 5 days
    (b) 4 days
    (c) 7 days
    (d) 6 days

16. Sita sold a whiteboard marker set at 10% profit. On selling it for ₹ 20 more, she would have earned a profit of 15%. What is the cost price of the whiteboard marker set?
    (a) ₹ 300
    (b) ₹ 350
    (c) ₹ 450
    (d) ₹ 400

17. Abraham can complete a work in 9 days, while Andrew can complete the same work in 6 days. In how many days can they complete the work if they work together?
    (a) 2
    (b) $3\dfrac{3}{5}$
    (c) $2\dfrac{3}{5}$
    (d) 3

18. A cyclist rides 20 km in 120 minutes and rides another 25 km in 150 minutes. What is the average speed of the cyclist, in km/h?
    (a) 15
    (b) 11
    (c) 10
    (d) 12.5

19. If $\left(x + \dfrac{1}{x}\right) = \sqrt{6}$, and x > 1, what is the value of $\left(x^8 - \dfrac{1}{x^8}\right)$?
    (a) $120\sqrt{3}$
    (b) $128\sqrt{3}$
    (c) $112\sqrt{3}$
    (d) $108\sqrt{3}$

20. A father gives 8% of his monthly income to both his sons as pocket money. The elder son gets 85% of the total amount given to both the sons. He spend 90% of the amount and saves ₹ 17. What is the monthly income of father?
    (a) ₹ 5000
    (b) ₹ 4500
    (c) ₹ 3500
    (d) ₹ 2500

1. The ratio of the number of boys in a school to the total number of boys and girls in that school is 7 : 17. If the number of boys in that school is 1099, then how many girls are there in that school?
   (a) 1570 (b) 1580
   (c) 1560 (d) 1550

2. For congruent triangles ∆ABC and ∆DEF, which of the following statements is correct
   (a) Perimeter of ∆ABC
      $= \dfrac{1}{2}$ × Perimeter of ∆DEF
   (b) Perimeter of ∆ABC = Perimeter of ∆DEF
   (c) Perimeter of ∆ABC < Perimeter of ∆DEF
   (d) Perimeter of ∆ABC > Perimeter of ∆DEF

3. Ram and Shyam are racing along a circular track. The speed of Ram is thrice the speed of Shyam. The length of the circular track is 1440 m. After the start of the race from the same point simultaneously, Ram meets Shyam for the first time at the end of the 8th minute. If Ram and Shyam start the race again from the same starting point simultaneously, then the time taken by Shyam to finish the race is: (given that the length of the race is same as the length of the track
   (a) 7.5 min (b) 16 min
   (c) 30 min (d) 22.5 min

4. Pipe A and pipe B running together can fill a cistern in 6 minutes. If B takes 5 minutes more than A to fill it, then the time in which A and B will fill that cistern separately will be, respectively _____.
   (a) 15 min and 10 min
   (b) 15 min and 20 min
   (c) 25 min and 20 min
   (d) 10 min and 15 min

5. If $(a^3 + b^3 + c^3 – 3abc) = 405$, and $(a – b)^2 + (b – c)^2 + (c – a)^2 = 54$, find the value of $(a + b + c)$.
   (a) 15 (b) 45
   (c) 9 (d) 27

6. What is the surface area (in cm^2) of a spherical sculpture whose radius is 35 cm? $\left(\text{Use } \pi = \dfrac{22}{7} \right)$
   (a) 16540 (b) 15700
   (c) 15400 (d) 14500

7. Pipe A can fill 50% of the tank in 6 hours and pipe B can completely fill the same tank in 18 hours. If both the pipes are opened at the same time, in how much time (in minutes) will the empty tank be completely filled?
   (a) 420 (b) 425
   (c) 432 (d) 435

8. A 9-digit number 846523X7Y is divisible by 9, and Y – X = 6. Find the value of $\sqrt{2X + 4Y}$.
   (a) 4 (b) 2
   (c) 6 (d) 8

9. ∆ABC is a right triangle. If ∠B = 90º and $\tan A = \dfrac{1}{\sqrt{3}}$, then the value of sin A cos C + cos A sin C is:
   (a) 1 (b) 2
   (c) $\dfrac{2}{3}$ (d) $\dfrac{1}{3}$

10. A policeman spots a thief at a distance of 360 m. Both the policeman and the thief simultaneously start running, with the former chasing the latter. While the thief runs at the speed of 8 km/h, the policeman runs at 9.2 km/h. How many metres will the policeman have to run before he catches up with the thief?
    (a) 2852 (b) 2714
    (c) 2668 (d) 2760

11. Which of the following will yield maximum discount on ₹ 7,500?
    1. Two successive discounts of 5% and 5%
    2. Single discount of 10%
    3. Two successive discounts of 8% and 2%
    (a) 2 (b) 1
    (c) All will yield the same discount
    (d) 3

12. Study the given table and answer the question that follows. The table gives the number of graduate students enrolled in 4 different colleges A, B, C, and D in a city over the years 2010 to 2014 and also the number of students who passed in the final examination during these years.

Year	College	A	B	C	D
2010	Errolled	680	550	480	710
2010	Pass	620	530	450	650
2011	Errolled	600	450	520	750
2011	Pass	560	420	500	710
2012	Errolled	720	600	580	680
2012	Pass	700	550	550	640
2013	Errolled	800	650	620	720
2013	Pass	760	620	600	690
2014	Errolled	750	700	720	740
2014	Pass	700	680	700	710

Find the percentage of students who passed from college B for all the years put together to the number of students from college B during all the years (rounded to 2 decimals).
   (a) 94.92% (b) 94.98%
   (c) 94.95% (d) 94.96%

13. If (a + b + c) = 13, and (ab + bc + ca) = 54, find the value of $(a^2 + b^2 + c^2)$.
    (a) 63 (b) 65
    (c) 61 (d) 59

14. If $\dfrac{21\cos A + 3\sin A}{3\cos A + 4\sin A} = 2$, then find the value of cot A.
    (a) $\dfrac{9}{11}$ (b) $\dfrac{11}{9}$
    (c) $\dfrac{1}{3}$ (d) $\dfrac{11}{10}$

1. A vessel is filled with liquid, 5 parts of which are water and 11 parts syrup. What part of the mixture must be drawn off and replaced with water so that the mixture may be syrup and water in the ratio 3 : 2?

   (a) $\dfrac{14}{45}$ (b) $\dfrac{27}{35}$

   (c) $\dfrac{36}{65}$ (d) $\dfrac{7}{55}$

2. There are two circles that touch each other externally. Radius of the first circle with centre O is 12 cm. Radius of the second circle with centre A is 8 cm. Find the length of their common tangent BC.

   (a) $6\sqrt{6}$ cm   (b) $8\sqrt{3}$ cm

   (c) $8\sqrt{2}$ cm   (d) $8\sqrt{6}$ cm

3. If △ABC, DE || BC and $\dfrac{AD}{DB} = \dfrac{4}{5}$. If DE = 12 cm, find the length of BC.

   (a) 48 cm   (b) 12 cm
   (c) 30 cm   (d) 27 cm

4. If $x^2 - 8x - 1 = 0$, what is the value of

   $x^2 + \dfrac{1}{x^2}$?

   (a) 68   (b) 62
   (c) 64   (d) 66

5. In the given figure, O is the centre of the circle and ∠AOB = 130°. Find ∠APB.
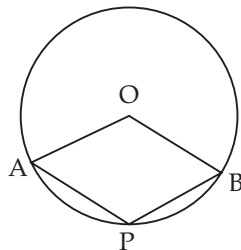
   (a) 110°   (b) 115°
   (c) 100°   (d) 95°

6. A four-digits number abba is divisible by 4 and a < b. How many such numbers are there?
   (a) 10   (b) 8
   (c) 12   (d) 6

7. If $\left(x^2 + \dfrac{1}{x^2} \right) = 6$, and 0 < x < 1, what

   is the value of $x^4 - \dfrac{1}{x^4}$?

   (a) $24\sqrt{2}$ (b) $-24\sqrt{2}$
   (c) $-12\sqrt{10}$ (d) $12\sqrt{10}$

8. A boat goes 20 km upstream and 44 km downstream in 8 hours. In 5 hours, it goes 15 km upstream and 22 km downstream. Determine the speed of the boat in still water
   (a) 6 km/h   (b) 10 km/h
   (c) 8 km/h   (d) 7 km/h

9. 4 men's work is equal to 6 women's work, and 4 women's work is equal to 6 boys' work. A boy can finish the work in 60 days. In how many days can the work be finished by a man and a woman together?
   (a) 16   (b) 24
   (c) 20   (d) 12

10. A policeman saw a thief at a distance of 400 m. The thief started running at a speed of 10 km/h and the policeman chased him at a speed of 12 km/h in the same direction. At what distance from the starting point will the policeman catch the thief?
    (a) 2.4 km   (b) 3 km
    (c) 2 km   (d) 2.8 km

11. A group of men decided to do a job in 11 days but 16 men left the work after each day. The work, as a result, got completed in 15 days. How many men were there initially in the group?
    (a) 400   (b) 480
    (c) 420   (d) 450

12. If cos A + cos² A = 1, then the value of $\sin^4 A + \sin^6 A$ is:
    (a) 2   (b) cos A
    (c) 1   (d) sin A

13. Which of the following sets of lengths (in cm) will give three sides of an obtuse-angled triangle?
    (a) 15, 62, 64   (b) 17, 64, 66
    (c) 16, 63, 65   (d) 18, 65, 67

14. If the slant height of a cone is 60 cm and the radius of its base is 21 cm, then find its curved surface area. $\left(\text{Use } \pi = \dfrac{22}{7} \right)$
    (a) 3880 cm²   (b) 3820 cm²
    (c) 3960 cm²   (d) 4020 cm²

15. Find the value of the given expression.
    1755 ÷ 39 × (8 − 28 ÷ 4) − 2
    (a) − 315   (b) − 45
    (c) 270   (d) 43

16. The following bar chart shows the trends of foreign direct investment (FDI) into India from all over the world.

    India's FDI (in millions of Euros)
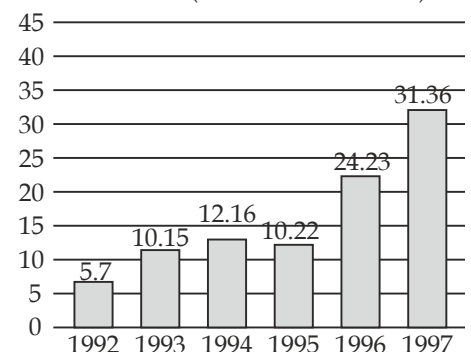
    What was the average of India's FDI over the years 1992-1995 (rounded off to the nearest integer)?
    (a) 7   (b) 8
    (c) 10   (d) 9

17. The value of cosec 30° − cos 60° is:

    (a) 1   (b) $\dfrac{1}{2}$

    (c) $\dfrac{3}{2}$ (d) $\dfrac{2\sqrt{2}-1}{\sqrt{2}}$

18. A thief steals an item and escapes, running at 20 km/h. A policeman arrives at the spot of the crime after 6 minutes and immediately starts chasing the thief. 24 minutes after the policeman started to chase the thief, there is still a gap of 400 m between the two. At what distance from the spot of crime would the policeman catch up with the thief, and what is the speed at which the policeman ran?

1. The length of the longest diagonal of a cube is $7\sqrt{3}$ cm. Find its volume (in cm?).
   (a) $343\sqrt{3}$
   (b) $49\sqrt{3}$
   (c) 334
   (d) 343

2. The mean proportional of $(a + b)(a – b)^3$, $(a + b)^3 (a – b)$ is:
   (a) $(a + b)^2 (a – b)^2$
   (b) $(a + b)^2 (a – b)$
   (c) $(a + b)(a – b)^2$
   (d) $a^2 – b^2$

3. A group of college students had decided to complete a project in 10 days. As 2 students dropped out every day, the project got completed at the end of the 15th day. The number of students at the beginning of the project was:
   (a) 42
   (b) 40
   (c) 35
   (d) 45

4. 4 men, working together, can finish a work in 18 days. How many more men are required to finish the same work in 12 days?
   (a) 4
   (b) 3
   (c) 2
   (d) 6

5. If cos (40° + x) = sin 30°, then the value of x is:
   (a) 22°
   (b) 20°
   (c) 19°
   (d) 23°

6. Having started from the same point and at the same time, two runners – P and Q – are running around a circular track of length 500 m in opposite directions with the speeds of 6 m/s and 10 m/s, respectively. If they exchange their speeds after meeting for the first time, who will reach the starting point first?
   (a) Q
   (b) P
   (c) Both P and Q will reach at the same time
   (d) No one of the P and Q

7. A cuboid with sides 4, 6 and 8 units is covered with paper. The paper is removed and a square is made from it. What is the side (in units) of the square?

   (a) 12.24
   (b) 16.62
   (c) 14.42
   (d) 12.62

8. S deposits a total of ₹50,000 in two accounts which give 8% and 12% simple interest annually, respectively. After one year, he gets a total ₹5,200. How much money does he deposit in the account with a 12% interest rate?
   (a) ₹30,000
   (b) ₹32,000
   (c) ₹20,000
   (d) ₹25,000

9. Study the given table and answer the question that follows.

   The table represents the expenditure of a company (in thousand rupees) per annum over the given year.

Year	Expenditure			
	Salary	Transport	Interest	Tax
2018	200	90	3	80
2019	250	100	2.5	100
2020	300	120	3	70
2021	350	130	3.5	80

   What is the average amount of salary per year, which the company has to pay during these four years?
   (a) ₹2,80,000
   (b) ₹3,00,000
   (c) ₹2,00,000
   (d) ₹2,75,000

10. Tarun owned a plot of land having an area that was 10% more than the area of the plot owned by Basab, while the area of the plot of land owned by Nakul was 40% more than the area of the plot owned by Tarun. If the area of the plot owned by Nakul was 2695 square feet, what was the area (in square feet) of the plot owned by Basab?
    (a) 1750
    (b) 1740
    (c) 1780
    (d) 1800

11. Simplify the expression

    $$\frac{s^2 + t^2 + 2st - u^2}{s^2 - t^2 - 2tu - u^2},$$

    provided (s + t + u) ≠ 0

    (a) $\frac{s+t-u}{s-t-u}$
    (b) $\frac{s+t+u}{s-t+u}$
    (c) $\frac{s-t-u}{s+t-u}$
    (d) $\frac{s-t+u}{s+t+u}$

12. Find $\left(\dfrac{1}{\sin\theta}\right) - \sin\theta$.
    (a) cos θ cot θ
    (b) cos θ sec θ
    (c) cos θ cosec θ
    (d) cos θ tan θ

13. A shopkeeper purchased 1600 mangos at the rate of ₹120 per dozen. Out of these, he sold 900 mangoes at ₹15 per mango and the remaining mangoes at ₹14 per mango. His gain percentage is:
    (a) 45.625%
    (b) 38.265%
    (c) 35.625%
    (d) 48.765%

14. A thief steals an item and escapes, running at a speed of 15 km/h. A policeman arrives at the spot of the crime after 4 minutes and immediately starts chasing the thief. 16 minutes after the policeman started to chase the thief; there is still a gap of 200 m between the two. At what distance from the spot of the crime will the policeman catch up the thief and what is the speed (in km/h) of the policeman?
    (a) 5.5 km; 16.5
    (b) 6 km; 18
    (c) 6.5 km; 19.5
    (d) 5 km; 15

15. In the following figure, the circles with centres B and D have radii 4 cm and x cm, respectively. AC is a tangent to both the circles. Find the value of x.
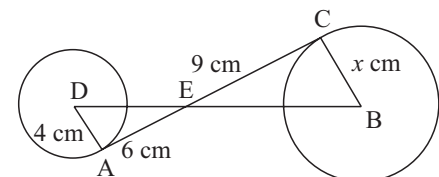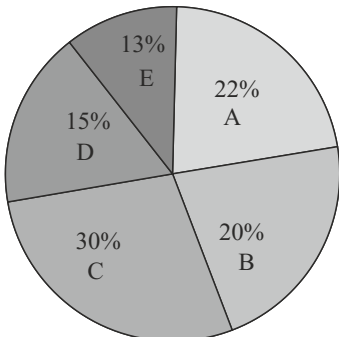
    (a) 6
    (b) 3
    (c) 7
    (d) 5

16. In the figure given below; PQ is the diameter of the circle with centre O. If ∠QOR = 100° then the measure of ∠PSR is :

1. The cube of the sum of two given numbers is 1728, while the product of the two given numbers is 32. Find the positive difference between the cubes of the two given numbers.
   - (a) 448
   - (b) 576
   - (c) 480
   - (d) 512

2. Simplify the following expression.
   $$\frac{x^2 - 2x - 63}{x^2 + 14x + 49}$$
   - (a) $\dfrac{x+9}{x+7}$
   - (b) $\dfrac{x-7}{x+7}$
   - (c) $\dfrac{x+7}{x-7}$
   - (d) $\dfrac{x-9}{x+7}$

3. The value of $\sqrt{\dfrac{1+\cos\theta}{1-\cos\theta}}$ is :
   - (a) $\sec\theta + \tan\theta$
   - (b) $\cosec\theta - \cot\theta$
   - (c) $\cosec\theta + \cot\theta$
   - (d) $\sec\theta - \tan\theta$

4. The pie chart below shows the distribution of female employees working in a company in five different districts (A, B, C, D and E).

   Total number of female employees in five districts = 136000

   Distribution of total number of female employees working in a company in five different districts

   What is the total number of female employees working in a company in district C and district D?
   - (a) 61200
   - (b) 62000
   - (c) 62290
   - (d) 61000

5. The difference between a discount of 40% and two successive discounts of 30% on a certain bill was ₹ 220. Find the amount of the bill (in ₹).
   - (a) 2200
   - (b) 1100
   - (c) 1000
   - (d) 2000

6. If $\left(y + \dfrac{1}{y}\right) = 4$, find the value of $\left(y^6 + \dfrac{1}{y^6}\right)$.
   - (a) 2702
   - (b) 2704
   - (c) 4096
   - (d) 2706

7. A is 50% more efficient than B. B worked to finish the same work in 20 days. If A and B worked together, then how much time will they take to finish the same work?
   - (a) 10 days
   - (b) 7 days
   - (c) 8 days
   - (d) 9 days

8. What is the area of the sector of a circle of radius 8 cm and formed by an arc of length 12 cm?
   - (a) 45 cm²
   - (b) 47 cm²
   - (c) 48 cm²
   - (d) 84 cm²

9. The cost price of an article is decreased by 10% and then increased by 20%. If the final price is ₹ 540, then the original cost price is:
   - (a) ₹ 500
   - (b) ₹ 650
   - (c) ₹ 550
   - (d) ₹ 600

10. The curved surface area of a solid circular cylinder of height 12 cm is 2640 cm². What is the volume of (in cm³) of the cylinder? $\left(\text{Take } \pi = \dfrac{22}{7}\right)$
    - (a) 46200
    - (b) 37900
    - (c) 42000
    - (d) 55200

11. $100 \div 10 - [-2 + \{-9 + (3 - 6 \text{ of } 2)\}] = $ _____.
    - (a) –6
    - (b) 20
    - (c) 30
    - (d) 0

12. The fourth proportional to 8, 32 and 13 is:
    - (a) 39
    - (b) 40
    - (c) 26
    - (d) 52

13. The rate of simple interest for which ₹ 9,000 will amount to ₹ 10,200 in 4 years is:
    - (a) $4\dfrac{2}{3}\%$
    - (b) $7\dfrac{1}{3}\%$
    - (c) $5\dfrac{1}{2}\%$
    - (d) $3\dfrac{1}{3}\%$

14. What is the remainder when $(x^{17} + 1)$ is divided by $(x + 1)$?
    - (a) x
    - (b) $x - 1$
    - (c) 0
    - (d) 1

15. A boat running upstream takes 10 hours to cover a certain distance, while it takes 7 hours to cover the same distance running downstream. What is the ratio between the speed of the boat and that of the water current, respectively?
    - (a) 17 : 5
    - (b) 3 : 17
    - (c) 2 : 17
    - (d) 17 : 3

16. Rice worth ₹35 per kilogram and ₹38 per kilogram are mixed with a third variety in the ratio 2 : 1 : 2. If the mixture is worth ₹42 per kilogram, the price of the third variety per kilogram is:
    - (a) ₹52
    - (b) ₹53
    - (c) ₹54
    - (d) ₹51

17. Two circles touch each other externally. The radius of the first circle with centre O is 6 cm. The radius of the second circle with centre P is 3 cm. Find the length of their common tangent AB.
    - (a) $3\sqrt{2}$ cm
    - (b) $4\sqrt{2}$ cm
    - (c) $6\sqrt{3}$ cm
    - (d) $6\sqrt{2}$ cm

18. What is the value of $5\sqrt{3} \cos 60° \tan 30° - 3 \cos 0° + 3 \cos^2 45° + 2 \sin^2 60°$?
    - (a) $2\sqrt{3}$
    - (b) 2.5
    - (c) 3.5
    - (d) $3\sqrt{2}$

19. The effective speed of a boat is 15.2 km/h against the stream and 20.8 km/h along the stream. Find the speed of the stream.
    - (a) 18 km/h
    - (b) 1.8 km/h
    - (c) 2.8 km/h
    - (d) 3 km/h

1. Find the value of tan (–1125°).

   (a) 1   (b) $\dfrac{1}{2}$

   (c) –1   (d) 0

2. The following pie charts show the data of the number of appeared and passed students of class 12 in sections A, B, C, D and E.

   Appeared students = 1800

   A, 42°; B, 50°; C, 100°; D, 110°; E, 58°
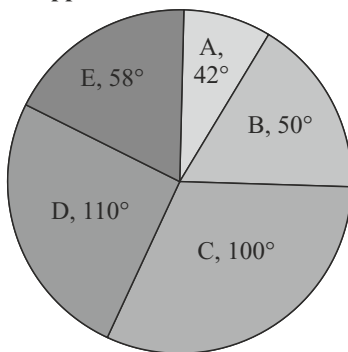
   Passed students = 800

   A, 20%; B, 30%; C, 25%; D, 15%; E, 10%
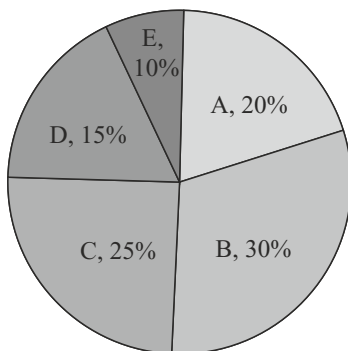
   Find the difference between the number of students who appeared for the exam in sections A and B.

   (a) 60   (b) 30

   (c) 50   (d) 40

3. $\sec\theta\sqrt{1-\sin^2\theta} = ?$

   (a) – 1   (b) 1

   (c) ∞   (d) 0

4. The angles of a triangle are in the ratio 2 : 3 : 7. What is the measure of the largest angle of the triangle?

   (a) 100°   (b) 45°

   (c) 90°   (d) 105°

5. P and Q together complete a job in $4\dfrac{2}{5}$ days. R and S complete the same job in $4\dfrac{8}{9}$ days. If P, Q, R and S work together, how many days do they need to complete the same job?

   (a) $2\dfrac{7}{18}$ (b) $1\dfrac{7}{18}$

   (c) $1\dfrac{6}{19}$ (d) $2\dfrac{6}{19}$

6. A can finish a work in 60 days. He works at it for 15 days and then B alone finishes the remaining work in 48 days. In how much time can A and B working together finish the work?

   (a) $\dfrac{960}{31}$ days   (b) $\dfrac{171}{37}$ days

   (c) 51 days   (d) 45 days

7. The value of which of the following is different from the other options?

   (a) sin 90°   (b) sec 60°

   (c) cos 0°   (d) tan 45°

8. A can complete $\dfrac{1}{3}$ of a work in 7 days and B can complete $\dfrac{2}{7}$ of the same work in 10 days. In how many days can both A and B together complete the work?

   (a) $12\dfrac{3}{8}$ (b) $11\dfrac{7}{8}$

   (c) $13\dfrac{1}{8}$ (d) $15\dfrac{1}{7}$

9. Ramesh, on his way to his hometown, travelled the first 250 km at a speed of 75km/h and the next 250 km at a speed of 85 km/h. Find the average speed for the whole journey(correct to 2 decimal places).

   (a) 80.55 km/h   (b) 79.69 km/h

   (c) 79.20 km/h   (d) 80.69 km/h

10. A can do $\dfrac{1}{3}$ of a piece of work in 32 days, B can do $37\dfrac{1}{2}\%$ of the same work in 24 days, while C can do 60%

   of the same work in 48 days. B and C together started and worked for x days. After x days, B left the work and A joined C and both completed the remaining work in (x + 8) days. If the ratio of the work done by (B + C) together to the work done by (A + C) together is 9 : 11, then what fraction of the same work can be completed by C alone in 3.5x days?

   (a) $\dfrac{18}{25}$ (b) $\dfrac{4}{5}$

   (c) $\dfrac{7}{10}$ (d) $\dfrac{3}{4}$

11. Which of the following numbers is divisible by 8?

    (a) 18718   (b) 18716

    (c) 18712   (d) 18714

12. The three sides of two triangles are 4, 5 and 6 cm. Select the INCORRECT statement.

    (a) The angle opposite to the greater side in those triangles will be greater.

    (b) The area of the two triangles will be different.

    (c) The two triangles are congruent.

    (d) The two triangles are scalene triangles.

13. If RP and RQ are two tangents to a circle with centre O such that ∠POQ = 120°, where P and Q are the points on the circle and R is a point outside the circle then ∠PRQ is equal to:

    (a) 90°   (b) 75°

    (c) 60°   (d) 45°

14. The length, breadth and height of a hall are 10 m, 20 m and 15m respectively. Find the cost of whitewashing the walls of the inside of the hall and ceiling at the rate of ₹10.20/m²

    (a) ₹ 13,394   (b) ₹ 11,220

    (c) ₹ 15,320   (d) ₹ 16,542

15. If $p + q + r = pqr = \dfrac{1}{p}+\dfrac{1}{q}+\dfrac{1}{r} = 1$, then find $p^3 + q^3 + r^3$.

    (a) 1   (b) –1

    (c) 5   (d) –5

1. The simple interest on a certain sum at the rate of 12.5% per annum for 6 years is ₹13,500 less than the principal. Find the simple interest.
   - (a) ₹13,500
   - (b) ₹54,000
   - (c) ₹40,000
   - (d) ₹40,500

2. Using cosec (a + b)
   $$= \frac{\sec\alpha \times \sec\beta \times \operatorname{cosec}\alpha \times \operatorname{cosec}\beta}{\sec\alpha \times \operatorname{cosec}\beta + \operatorname{cosec}\alpha \times \sec\beta},$$
   find the value of cosec 75°.
   - (a) $\dfrac{\sqrt{6}+\sqrt{2}}{4}$
   - (b) $\dfrac{\sqrt{6}-\sqrt{2}}{4}$
   - (c) $\sqrt{6}-\sqrt{2}$
   - (d) $\sqrt{6}+\sqrt{2}$

3. Ram has an average score of 65 runs in 19 innings in cricket matches. Find out how many runs are to be scored by him in the 20th innings to raise the average score to 67.
   - (a) 135
   - (b) 105
   - (c) 115
   - (d) 195

4. A metallic cube has each of its side of length 12 cm, it is melted and recast into three small cubes. Out of these cubes, two have their sides as 6 cm and 8 cm, respectively. The length of each side of the third cube is:
   - (a) 7 cm
   - (b) 9 cm
   - (c) 10 cm
   - (d) 5 cm

5. A policeman starts chasing a thief when he was already 600 m ahead. If the policeman is running at a speed of 9 km/h and the thief at 8 km/h, then the thief would be caught at a distance of:
   - (a) 6.5 km
   - (b) 6 km
   - (c) 5 km
   - (d) 5.4 km

6. A shopkeeper bought certain number of apples for ₹3,600. He sold one-fifth of them at a loss of 10%, one-fourth of the remaining apples at a loss of 5%, and two-third of the rest at a profit of 15%. At what price (in ₹) should he sell the remaining apples to earn a profit of 27% overall?
   - (a) 1,548
   - (b) 1,584
   - (c) 1,845
   - (d) 1,864

7. 4 men and 6 women can complete a work in 8 days, while 3 men and 7 women can complete it in 10 days. In how many days will 25 women complete it?
   - (a) 20
   - (b) 16
   - (c) 25
   - (d) 18

8. The following bar graph shows the sales of books (in thousands) from six branches of a publishing company during two consecutive years 2018 and 2019

   Sales of Books from Six Branches of Publishing Company
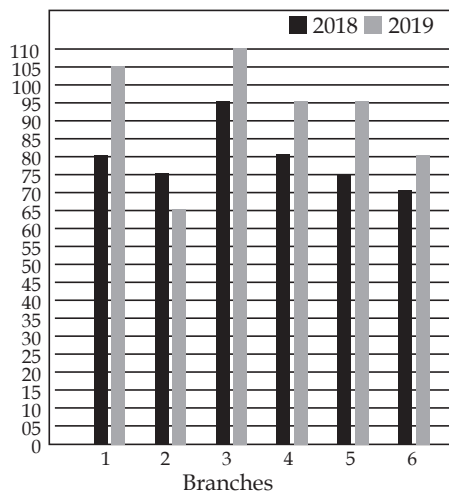
   Total sales of 6th branch for both the years is what percentage of the total sales of 3rd branch for both the years? (rounded off of two decimal places)
   - (a) 73.17%
   - (b) 65.29%
   - (c) 68.25%
   - (d) 62.23%

9. Find the remainder when 8^8 + 6 is divided by 7
   - (a) 0
   - (b) 2
   - (c) 3
   - (d) 1

10. What values of 'y' will satisfy the following equation?
    $$\frac{3y}{1+\dfrac{1}{1+\dfrac{y}{1-y}}} = 2$$
    - (a) $\dfrac{2}{3}$
    - (b) $\dfrac{5}{4}$
    - (c) $\dfrac{4}{5}$
    - (d) $\dfrac{3}{2}$

11. In a division sum, the divisor is 13 times the quotient and 6 times the remainder. If the remainder is 39, then the dividend is:
    - (a) 4240
    - (b) 4576
    - (c) 4251
    - (d) 4800

12. If tan α = 6, then sec α equals to:
    - (a) $\sqrt{7}$
    - (b) $\sqrt{5}$
    - (c) $\sqrt{37}$
    - (d) $\sqrt{35}$

13. Study the given graph carefully and answer the question that follows.

    Wheat imports (in thousand tonnes)
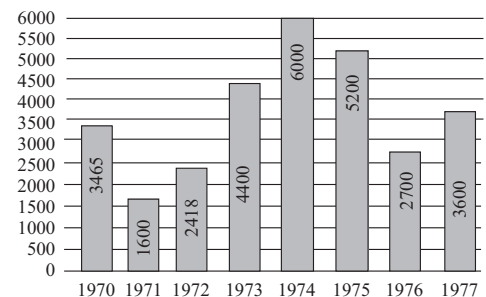
    The imports in 1977 were approximately how many times that of the year 1976?
    - (a) 1.11
    - (b) 1.22
    - (c) 1.33
    - (d) 1.44

14. In the following figure, there are two circles that touch each other externally. The radius of the first circle with centre P is 25 cm. The radius of the second circle with centre Q is 4 cm. Find the length of their direct common tangent AB.
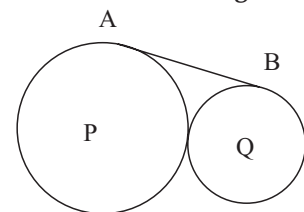
    Figure is not to scale and is only for representational purpose.
    - (a) 21 cm
    - (b) 18 cm
    - (c) 20 cm
    - (d) 22 cm

15. If $\left(y-\dfrac{1}{y}\right)=4,$ find the value of $\left(y^6+\dfrac{1}{y^6}\right).$
    - (a) 5774
    - (b) 4096
    - (c) 5776
    - (d) 5778

1. **6 labourers can finish a work in 16 days, 10 labourers are available, but the work is to be finished by 8 days. How many more labourers are to be called to finish the work in time?**
   (a) 2   (b) 0
   (c) 4   (d) 1

2. **R, S and T can finish a work in 20, 15 and 10 days, respectively, R works on all days and S and T work on alternate days with T starting the work on the first day. In how many days is the work finished?**
   (a) $\dfrac{61}{7}$ (b) $\dfrac{50}{7}$
   (c) $\dfrac{52}{7}$ (d) $\dfrac{57}{8}$

3. **The side of an equilateral triangle is 12 cm. What is the area (in cm², rounded off to 2 decimal places) of the triangle? Given: $\sqrt{3} = 1.732$**
   (a) 68.07   (b) 63.89
   (c) 62.35   (d) 65.23

4. **A dishonest shopkeeper sells mangoes at ₹30/kg bought at ₹20/kg and he is giving 800 g instead of 1 kg. The shopkeeper's actual profit percentage is :**
   (a) 75%   (b) 37.5%
   (c) 50%   (d) 87.5%

5. **Simplify:** $\dfrac{1}{2+2p} + \dfrac{1}{2+2q} + \dfrac{1}{2+2r}$,
   where $p = \dfrac{x}{y+z}$, **if** $q = \dfrac{y}{z+x}$ **and**
   $r = \dfrac{z}{x+y}$,
   (a) 1   (b) $x + y + z$
   (c) 2   (d) $\dfrac{1}{2}$

6. **A ball is to be made with inner radius of 2 units and outside radius of 3 units. How much material is required to make the ball?**
   (a) $\dfrac{19}{3}\pi$ (b) 19π
   (c) $\dfrac{76}{3}\pi$ (d) π

7. **4 men and 6 women can complete a work in 8 days, while 3 men and 7 women can complete it in 10 days. In how many days will 10 women complete it?**
   (a) 44   (b) 40
   (c) 15   (d) 16

8. **The given chart shows the marks scored by a class X student in different subjects.**

Class X Marks of a Student (Values are in Degrees)

   ☐ English - 60°
   ☐ Hindi - 62°
   ☐ Social Science - 72°
   ☐ Mathematics - 84°
   ☐ Science - 82°
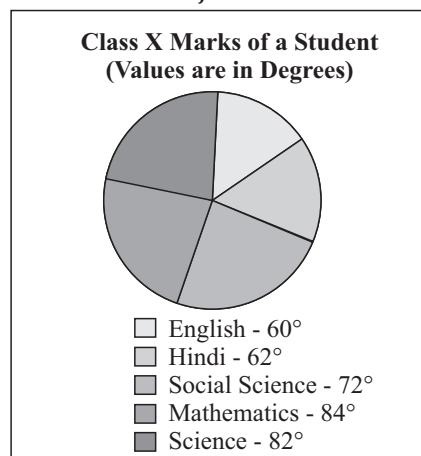
   If the total marks are 1800, then find the marks in social science.
   (a) 350   (b) 306
   (c) 360   (d) 72

9. **If $a\cot\theta = b$, then what will be the value of $\dfrac{b\cos\theta - a\sin\theta}{b\cos\theta + a\sin\theta}$?**
   (a) $\dfrac{b^2 + a^2}{b^2 - a^2}$ (b) $b^2 + a^2$
   (c) $\dfrac{b^2 - a^2}{b^2 + a^2}$ (d) 0

10. **The time required for a sum of money to amount to three times itself at 8% simple interest p.a. will be:**
    (a) 35 years   (b) 25 years
    (c) 30 years   (d) 20 years

11. **Simplify:**
    220 + 80 ÷ [63 – {7 × 8 + (13 – 2 × 4)}]]
    (a) 260   (b) 270
    (c) 240   (d) 250

12. **A boat covers a distance of 80 km downstream in 8 h while it takes 10 h to cover the same distance upstream. What is the speed (in km/h) of the boat in still water?**
    (a) 18   (b) 12
    (c) 9   (d) 16

13. **Simplify the given expression.**
    $\dfrac{1 + \sin^4\theta + \cos^4\theta}{\cos^2\theta + \sin^4\theta}$
    (a) 3   (b) 1
    (c) 2   (d) 4

14. **Dharmendra can row 80 km upstream and 110 km downstream in 13 hours. Also, he can row 60 km upstream and 88 km downstream in 10 hours. What is the speed (in km/h) of the current?**
    (a) 6   (b) 16
    (c) 10   (d) 12

15. **In an examination a candidate had to sit for three papers A, B and C. The candidate secured 75% marks in Paper A, 80% marks in Paper B, and 60% marks in Paper C. If the weightage assigned to Papers A, B and C were 40%, 50% and 10%, respectively, then find the weighted percentage of marks obtained by the candidate, when all the three papers were taken together.**
    (a) 77%   (b) 74%
    (c) 72%   (d) 76%

16. **Study the given pie-chart carefully and answer the following question, What is the total amount (in ₹) used by the school for the payment?**

The entire fund that school gets from different sources is equal to ₹10 lakh
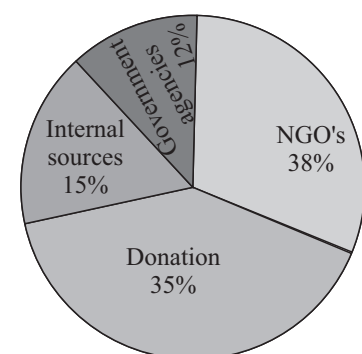
Source of funds in school

1. A car covers a distance of 350 km in 5 hours and covers another 450 km at a speed of 90 km/h. What is the average speed (in km/h) of the car?
   (a) 72
   (b) 82
   (c) 80
   (d) 85

2. Simplify the following.
   $$\frac{0.01 \times 0.01 \times 0.01 + 0.003 \times 0.003 \times 0.003}{0.05 \times 0.05 - 0.015 \times 0.05 + 0.015 \times 0.015}$$
   (a) $\frac{13}{25} \times 10^3$
   (b) $\frac{13}{15} \times 10^{-3}$
   (c) $\frac{13}{15} \times 10^3$
   (d) $\frac{13}{25} \times 10^{-3}$

3. A shopping mart offers four different discounts schemes on the sale of an object as follows:
   (1) A discount of 30%
   (2) Two successive discounts of 15%
   (3) Buy 2, get 1 free
   (4) Buy 5, get 3 free

   Which discount scheme offers the maximum discount to a customer?
   (a) (1)
   (b) (4)
   (c) (2)
   (d) (3)

4. Two circles with radii 22 cm and 16 cm touch each other externally. The length of the direct common tangent is :
   (a) $4\sqrt{22}$ cm
   (b) $8\sqrt{11}$ cm
   (c) $4\sqrt{11}$ cm
   (d) $8\sqrt{22}$ cm

5. If ∆ABC and ∆DEF are congruent triangles, then which of the following is False?
   (a) The ratio fo AC to DF is 2 : 1.
   (b) The perimeter of both the triangles is equal
   (c) AB = DE and BC = EF
   (d) The ratio of the angles in both the triangles is the same

6. If $\tan x = \frac{7}{5}$, then the value of
   $$\frac{9 \sin x - \frac{42}{5} \cos x}{15 \sin x + 21 \cos x}$$ is :
   (a) 0
   (b) 1
   (c) 0.1
   (d) 0.5

7. The difference between the cubes of two given natural numbers is 6272, while the positive difference between the two given numbers is 8. What is the product of the two given numbers?
   (a) 160
   (b) 240
   (c) 200
   (d) 320

8. If $\frac{a}{b} = \frac{7}{6}$, then find the value of the expression $\frac{6a + 13b}{6a - 13b}$
   (a) $-\frac{3}{10}$
   (b) $\frac{10}{3}$
   (c) $-\frac{10}{3}$
   (d) $\frac{3}{10}$

9. In a 200 m linear race, if A gives B a start of 25 m, then A wins the race by 10 seconds. Alternatively, if A gives B a start of 45 m, the race ends in a dead heat. How long does A take to run 200 m?
   (a) 78 seconds
   (b) 77 seconds
   (c) 78.5 seconds
   (d) 77.5 seconds

10. Ram can copy 60 pages in 15 hours. If Ram and Riya together can copy 180 pages in 30 hours, then in how many hours can Riya copy 20 pages?
    (a) 29 hours
    (b) 12 hours
    (c) 20 hours
    (d) 10 hours

11. 4 women and 7 men earn a total of ₹11,480 in 7 days, while 10 women and 17 men earn a total of ₹36,360 in 9 days. How much will 11 women and 9 men together earn (in ₹) in 13 days?
    (a) 42,770
    (b) 42,640
    (c) 42,510
    (d) 42,900

12. A notebook was sold for ₹28 with a profit of 12%. If it had been sold for ₹26.25, then what would have been the profit percentage?
    (a) 5%
    (b) 7%
    (c) 4%
    (d) 6%

13. A can complete a work in 9 days and B in 12 days. If they work together on it for 5 days, then the fraction of the work left is :
    (a) $\frac{1}{35}$
    (b) $\frac{1}{36}$

    (c) $\frac{5}{36}$
    (d) $\frac{35}{36}$

14. An airplane travels five times as fast as a bus. If the bus covers 60 km in 80 minutes, then what distance (in km) will the airplane cover in 25 minutes?
    (a) 95.35
    (b) 93.75
    (c) 65.35
    (d) 18.75

15. The interest on a certain deposit at 4.5% p.a. is ₹135 in one year. How much will the additional interest in one year be on the same deposit at 5% p.a.?
    (a) ₹ 16
    (b) ₹ 15
    (c) ₹ 14
    (d) ₹ 18

16. Simplify the following expression
    2 + (30 − 26)² + 8³⁻² × 0.5
    (a) 2
    (b) 1
    (c) 3
    (d) 0

17. The centroid of an equilateral triangle PQR is L. If PQ = 6 cm, the length of PL is :
    (a) $2\sqrt{3}$ cm
    (b) $4\sqrt{3}$ cm
    (c) $5\sqrt{3}$ cm
    (d) $3\sqrt{3}$ cm

18. Simplify the given expression.
    15 − (−5) × {4 − (7 − 3)}
    $$÷ [3 × \{5 + (−3) × (−6)\}]$$
    (a) 21
    (b) 15
    (c) 88
    (d) 125

19. Study the given pie-chart and answer the question that follows.
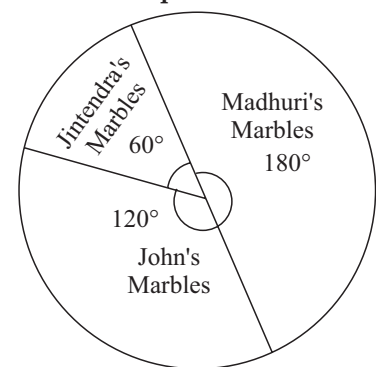
    If the pie-chart shows the distribution of 36 marbles among 3 persons, then the number of marbles Madhuri has is:

1. In a class of 60 students, 20 are girls. The average weight of the boys in the class is 40 kg, while that of all the girls is 35 kg. What is the average weight (in kg) of the entire class (correct to two decimal places)?
   - (a) 36.67
   - (b) 38.33
   - (c) 33.33
   - (d) 40.67

2. If cosec θ + cot θ = m, find the value of $\dfrac{m^2 - 1}{m^2 + 1}$.
   - (a) 1
   - (b) 0
   - (c) cos θ
   - (d) – sin θ

3. Three numbers are in the ratio $\dfrac{4}{5} : \dfrac{5}{6} : \dfrac{9}{10}$. The difference between the smallest and the greatest numbers is 12. Find the number which is NEITHER the smallest NOR the greatest.
   - (a) 96
   - (b) 108
   - (c) 100
   - (d) 104

4. The length of the common chord of two circles of radii 15 cm and 13 cm, whose centres are 14 cm apart, is :
   - (a) 14 cm
   - (b) 12 cm
   - (c) 15 cm
   - (d) 24 cm

5. The following table shows the marks distribution among the students in a class.

Marks	No. of Students
Less than 10	2
Less than 20	5
Less than 30	6
Less than 40	8
Less than 50	10

   How many students scored less than 20 marks?
   - (a) 5
   - (b) 7
   - (c) 2
   - (d) 6

6. The value of $x^2 + y^2$ when $x = 1$, $y = 2$ is:
   - (a) 5
   - (b) 4
   - (c) 2
   - (d) 1

7. A dishonest shopkeeper sells millet at ₹20 per kg which he has bought at ₹16 per kg and he is giving 800 gm instead of 1000 gm. Find his actual profit percentage.
   - (a) 52.12%
   - (b) 58.36%
   - (c) 54.25%
   - (d) 56.25%

8. A can do a certain piece of work in 1.5 times the number of days in which B and C together can do it, if A and B together can do the said piece of work in 30 days and C alone can do it in 120 days, then how many days will B take to do this piece of work alone?
   - (a) 75
   - (b) 45
   - (c) 60
   - (d) 50

9. Aarti can type 85 pages in 10 hours. Aarti and Bina together can type 500 pages in 40 hours. How much time will Bina take to type 40 pages?
   - (a) 10 hours
   - (b) 15 hours
   - (c) 14 hours
   - (d) 12 hours

10. The simple interest on ₹800 for 6 years at 5.5% per annum is equal to the simple interest on ₹600 at 4% per annum for a certain period of time. The period of time is:
    - (a) 11 years
    - (b) 9 years
    - (c) 12 years
    - (d) 10 years

11. Study the given table and answer the question that follows.

    The table shows the number of students studying in six different classes of six different schools.

School	Class V	Class VI	Class VII	Class VIII	Class IX	Class X
P	152	160	145	156	147	144
Q	148	166	150	155	157	143
R	161	152	140	145	143	165
S	159	142	149	140	142	168
T	147	144	158	163	154	150
U	150	160	162	160	161	140
Total	917	924	904	919	904	910

    What is the respective ratio of students studying in class IX of schools Q and R together to those studying in class VI of school S and T together?
    - (a) 181 : 127
    - (b) 143 : 150
    - (c) 150 : 143
    - (d) 127 : 181

12. If $\tan x = -\dfrac{12}{5}$, where x lies in the second quadrant, what is the value of sin x – cot x?
    - (a) $\dfrac{209}{156}$
    - (b) $\dfrac{169}{156}$
    - (c) $\dfrac{156}{209}$
    - (d) $\dfrac{144}{169}$

13. Find the least number divisible by 2, 3, 5, 6, 9 and 18, which is a perfect square.
    - (a) 900
    - (b) 400
    - (c) 144
    - (d) 3600

14. Simplify the following expression.
    $(4x + 1)^2 - (4x + 3)(4x - 1)$
    - (a) $(4x + 1)$
    - (b) 4
    - (c) $(4x - 3)$
    - (d) $4x$

15. In ΔABC, D is the mid-point of BC and G is the centroid. If GD = 10 cm, then the length of AD is _____.
    - (a) 20 cm
    - (b) 30 cm
    - (c) 15 cm
    - (d) 10 cm

16. If $\left(x + \dfrac{1}{x}\right) = 2\sqrt{2}$, what is the value of $\left(x^6 + \dfrac{1}{x^6}\right)$?
    - (a) 198
    - (b) 216
    - (c) 180
    - (d) 234

17. A pipe can fill a tank in 30 hours. Due to a leakage at the bottom, it is filled in 50 hours. How much time will the leakage take to empty the completely filled tank?
    - (a) 60 hours
    - (b) 85 hours
    - (c) 70 hours
    - (d) 75 hours

18. Two men walk from a place of speeds of 9 km/h and 12 km/h, respectively. The first man takes 20 minutes more than the second one to cover the journey. Find the distance of the journey.
    - (a) 10 km
    - (b) 13 km
    - (c) 15 km
    - (d) 12 km

1. The value of

   $$\frac{p^2-(q-r)^2}{(p+r)^2-q^2}+\frac{q^2-(p-r)^2}{(p+q)^2-r^2}+\frac{r^2-(p-q)^2}{(q+r)^2-p^2}$$

   is:
   (a) 1   (b) 2
   (c) 0   (d) 3

2. A dealer marks his goods at 20% above the cost price and allows a discount of 15%. What is his gain percentage?
   (a) 3%   (b) 4%
   (c) 2%   (d) 1%

3. A one metre pipe is made with inner diameter equal to outer radius. How much material (in cubic units) is required to make the pipe, if it can hold $\frac{88}{7}$ cubic metres water in it?
   (a) 37.7   (b) 35.5
   (c) 33.3   (d) 36.6

4. A boat can cover 120 km upstream and back in a total of 30 hours, and 25 km upstream and 40 km downstream in a total of 7 hours. How much distance will the boat cover in 16 hours in still water?.
   (a) 200 km   (b) 180 km
   (c) 175 km   (d) 225 km

5. The ratio of the length to width of a certain rectangle is 3 : 2 and the area is 150 cm². The perimeter of the rectangle (in cm) is:
   (a) 20   (b) 30
   (c) 50   (d) 40

6. If 2 Cotθ = 3, then find the value of

   $$\frac{\sqrt{13}\,\sin\theta-3\tan\theta}{3\tan\theta+\sqrt{13}\,\cos\theta}.$$

   (a) $\frac{1}{\sqrt{13}}$ (b) $\frac{2}{\sqrt{13}}$
   (c) 0   (d) $\frac{2}{3}$

7. The following pie chart represents the percentage distribution of girls in five girls' colleges A, B, C, D and E. The total number of girls in all the five colleges is 2,500.
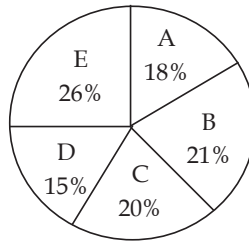
   What is the average number of girls in the colleges C and E?
   (a) 500   (b) 650
   (c) 700   (d) 575

8. Find the value of the given expression.

   $2 + \cos 49^0 \cos 41^0 – \sin 49^0 \sin 41^0.$
   (a) 2   (b) –1
   (c) 0   (d) 1

9. During a school excursion each student of junior school was charged ₹325. and each student of senior school was charged ₹400. If there were 80 students from junior school and the combined average amount charged per student was ₹352, then how many students from senior school went for the excursion?
   (a) 55   (b) 45
   (c) 50   (d) 40

10. A thief is noticed by a policeman from a distance of 500 m. The thief starts running and the policeman chases him. The thief and the policeman run at the rate of 17 km/h and 20 km/h, respectively. What is the distance between them after 8 minutes?
    (a) 100 m   (b) 180 m
    (c) 200 m   (d) 150 m

11. If the length of a chord, drawan at a distance of 21 cm from the centre of a circle, is 40 cm, then the radius (in cm) of the circle is:
    (a) 29   (b) 21
    (c) 25   (d) 20

12. P, Q and R can complete a piece of work in 10 days, 15 days and 20 dyas, respectively. If they work together, in how many days can they finish the same work?

13. Ankita sold her watch at 5% loss. If she had sold it for ₹300 more, she would have gained 5%. Find the selling price of the watch.
    (a) ₹2,900   (b) ₹2,750
    (c) ₹3,000   (d) ₹2,850

    (a) $4\frac{8}{13}$ (b) $4\frac{3}{5}$
    (c) $4\frac{7}{13}$ (d) $4\frac{5}{7}$

14. What is the value of the given expression?

    $$\frac{4^{a+4}-5\times4^{a+2}}{15\times4^a-2^2\times4^a}$$

    (a) 16   (b) 64
    (c) 20   (d) 24

15. If 720 ÷ 8 + 915 ÷ 15 – m + 32 × 5 = 1104 ÷ 16 × 111 ÷ 37, then the value of m is:
    (a) 104   (b) 518
    (c) 207   (d) 311

16. P takes twice as long as Q or three times as long as R to complete a task. If they work together, they can complete the task in two days. How long will it take Q to complete the task on his own?
    (a) 8 days   (b) 6 days
    (c) 5 days   (d) 7 days

17. The length of each side of a triangle is 12 cm. What is the length of the circumradius of the triangle?
    (a) $8\sqrt{3}$ cm   (b) $2\sqrt{3}$ cm
    (c) $6\sqrt{3}$ cm   (d) $4\sqrt{3}$ cm

18. Solve the following.

    22 – [9 – {6 – (10 – 4 + 3)}] ÷ 2 × 3
    (a) 12   (b) 4
    (c) 3   (d) 20

19. A policeman chases a thief. The speeds of the policeman and the thief are 8 km/h and 6 km/h, respectively. If the policeman started 10 minutes late, at what distance he will catch the thief?
    (a) 6 km   (b) 8 km
    (c) 4 km   (d) 2 km

1. If 8 cot A = 7, find sin A.

   (a) $\dfrac{7}{15}$ (b) $\dfrac{8}{\sqrt{113}}$

   (c) $\dfrac{7}{8}$ (d) $\dfrac{8}{7}$

2. If 20 : 98 :: 98 : y, find the value of y.

   (a) 333   (b) 338
   (c) 348   (d) 343

3. A is 40% more efficient than B. How much time will they take to work together to complete a job, which A alone could have done in 31 days?

   (a) $\dfrac{217}{12}$ days   (b) $\dfrac{515}{32}$ days

   (c) $\dfrac{215}{12}$ days   (d) $\dfrac{517}{32}$ days

4. Find the value of a to make 6234a6 divisible by 9.

   (a) 8   (b) 7
   (c) 10   (d) 6

5. If (a – b) = 1, then what is the value of (a³ – b³)?.

   (a) $a^2 + ab + b^2$ (b) $(a + b)^2 + 3ab$
   (c) $a^2 - ab + b^2$ (d) $a^2 + 2ab + b^2$

6. A can do a piece of work in 8 days, while B can do it in 18 days. In how many days will the work be completed if they both work on alternate days starting with B?

   (a) $11\dfrac{1}{3}$ (b) $12\dfrac{1}{3}$

   (c) 10   (d) $10\dfrac{1}{3}$

7. Simplify $\dfrac{1+\sin t}{4-4\sin t} - \dfrac{1-\sin t}{4+4\sin t}$

   (a) 4tan t . sin t   (b) tan t . sec t
   (c) tan t - sin t   (d) tan t + sin t

8. The given pie-chart shows the marks scored by a student in different skills in an examination: mathematical ability, verbal ability, reasoning, coding and puzzle solving. The values are given in degrees.

   Answer the following question. If total marks were 3000, then what would be the marks in reasoning?
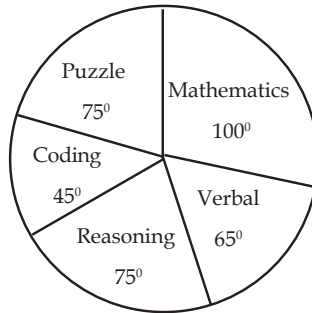
   (a) 375   (b) 833
   (c) 625   (d) 541

9. Ramlal marks up his goods by 40% and gives a discount of 10%. What is his net profit percentage?

   (a) 24%   (b) 26%
   (c) 28%   (d) 32%

10. In the given figure, PQ is a chord passing through the centre 'O' of the circle. Calculate <PQS.

   (a) 40^0 (b) 60^0
   (c) 20^0 (d) 80^0
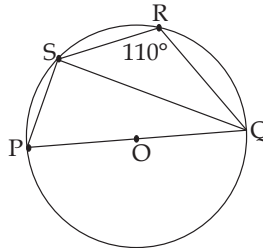
11. Study the given graph carefully and answer the question that follows.
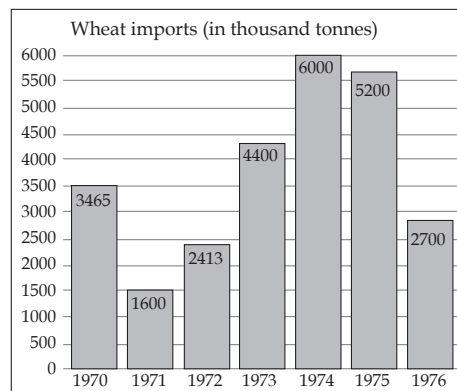
   The decrease in imports in 1971 was what percentage of the imports in 1970 (rounded off to the nearest integer)?

   (a) 54%   (b) 56%
   (c) 52%   (d) 53%

12. What is the smallest number which can be added to 9454351626 so that it becomes divisible by 11?.

   (a) 1   (b) 6
   (c) 5   (d) 4

13. Ajeet works 4 times as fast as Sohan. If Sohan can complete a work in 20 days independently, the number of days in which Ajeet and Sohan can together finish the work is:

   (a) 2   (b) 3
   (c) 4   (d) 5

14. Anil and Tiran drove between two points A and B 192 km apart. Anil started the journey from point A at 8:20 a.m.; drove at a speed of 64 km/h; reached point B and immediately returned to A at the same speed. Tirath started the journey from point A at 9:50 a.m.; drove at a speed of 96 km/h; reached point B and immediately returned to A at the same speed. At what time did Anil and Tirath first meet each other?.

   (a) 11 : 38 a.m.   (b) 11 : 28 a.m.
   (c) 11 : 43 a.m.   (d) 11 : 33 a.m.

15. An arc on a circle, whose length is 19.25 cm, subtends an 18^0 angle at the centre. What is the area of the circle?

   [Use $\pi = \dfrac{22}{7}$.]

   (a) 11796.625 cm^2
   (b) 11786.625 cm^2
   (c) 11780.625 cm^2
   (d) 11790.625 cm^2

16. Which of the following statements is FALSE?

   (a) Two triangles are congruent if the size and shape of the triangles may not be equal.
   (b) SAS an SSS are both conditions of congruency of triangles.
   (c) If two angles and the included side of one triangle is equal to two angles and the included side of other triangle, then the triangles are congruent.
   (d) If two triangles are congruent, then one of them can be superimposed on the other triangle.

1. Simjplify the following expression.

   $[(1 + p) (1 + p^2) (1+p^4) (1 + p^8) (1 + p^{16}) (1 - p) - 1]$

   (a) $-p^{32}$ (b) p^{32}

   (c) $(1 + p^{32})$ (d) $(1- p^{32})$

2. S_1 and S_2 are two stations which are 195 km apart. A train starts from S_1 at 4:00 pm and moves towards S_2 at the speed of 65 km/h. Another train starts from S_2 at 5:00 pm and moves towards S_1 at the speed of 35 km/h. At what time will the two trains meet?

   (a) 6:06 p.m.   (b) 6:30 p.m.
   (c) 6:15 p.m.   (d) 6:18 p.m.

3. Two chords AB and CD of a circle meet inside the circle at point P. If AP = 12 cm, AB = 20 cm and CP = 16 cm, then CD = ?

   (a) 22 cm   (b) 15 cm
   (c) 21 cm   (d) 24 cm

4. There are 15 students in a class. Their average weight is 40 kg. When one student leaves the class, the average weight is 39.5 kg. What is the weight of the students who left the class (where kg means kilogram)?

   (a) 47 kg   (b) 42 kg
   (c) 52 kg   (d) 48 kg

5. In $\triangle XYZ$, right angled at Y, if $\sin X = \dfrac{1}{2}$ find the value of cos X cos Z + sin X Sin Z.

   (a) $\dfrac{\sqrt{3}}{2}$ (b) $\dfrac{\sqrt{3}}{4}$

   (c) $\dfrac{2}{\sqrt{3}}$ (d) $\sqrt{3}$

6. Rekha alone can complete a work in 16 days, and Bina alone can complete the same work in 12 days. Starting with Rekha, they work on alternate days. The total work will be completed in:

   (a) $12\dfrac{3}{4}$ days   (b) 12 days

   (c) 13 days   (d) $13\dfrac{3}{4}$ days

7. A certain amount is lent at x% p.a. simple interest for 3 years. Instead, if the amount was lent at 3x% p.a. simple interest for 'y' more years, then the simple interest would have been seven times the earlier interest. What is the value of y?.

   (a) 3   (b) 4
   (c) 5   (d) 6

8. The value of (16+14) ÷ 2 - 12 + 16 × 4 - 28 + 13 (-16+13) is:

   (a) 6   (b) 0
   (c) -3   (d) 3

9. Study the given table and answer the question that follows.

   The table gives the number of graduate students enrolled in 4 different colleges A, B, C, and D in a city over the yearss 2010 to 2014 and also the number of students who passed in the final examination during these years.

   Find the ratio of the average of students enrolled from college D to the average of students who passed from college D over all the years.

Year	2010	2010	2011	2011	2012	2012	2013	2013	2014	2014
College	Enrolled	pass	Enrolled	pass	Enrolled	pass	Enrolled	pass	Enrolled	pass
A	680	620	600	560	720	700	800	760	750	700
B	550	530	450	420	600	550	650	620	700	680
C	480	450	520	500	580	550	620	600	720	700
D	710	650	750	710	680	640	720	690	740	710

   (a) 19 : 17   (b) 18 : 17   (c) 21 : 17   (d) 20 : 17

10. If x and y are positive numbers such that x - y = 5 and xy = 150, then the value of (x + y) is:

    (a) 45   (b) 25
    (c) 35   (d) 15

11. The value of

    $\dfrac{3}{2} \div \dfrac{1}{7} \times \left[\left(\dfrac{1}{2} - \dfrac{1}{3} \right) \div \dfrac{1}{42} \right] = ?$

    (a) $72\dfrac{1}{3}$ (b) $73\dfrac{1}{2}$

    (c) $72\dfrac{1}{2}$ (d) $71\dfrac{1}{3}$

12. In a circular race of 1600 m, A and B start from the same point and at the same time with speeds of 27 km/h and 45 km/h, respectively. After how long will they meet again for the first time on the track when they are running in the same direction?

    (a) 90 seconds   (b) 320 seconds
    (c) 240 seconds   (d) 180 seconds

13. A can do 20% of a work in 4 days, and B can do $33\frac{1}{3}$% of the same work in 10 days. They worked together for 9 days and then C completed the remaining work in 6 days. B and C together will complete 75% of the same work in:

    (a) 12 days   (b) 9 days
    (c) 11 days   (d) 10 days

14. What is the equivalent discount percentage corresponding to two successive discounts of 9% and 17%?.

    (a) 27.53%   (b) 26.47%
    (c) 26.00%   (d) 24.27%

15. If $\dfrac{\cos\alpha}{\sin\beta} = 10$ and $\dfrac{\cos\alpha}{\cos\beta} = 11$, then the value of $\cos^2\beta$ is:

    (a) $\dfrac{121}{132}$ (b) $\dfrac{100}{221}$

    (c) $\dfrac{88}{108}$ (d) $\dfrac{221}{121}$

1. The distance between two towns is covered in 7 hours and 30 minutes at the speed of 72 km/h. The time saved if the speed is increased by 25% is:
   (a) 1 hour 36 minutes
   (b) 1 hour 50 minutes
   (c) 1 hour 30 minutes
   (d) 1 hour 20 minutes

2. Simplify:
   $264 – [142 – \{ 75 + (38 – \left(\dfrac{5}{4} + \dfrac{11}{4} \right))\}]$
   (a) 231
   (b) 230
   (c) 232
   (d) 234

3. The chart shows the population of seven districts of National Capital Territory of Delhi.

   Sales
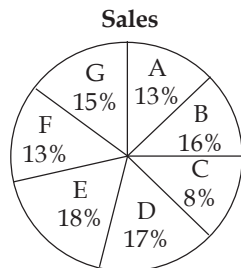
   If the total population of the seven districts is 150 corore, find the total population of A and D.
   (a) 45 Crore
   (b) 46 Crore
   (c) 40 Crore
   (d) 42 Crore

4. Rice worth ₹126 per kg and ₹135 per kg are mixed with a third variety in the ratio of 1 : 1 : 2. If the mixture is worth is worth ₹153 per kg, then the price of the third variety per kg (in ₹) is:
   (a) 182.5
   (b) 195.5
   (c) 133.5
   (d) 175.5

5. While baking a cake for 15 people, Jaya used 2.4 kg of flour. How much flour will she need to bake a similar cake for 36 people?
   (a) 5.60 kg
   (b) 6.00 kg
   (c) 5.88 kg
   (d) 5.76 kg

6. A person borrowed some money on simple interest. After 4 years, he returned $\dfrac{9}{5}$ of the money to the lender. What was the rate of interest?
   (a) 25% p.a.
   (b) 10% p.a.
   (c) 15% p.a.
   (d) 20% p.a.

7. A policeman chasing a thief is 0.5 km behind the thief. The speed of thief is 80% of the speed of the policeman and policeman catches him in 12 minutes. What is the speed of the thief (in km/h)?
   (a) 10
   (b) 12.5
   (c) 15
   (d) 7.5

8. An inlet pipe can fill an empty tank in $4\dfrac{1}{2}$ hours while an outlet pipe drains a completely filled tank in $7\dfrac{1}{5}$ hours. The tank is initially empty, and the two pipes are alternatively opened for an hour each, till the tank is completely filled, starting with the inlet pipe. In how many hours will the tank be completely filled?
   (a) 24
   (b) $20\dfrac{1}{4}$
   (c) $20\dfrac{3}{4}$
   (d) $22\dfrac{3}{8}$

9. If ∆ABC is right angled at B, AB = 12 cm and ∠CAB = 60⁰, determine the length of BC.
   (a) $12\sqrt{2}$ cm
   (b) 12
   (c) $12\sqrt{3}$ cm
   (d) $24\sqrt{2}$ cm

10. The value of $(3^2)^2 + 3 × 3 ÷ 3$ -3 is:
    (a) 3^2
    (b) 9^2
    (c) 2^3
    (d) 3^0

11. A works 5.4 times as fast as B, and A takes 22 days less than B to complete the job when each works alone. Calculate the number of days taken to complete the same job if A and B work together.
    (a) $4\dfrac{1}{4}$
    (b) $4\dfrac{3}{16}$
    (c) $4\dfrac{7}{32}$
    (d) $4\dfrac{5}{32}$

12. Two pipes S1 and S2 alone can fill an empty tank in 15 hours and 20 hours respectively. Pipe S3 alone can empty that completely filled tank in 40 hours. Firstly both pipes S1 and S2 are opened and after 2 hour pipe S3 is also opened. In how much time tank will be completely filled after S3 is opened?

    (a) 90/17 hours
    (b) 89/12 hours
    (c) 90/13 hours
    (d) 92/11 hours

13. Amit can complete a piece of work in 5 hours; Jeevan and Paul together can complete it in 4 hours, while Amit and Paul together can complete it in 3 hours. Approximately, how many hours will Jeevan alone take to complete the work (rounded off to the nearest integer)?
    (a) 5
    (b) 6
    (c) 9
    (d) 8

14. What is the value of $\left(\dfrac{1}{a} - \dfrac{1}{b} - \dfrac{1}{c} \right)$ if, $\dfrac{2a-5}{a} - \dfrac{4b-5}{b} + \dfrac{6c+5}{c} = 0$?
    (a) $\dfrac{4}{5}$
    (b) $-\dfrac{8}{5}$
    (c) $\dfrac{2}{5}$
    (d) $-\dfrac{12}{5}$

15. The following bar diagram shows the number of students who opted for the different subjects in the year 2020 and 2021
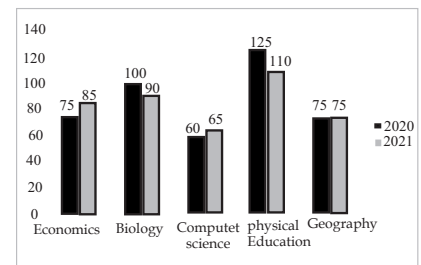
    Out of all 5 subjects, what percentage (rounded up to two decimals) of students opted for Biology in 2021?.
    (a) 23.14%
    (b) 22.34%
    (c) 21.18%
    (d) 24.31%

16. AB = 28 cm and CD = 22 cm are two parallel chords on the same side of the centre of a circle. The distance between them is 4 cm. The radius of the circle is _____. (Consider up to two decimals)
    (a) 15.20 cm
    (b) 14.82 cm
    (c) 15.82 cm
    (d) 13.20 cm

17. If $\left(x - \dfrac{1}{x} \right) = 2\sqrt{2}$, what is the value of $\left(x^6 + \dfrac{1}{x^6} \right)$?

1. Anuj and Anup have to travel from a place A to a place B in their respective cars. Anuj is driving at 70 km/h, and takes 3 halts of 10 minutes each, while Anup is driving at 80 km/h, and takes 4 halts of 15 minutes each. The time taken by Anup to reach Place B, if Anuj takes 8.5 hours, is:.
   - (a) 8 hours
   - (b) 7 hours
   - (c) 4 hours
   - (d) 6 hours

2. In the given figure, diameter AB and chord CD of a circle at P.PT is a tangent to the circle at T. If CD = 8 cm, PD = 10 cm and PB = 8 cm, find AB.
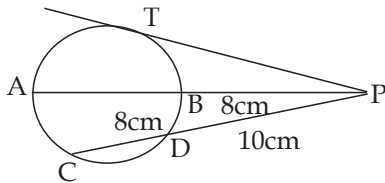
   - (a) 14.5 cm
   - (b) 22.5 cm
   - (c) 12 cm
   - (d) 8 cm

3. If secA + tanA =3, then cosA is equal to:
   - (a) $\dfrac{4}{3}$
   - (b) $\dfrac{3}{5}$
   - (c) $\dfrac{3}{4}$
   - (d) $\dfrac{5}{3}$

4. If x + y = 7 and xy = 19, then calculate the value of $x^2 + y^2$.
   - (a) 17
   - (b) 12
   - (c) 11
   - (d) 19

5. Which of the following options is NOT a correct trigonometric identity?.
   - (a) $1 + \cot^2\theta \equiv \csc^2\theta$
   - (b) $1 + \tan^2\theta \equiv \sec^2\theta$
   - (c) $1 - \sin^2\theta \equiv \cos^2\theta$
   - (d) $\cos^2\theta - \sin^2\theta \equiv 1$

6. The volume of a cuboid is twice that of a cube. If the dimensions of the cuboid are (8 m × 8 m × 16 m), the total sfurface area of the cube is:
   - (a) 316 m²
   - (b) 288 m²
   - (c) 324 m²
   - (d) 384 m²

7. Simplify the given expression.
   (a – 2b) (b – 3a) + (a + b) (a – 3b) – (b - 3a) (4a – 5b)
   - (a) $8a^2 – 10ab$
   - (b) $8a^2 + 10ab$
   - (c) $10a^2 – 14ab$
   - (d) $10a^2 – 4ab$

8. If (a + b + c) = 12, and (ab + bc + ca) = 47, find the value of $(a^3 + b^3 + c^3 – 3abc)$.
   - (a) 24
   - (b) 36
   - (c) 48
   - (d) 42

9. Find the value of the given expression:
   10 ÷ 5 × 1 + 3 – [8 – {5 – (7 – 7 – 9)}]
   - (a) 11
   - (b) 10
   - (c) 9
   - (d) 8

10. What is the value of $\sec^2\theta – \cot^2(90° – \theta)$?
    - (a) 2
    - (b) 1
    - (c) -1
    - (d) 0

11. If A and B together can do a piece of work in 20 days, and A alone can do the same work in 30 days, then in how many days can B alone complete the same work?
    - (a) 45
    - (b) 40
    - (c) 60
    - (d) 50

12. A worker completes $\dfrac{3}{5}$ of a work in 12 days. In how many days will he complete $\dfrac{3}{4}$ of the work?
    - (a) 18
    - (b) 20
    - (c) 16
    - (d) 15

13. The weights (in kg) of five girls of a class are 49, 42, 61, 55 and 58. What is the average weight (in kg) of these five girls?
    - (a) 53
    - (b) 54
    - (c) 51
    - (d) 52

14. Anand covers a certain distance in the first lag of 5 hour at the speed of 50 km/h. In the second lag, he increased the speed by 20% due to which he covered 20% extra distance than that of the first lag. He covered the third lag at the average speed of the first two lags and covered 10% extra distance than that of the second lag distance. How much total time (in hours) did he take to complete all three lags?
    - (a) 16
    - (b) 15
    - (c) 18
    - (d) 14

15. The monthly income of a person was ₹12,000 and his monthly expenditure was ₹8,000. Next year, his income increased by 10% and his expenditure by 8%. Find the percentage increase in his savings.
    - (a) 10%
    - (b) 14%
    - (c) 12%
    - (d) 15%

16. At simple interest a sum of ₹6,400 becomes ₹8,320 in 3 years. What will ₹7,200 become in 5 years at the same rate?
    - (a) ₹10,200
    - (b) ₹10,600
    - (c) ₹10,800
    - (d) ₹10,400

17. In the given figure, a circle is inscribed in ΔPQR, such that it touches the sides PQ, QR and RP at points D, E, F, respectively. If the lengths of the sides PQ = 18 cm, QR = 13 cm and RP = 15 cm, then find the length of PD.
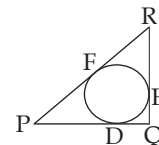
    - (a) 10 cm
    - (b) 8 cm
    - (c) 15 cm
    - (d) 12 cm

18. A works 3.5 times as fast as B, and A takes 45 days less than B to complete a job when each works alone. Calculate the number of days taken to complete the same job if A and B work together.
    - (a) 10.5
    - (b) 17.5
    - (c) 21
    - (d) 14

19. Solve the following expression.
    50 – [20 + (30 – (25 – 5)]
    - (a) 10
    - (b) 30
    - (c) 20
    - (d) 40

20. A sold an article to B at 25% profit and B further sold it to C by earning a certain profit. If the cost price of C is 30% more than the cost price of A, then find the profit percentage earned by B.
    - (a) $5\dfrac{1}{2}\%$
    - (b) 4%
    - (c) 5%
    - (d) $4\dfrac{1}{2}\%$

1. Pass percentage of an examination is 35% . If a students who got 210 marks, failed by 14 marks, then what are the maximum marks of the examination?
   - (a) 600
   - (b) 660
   - (c) 620
   - (d) 640

2. The following pie charts show the data of the number of appeared and passed students of class 12 in sections A,B,C,D and E.

   Appeared students = 1800   Passed students = 800
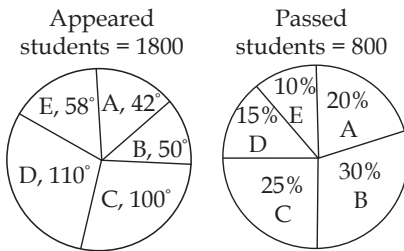
   What is the percentage of students who appeared for the exam in section E (correct to one decimal place)?
   - (a) 29.1%
   - (b) 16.8%
   - (c) 18.2%
   - (d) 16.1%

3. If $\left(x - \dfrac{1}{x} \right) = 6$, and X > 0, find the value of $\left(x^2 - \dfrac{1}{x^2} \right)$.
   - (a) $12\sqrt{10}$
   - (b) $18\sqrt{10}$
   - (c) $24\sqrt{2}$
   - (d) $24\sqrt{10}$

4. What is the value of $\sec^2 A - \tan^2 A$?
   - (a) 0
   - (b) $\cot^2 A$
   - (c) 1
   - (d) $\sin^2 A$

5. The average monthly income of the father and mother is ₹5,000. The average monthly income of the mother and her son is ₹6,000. The average monthly income of the father and his son is. ₹10,000. Find the monthly income (in₹) of the father.
   - (a) 9,000
   - (b) 8,000
   - (c) 12,000
   - (d) 10,000

6. Δ ABC ~ ΔPQR, ar (ΔABC) = 16 cm^2 and ar (ΔPQR) = 25cm^2. If BC = 20 cm, then QR is equal to:
   - (a) 15 cm
   - (b) 10 cm
   - (c) 25 cm
   - (d) 16 cm

7. X, Y and Z completed a work costing ₹3,400. X worked for 5 days Y for 7 days and Z for 10 days. If their daily wages are in the ratio of 4 : 5 : 3, how much amount will be received by X?.
   - (a) ₹ 700
   - (b) ₹ 900
   - (c) ₹ 800
   - (d) ₹ 600

8. Ram rides at the rate of 36 km/h but stops for five minutes to take a drink at the end of every 10 km. Find the time that Ram will take to cover a distance of 84 km.
   - (a) 180 minutes
   - (b) 60 minutes
   - (c) 220 minutes
   - (d) 120 minutes

9. A 15 cm long perpendicular is drawn from the centre of a circle to a 40 cm long chord. Find the diameter of the circle.
   - (a) 52 cm
   - (b) 48 cm
   - (c) 50 cm
   - (d) 45 cm

10. If $\left(x + \dfrac{1}{x} \right) = 3\sqrt{2}$, and X > 1, what is the value of $\left(x^8 - \dfrac{1}{x^8} \right)$?
    - (a) $24364\sqrt{7}$
    - (b) $24384\sqrt{11}$
    - (c) $24384\sqrt{7}$
    - (d) $12192\sqrt{7}$

11. In a Δ ABC, DE ll BC, where D is a point on AB and E is a point on AC. If DE divides the area of Δ ABC into two equal parts, then DB : AB is equal to:
    - (a) $\sqrt{2} : \sqrt{3}$
    - (b) $\sqrt{2} : \sqrt{2} + 1$
    - (c) $\sqrt{2} + 1 : \sqrt{2}$
    - (d) $\sqrt{2} - 1 : \sqrt{2}$

12. Simplify : [0.08 – {3.5 – 4.9 – (12.5 – 7.8 – 4.6)}].
    - (a) 1.58
    - (b) 0.08
    - (c) 2.58
    - (d) 12.58

13. In a right-angle triangle, the hypotenuse is 5 cm and the base is 3 cm . If one angle is θ, then tan θ is equal to:
    - (a) $\dfrac{4}{3}$
    - (b) $\dfrac{5}{3}$
    - (c) $\dfrac{3}{5}$
    - (d) $\dfrac{5}{4}$

14. The width of a rectangle is 2 m less than its length. If the perimeter of the rectangle is 68 m, then what is the length (in metres) of the rectangle?
    - (a) 20
    - (b) 18
    - (c) 16
    - (d) 17

15. Pipe A can fill a tank in 12 minutes; pipe B can fill it in 18 minutes, while pipe C can empty the full tank in 36 minutes. If all the pipes are opened simultaneously, how much time will it take to fill the empty tank completely?
    - (a) 7 minutes 30 second
    - (b) 10 minutes
    - (c) 9 minutes
    - (d) 6 minutes

16. A vertical pole of 28m height casts a 19.2m long shadow. At the same time, find the length of the shadow cast by another pole of 52.5m height.
    - (a) 36m
    - (b) 35m
    - (c) 40m
    - (d) 30m

17. Find the value of $\dfrac{\cos 41}{\sin 49} + \dfrac{\sin 51}{\cos 39}$.
    - (a) 4
    - (b) 2
    - (c) 3
    - (d) 1

18. The cost price and selling price of rice are the same. Due to a faulty weighing machine, the seller earns a 15% profit. If ₹ x is the cost price of 1000 gm rice and the machine is changed which shows 1000 gm instead of 950 gm, what should be the selling price (in₹) now to get the same percentage of profit?
    - (a) 1.0295x
    - (b) 1.0259x
    - (c) 1.0925x
    - (d) 1.0950x

19. The length, breadth and height of a cuboid are in the ratio 1 : 2 : 3. The length, breadth and height of the cuboid are increased by 200%, 300% and 300%, respectively. Then compared to the original volume, the increase in the volume of the cuboid will be.

1. From a point Q, the length of the tangent to a circle is 20 cm and the distance of Q from the centre of the circle is 25 cm. The radius of the circle is:
   (a) 5 cm   (b) 10 cm
   (c) 15 cm   (d) 12.5 cm

2. Solve the following expression.
   8 + (– 9 – 3) – (– 12 – 5)
   (a) 14   (b) 13
   (c) 16   (d) 15

3. Supraja and Kausalya can complete a work in 30 days and 20 days, respectively. If Supraja starts the work and they work on alternate days, in how many days will 75% of the work be completed?
   (a) 28   (b) 24
   (c) 20   (d) 18

4. A and B can do a project in 9 days. B and C can do it in 12 days while C and A can do it in 18 days. In how many days A, B and C all working togethe, can finish the project?
   (a) 9   (b) 8
   (c) 11   (d) 10

5. In a circle with centre O, PA and PB are the tangents at A and B, respectively, from an external point P. If $\angle APB = 24°$, then find $\angle AOB$.
   (a) 158°   (b) 48°
   (c) 156°   (d) 180°

6. A and B working together can finish a piece of work in 8 days while B alone can do it in 24 days. In how many days can A alone finish the work?
   (a) 10   (b) 16
   (c) 12   (d) 14

7. A person invests ₹9,840 at 5% per annum simple interest to obtain a total amount of ₹12,300. For how many years did he invest the sum?
   (a) 5 years   (b) 4.5 years
   (c) 3.5 years   (d) 3 years

8. P gives Q a head–start of 2 seconds in a 400 m race, but both finish the race at the same time. Find the time taken by P to finish the race if the speed of Q is 2 m/sec.
   (a) 198 seconds (b) 199 seconds
   (c) 200 seconds (d) 195 seconds

9. The price of an article is increased by r%. The new price was decreased by r% later. Now the latest price is ₹1. What was the original price of the article?
   (a) $\dfrac{10000}{10000-r^2}$ (b) $\dfrac{10000-r^2}{10000}$
   (c) $\dfrac{100}{100-r^2}$ (d) $\dfrac{100}{1-r^2}$

10. Study the given bar–graph and answer the question that follows.
    A company provides five different products. The sales of these five products (in 1000 number of packs) during 2019 are shown in the bar–graph

    Sales of different products during 2019
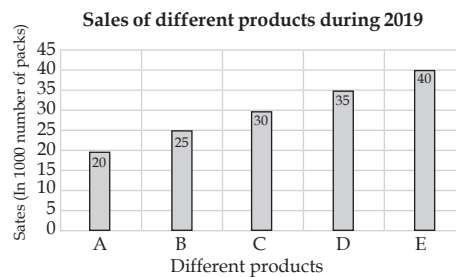
    What is the approximate ratio of sales of product A to product E in 2019?
    (a) 1 : 2   (b) 1 : 3
    (c) 2 : 3   (d) 2 : 1

11. The cost of 50 dozens of bananas is ₹2,400 and the transport cost per banana is ₹0.25. The selling price is ₹10 for a pair of bananas. What is the profit percentage (rounded off up to one dicimal place)?
    (a) 14.5%   (b) 17.6%
    (c) 15.4%   (d) 16.7%

12. The three sides of a triangle are 12, 17 and x units. Which of the following options is correct?
    (a) 5 < x < 29   (b) 5 ≤ x < 29
    (c) 5 ≤ x ≤ 29   (d) 5 < x ≤ 29

13. The following bar graph represents the demand and production for five companies, V, W, S, Y and Z. On the basis of the bar graph, answer the question.
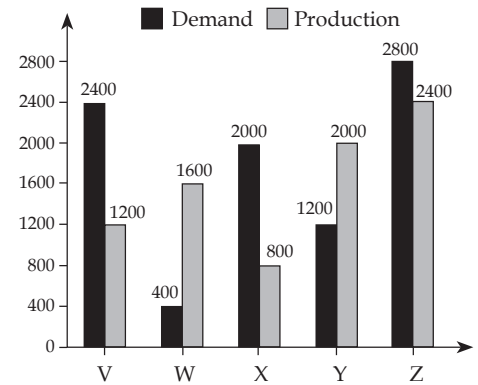
    If K% of the production for company X equals the demand for company W, then K equals:
    (a) 40   (b) 45
    (c) 35   (d) 50
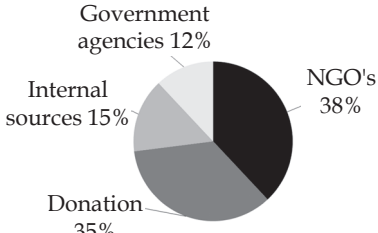
14. A thief is noticed by a policeman from a distance of 200 m. The thief starts running as soon as he is noticed, and the policeman chases him simultaneously. The thief and the policeman run at the speeds of 10 km/h and 11 km/h, respectively. What is the distance (in m) between them after 6 min policeman starts chasing?
    (a) 75   (b) 100
    (c) 125   (d) 150

15. If a + b + c = 7, ab + bc + ca = 11 and abc = –1, then $a^3 + b^3 + c^3$ is equal to:
    (a) 101   (b) 107
    (c) 109   (d) 111

16. The maximum value of $(\sin^{12}\theta + \cos^{20}\theta)$ for all the real value of θ is:
    (a) 2   (b) 3
    (c) 1   (d) 0

17. Find the value of $\dfrac{2}{3}\tan^2 60° + 3\cos^2 30° - 2\sec^2 30° - \dfrac{3}{4}\cot^2 60°$.
    (a) 2.33   (b) 2.01
    (c) 1.33   (d) 3.33

18. The square of 72 is equal to the product of 216 and a number. Find the number.
    (a) 36   (b) 18
    (c) 24   (d) 48

19. P and Q can do a job in 24 days, Q and R can do it in 30 days, while P and R can do it in 40 days. X is four times as efficient as P, Y is half as efficient as Q, and Z is 2.5 times as
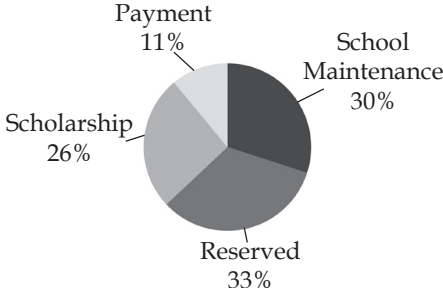
1. A solid cone with curved surface area twice its base area has slant height of $6\sqrt{3}$ cm. Its height is :
   (a) $6\sqrt{2}$ cm   (b) 9 cm
   (c) 6 cm   (d) $3\sqrt{6}$ cm

2. A sum of money earns a simple interest at 7.25% per annum for the first eight years, at 8.5% for the next six years, and at 6.5% for the final four years. If the total interest earned during these eighteen years was ₹ 35,100, what was the original sum invested (in ₹)?
   (a) 25,800   (b) 22,500
   (c) 26,400   (d) 26,000

3. If x > 0 and $x^4 + \dfrac{1}{x^4} = 142$, what is the value of $x^7 + \dfrac{1}{x^7}$?
   (a) $1561\sqrt{14}$ (b) $1563\sqrt{14}$
   (c) $1560\sqrt{14}$ (d) $1562\sqrt{14}$

4. Study the given pie-chart carefully and answer the following question.
   What is the difference between the funds (in ₹) acquired by the school from donation and those from government agencies?
   The entire fund that school gets from different sources is equal to ₹ 10 lakh

   Government agencies 12%
   NGO's 38%
   Internal sources 15%
   Donation 35%

   Source of funds in school

   Payment 11%
   School Maintenance 30%
   Scholarship 26%
   Reserved 33%

   Uses of funds by school

5. A and B can complete a piece of work in 12 days and 18 days, respectively. If they work at it alternatively, A beginning, in how many days will the work be finished?
   (a) $14\dfrac{2}{3}$ (b) $14\dfrac{1}{3}$
   (c) $15\dfrac{1}{3}$ (d) $15\dfrac{2}{3}$

6. In a factory a piece of work is completed by Raima in 15 days while Joe can finish it in 10 days. The factory manager has to complete the work as soon as possible and so he orders Joe and Raima to work together. How days will they take to complete the work?
   (a) 5   (b) 8
   (c) 7   (d) 6

7. A, B and C can do a work in 10 days, 15 days, and 20 days, respectively. They finished that work together and got ₹ 2,600 as wages. Find C's wage.
   (a) ₹ 550   (b) ₹ 600
   (c) ₹ 575   (d) ₹ 625

8. A seller professes to sell his fruits at cost price but still gains $5\dfrac{5}{19}$%. How much does he give for 1 kg?
   (a) 905 gm   (b) 5 gm
   (c) 900 gm   (d) 950 gm

9. Suppose ∆PQR and ∆STU are congruent triangles under ASA. If ∠PQR = 60°, ∠PRQ = 30° and ∠STU = 60°, find ∠TSU.
   (a) 90°   (b) 75°
   (c) 60°   (d) 45°

10. Which of the following numbers is divisible by 9?
    (a) 83061   (b) 29568
    (c) 78432   (d) 47695

11. If a : b :: b : c, and b = 96, then which of the following can be a possible pair of values of a and c?

(a) 2,30,000   (b) 2,50,000
(c) 2,80,000   (d) 2,40,000

(a) a = 24 ; c = 374
(b) a = 32 ; c = 288
(c) a = 48 ; c = 168
(d) a = 16 ; c = 586

12. Which of the following is a FALSE statement?
    (a) The circumcentre is the centre of a circle which circumscribes the triangle.
    (b) The angle formed by any side at the incentre is always 90° more than the angle at the opposite vertex.
    (c) Incentre is the point of concurrency of angle bisectors of a triangle.
    (d) Centroid of the triangle divides each median in the ratio of 2 : 1

13. $7.5 \times 17.2 \div 8.6 + (59.5)$ of $\dfrac{1}{17} - \dfrac{7}{2}$ of 5 = ?
    (a) 1   (b) 3
    (c) 4   (d) 2

14. A thief is chased by a policeman and distance between them is 3 km. The speed of policeman is 75 km/h and the speed of the thief is 60 km/h. The policeman will be able to catch the thief when the thief would have covered the distance of ____km.
    (a) 18   (b) 12
    (c) 15   (d) 10

15. The average weight of 15 persons is increased by 1.2 kg when one of them whose weight is 51 kg is replaced by a new man. The weight of the new man is:
    (a) 69 kg   (b) 70 kg
    (c) 65 kg   (d) 59 kg

16. The following expression is equal to. cot 85° + cos 75°
    (a) tan 85° + sin 75°
    (b) tan 5° + sin 15°
    (c) tan 85° – sin 75°
    (d) tan 5° – sin 15°

17. If x + y + z = 4 and $x^2 + y^2 + z^2 = 12$ then find xy + yz + xz.
    (a) 4   (b) 6
    (c) 7   (d) 2

18. If $\left(5y + \dfrac{5}{y}\right) = 11$, find the value of $\left(y^2 + \dfrac{1}{y^2}\right)$.

1. A shopkeeper sold a pair of headphones for ₹ 5,520 at a gain of 20%. What would have been the gain or loss percent if it had been sold for ₹ 4,370?
   - (a) Gain 15%
   - (b) Loss 5%
   - (c) Gain 2%
   - (d) Loss 10%

2. In a certain year, the population of a city was 18,000. If in the next year, the population of males increased by 5% and that of females increased by 7%, and the total population increased to 19,200, then what was the ratio of the populations of males and females in that given year?
   - (a) 2 : 5
   - (b) 1 : 5
   - (c) 4 : 3
   - (d) 3 : 5

3. An inlet pipe can fill an empty tank in 120 hours while an outlet pipe drains a completely-filled tank in 54 hours. If 8 inlet pipes and 3 outlet pipes are opened simultaneously, when the tank is empty, then in how many hours will the tank get completely filled?
   - (a) 81
   - (b) 96
   - (c) 72
   - (d) 90

4. If $\sin x = \dfrac{3}{10}$, then what is the value of $\tan x + \cot x$ = ?
   - (a) $\dfrac{100}{3\sqrt{91}}$
   - (b) $\dfrac{100}{2\sqrt{83}}$
   - (c) $\dfrac{100}{7\sqrt{95}}$
   - (d) $\dfrac{100}{3\sqrt{85}}$

5. The marked price of a frock is ₹4,500. It is to be sold at ₹2,400 at two successive discounts. If the first discount is 20%, then the second discount will be:
   - (a) 40%
   - (b) 30%
   - (c) $66\dfrac{1}{3}$%
   - (d) $33\dfrac{1}{3}$%

6. Which of the following number is divisible by 11?
   - (a) 97174
   - (b) 56923
   - (c) 63962
   - (d) 17295

7. Two trains of length 130 m and 120 m are running on parallel lines in the same direction at a speed of 40 km/h and 50 km/h, respectively. In how much will they pass each other?
   - (a) 85 sec
   - (b) 62 sec
   - (c) 63 sec
   - (d) 90 sec

8. The square of the sum of two given natural numbers is 784, while the product of the two given numbers is 192. Find the positive difference between the squares of these two given numbers.
   - (a) 512
   - (b) 122
   - (c) 400
   - (d) 112

9. Solve the given expression.
   $$\frac{\sec^2(90° - \theta) - \cot^2 \theta}{2(\sin^2 35° + \sin^2 55°)}$$
   - (a) 0.5
   - (b) 2
   - (c) 1.5
   - (d) 1

10. What is the sum of the divisors of 484 that are perfect squares?
    - (a) 125
    - (b) 35
    - (c) 610
    - (d) 13

11. Study the bar graph carefully and answer the question that follows. The following bar graph shows the sale of Bluetooth earphones on online market places over the years.

    Sale of Bluetooth earphones (in lakhs)
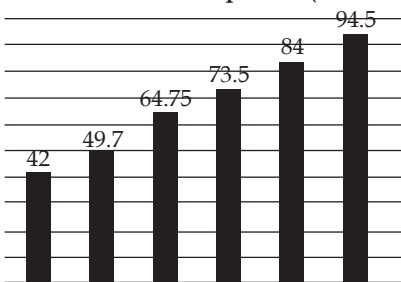
    ■ Sale of Bluetooth earphones (in lakhs)

    Find the approx, percentage increase in the sale of earphones from 2017 to 2020.
    - (a) 69%
    - (b) 57%
    - (c) 78%
    - (d) 71%

12. C1 and C2 are two concentric circles such that the radius of C2 is less than the radius of C1. If AB is the chord of C1 of length 12 cm, touching C2 at P, find the length of AP.
    - (a) 9 cm
    - (b) 10.5 cm
    - (c) 8 cm
    - (d) 6 cm

13. In the given figure, the length of arc AB is equal to 3 times radius r of the circle.
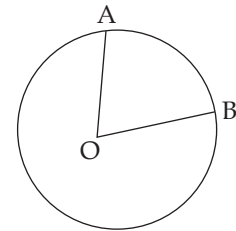
    Find the area of sector OAB in terms of radius r.
    - (a) 1.5 r²
    - (b) 2.5 r²
    - (c) $\dfrac{1}{2}r^2$
    - (d) 3 r²

14. The average age of a group of friends is 27 years. If 4 new friends whose average age is 25 years join them the average age of the entire group becomes 26 years. How many people were there in the group initially?
    - (a) 3
    - (b) 4
    - (c) 5
    - (d) 6

15. Simplify the expression $\dfrac{1^2 - m^2}{(1+m)^2}$, provided $(1 + m) \neq 0$.
    - (a) $\dfrac{1+m}{1-m}$
    - (b) $\dfrac{1-m}{1+m}$
    - (c) 0
    - (d) 1

16. $\csc 2910° + \sec 4260° + \tan 2565° + \cot 1755°$ = ?
    - (a) 3
    - (b) 1
    - (c) 4
    - (d) 0

17. If $(a^3 + b^3 + c^3 - 3abc) = 405$ and $(a + b + c) = 15$ find the value of $(a - b)^2 + (b - c)^2 + (c - a)^2$.
    - (a) 27
    - (b) 54
    - (c) 18
    - (d) 45

18. Radhika owns 2 dogs, 3 rabbits and 4 parrots as pets. What is the ratio of the number of rabbits to the total number of pets Radhika owns?
    - (a) 2 : 3
    - (b) 1 : 3
    - (c) 3 : 1
    - (d) 3 : 2

19. PT is a tangent to a circle whose centre is O, and where T is a point on the circle. If PT = 12 cm and PO = 13 cm, then find the radius of the circle.
    - (a) 4 cm
    - (b) 6 cm
    - (c) 4.5 cm
    - (d) 5 cm

1. Which number among 98984, 98992, 98998 and 99008 is NOT divisible by 8?
   (a) 98998
   (b) 98992
   (c) 98984
   (d) 99008

2. Two numbers are, respectively, 17% and 50% more than a third number. The ratio of the two numbers is:
   (a) 27 : 25
   (b) 39 : 50
   (c) 19 : 11
   (d) 29 : 25

3. If $\cos x + \sin x = \sqrt{2}\cos x$, what is the value of $(\cos x - \sin x)^2 + (\cos x + \sin x)^2$?
   (a) 2
   (b) 1
   (c) 0
   (d) $\dfrac{1}{\sqrt{2}}$

4. 14 persons can build a house in 60 days. How long will it take 30 person to build the same house, provided that they all work at the same rate?
   (a) 28 days
   (b) 30 days
   (c) 32 days
   (d) 56 days

5. The average of 8 numbers is 18. If one of the numbers is excluded, the average becomes 20. Find the excluded number.
   (a) 6
   (b) 10
   (c) 8
   (d) 4

6. The cube of the sum of two given numbers is 1728, while the product of the two given numbers is 32. Find the sum of the cubes of the two given numbers.
   (a) 576
   (b) 260
   (c) 640
   (d) 512

7. Ashok runs $2\dfrac{2}{3}$ times as fast as Bharat. If Ashok gives Bharat a head start of 160 m, then how far must the winning post be so that Ashok and Bharat can reach it at the same time?
   (a) 225 m
   (b) 256 m
   (c) 240 m
   (d) 200 m

8. The value of $\cos^2 32° - \sin^2 58°$ is:
   (a) $\dfrac{1}{2}$
   (b) -1
   (c) 1
   (d) 0

9. The following figure shows the different expenses that are incurred in manufacturing toys, If the total expenditure is ₹3,00,000, then how much expenditure was incurred on Material Cost and Selling Expenses (in ₹)

Material Cost 15%
Selling Expenses 28%
Labour Cost 12%
Packaging 25%
Assembling Cost 20%

   (a) 1,20,000
   (b) 1,15,000
   (c) 1,29,000
   (d) 84,000
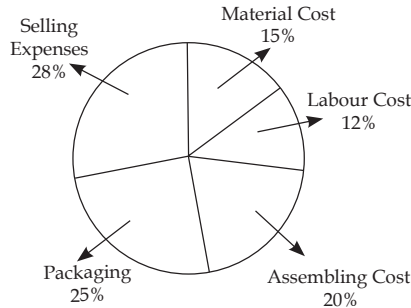
10. Aditya buys 300 mangoes for ₹ 1,100. Some of these mangoes are rotten and are thrown away. He sells the remaining mangoes at ₹5 each and makes a profit of ₹150. Find the percentage of mangoes thrown away.
    (a) $16\dfrac{1}{2}\%$
    (b) $15\dfrac{2}{3}\%$
    (c) $16\dfrac{2}{3}\%$
    (d) $16\dfrac{1}{3}\%$

11. (N+15) persons, each working for 9 hours a day, can complete 36% of a work in 8 days. (N+9) persons can complete the remaining work in 20 days, if each of them works for 7 hours per day. Determine the value of N.
    (a) 55
    (b) 52
    (c) 64
    (d) 50

12. The mid points of AB and AC of a $\triangle ABC$ are X and Y, respectively. If BC + XY = 18 units, then the value of BC – XY is:
    (a) 12 cm
    (b) 6 cm
    (c) 8 cm
    (d) 4 cm

13. In the shown figure, BC is a chord and CD is a tangent through the point C. IF $\angle AOC = 112°$, then find $\angle ACD$.

    (a) 63°
    (b) 59°
    (c) 65°
    (d) 56°

14. If $\sin\theta - \cos\theta = 0$, then find the value of $(\sin^3\theta - \cos^3\theta)$.
    (a) 0
    (b) 2
    (c) 1
    (d) $\dfrac{1}{\sqrt{2}}$
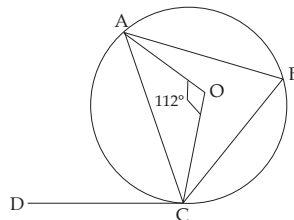
15. A dealer marks an article 60% above the cost price and sells it to a customer allowing two successive discounts of 10% and 20% on the marked price. If he gains ₹1,064 in the transaction, the cost price (in₹) of the article is:
    (a) 8,400
    (b) 7,000
    (c) 6,300
    (d) 7,200

16. A thief seeing a policeman from a distance of 300 m starts running at a speed of 10 km/h. The policeman gives chase immediately at a speed of 12 km/h and the thief is caught. What is the distance run by the thief?
    (a) 2 km
    (b) 2.5 km
    (c) 3.2 km
    (d) 1.5 km

17. If $\left(x + \dfrac{1}{x}\right) = 2$, then $x^7 + \dfrac{1}{x^{117}} =$ _____.
    (a) 1
    (b) 2
    (c) 4
    (d) 3

18. When m is divided by 7, the remainder is 5. When 3m is divided by 7, the remainder is:
    (a) 3
    (b) 2
    (c) 1
    (d) 0

19. 12 men can complete a work in 10 days. How many more men are required to complete the work in 6 days?
    (a) 24
    (b) 10
    (c) 8
    (d) 20

20. Study the given bar graph carefully and answer the following question. What is the ratio of the number of companies with more demand than production to the number of companies with more production than demand?
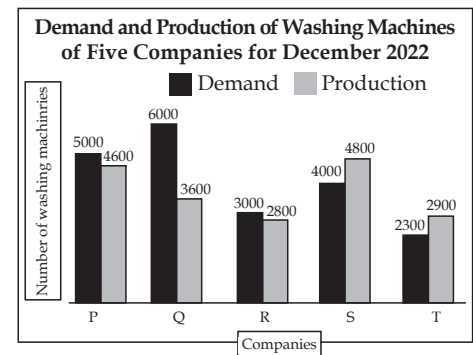
Demand and Production of Washing Machines of Five Companies for December 2022

Demand ■ Production ▨

P: 5000, 4600
Q: 6000, 3600
R: 3000, 2800
S: 4000, 4800
T: 2300, 2900

Number of washing machinries — Companies

    (a) 3 : 2
    (b) 4 : 3
    (c) 3 : 5
    (d) 2 : 3

1. The sum of the two numbers is 98. The difference between the two numbers is 28. Find one of the two numbers.
   - (a) 32
   - (b) 62
   - (c) 58
   - (d) 35

2. The speed of boat a down the stream is 125% of the speed in still water. If the boat takes 30 minutes to cover 20 km in still water, then how much time (in hours) will it take to cover 15 km upstream?
   - (a) $\dfrac{3}{4}$
   - (b) $\dfrac{1}{2}$
   - (c) $\dfrac{1}{4}$
   - (d) 1

3. Archana took a loan of ₹ 78,000 from a bank on 24th January 2012 at $8\dfrac{3}{4}\%$ per annum simple interest and paid it back on 18th June 2012. Find the total amount paid by Archana. (Approximated to nearest integer)
   - (a) ₹ 80,723
   - (b) ₹ 90,730
   - (c) ₹ 85,733
   - (d) ₹ 88,730

4. Mother told her daughter, "Seven years ago, I was seven times as old as you were then, Also, three from now, I shall be three times as old as you will be". Find the present ages of the mother and the daughter, respectively.
   - (a) 45; 15
   - (b) 40; 10
   - (c) 42; 12
   - (d) 50; 20

5. The following pie chart shows the annual expenditure on different items. What is the minimum angle in the given pie chart?
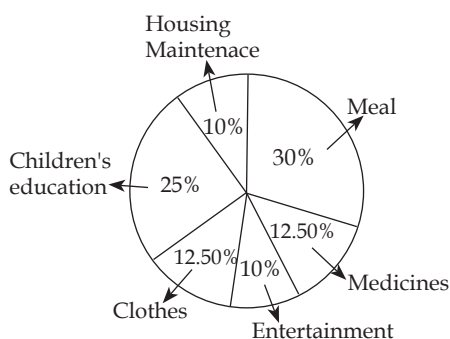
   - (a) 36°
   - (b) 45°
   - (c) 32°
   - (d) 30°

6. What is the number of common tangents that can be drawn to two circles that touch each other externally?
   - (a) 2
   - (b) 4
   - (c) 3
   - (d) 1

7. Which of the number 9592450, 9592330, 9592885 and 9592741 is divisible by 11?
   - (a) 9592885
   - (b) 9592741
   - (c) 9592450
   - (d) 9592330

8. The number of mobile sim-cards in 4 State/UT are given in the bar diagram. Study the diagram and answer the question.
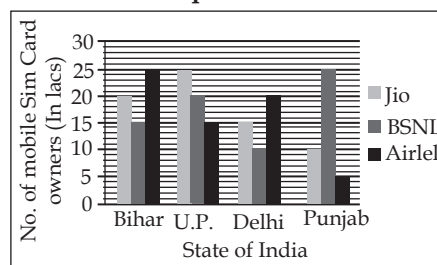
   In Delhi, the ratio of BSNL sim card and Airtel sim card sold is:
   - (a) 1 : 2
   - (b) 2 : 1
   - (c) 3 : 2
   - (d) 2 : 3

9. For any acute angle θ, $\sin\theta + \sin^2\theta = 1$, Then the value of $\cos^2\theta + \cos^4\theta$ = _____.
   - (a) 0
   - (b) 1
   - (c) 2
   - (d) – 1

10. Two persons started runing on a circular track at a speed of 20 m/s and 30 m/s in opposite directions. If the circumference of the circular track is 100 m, find at how many distinct points they will cross each other?
    - (a) 2
    - (b) 3
    - (c) 5
    - (d) 10

11. Susan can type 12 pages in 6 minutes. Mary can type 6 pages in 12 minutes. Working together, how many pages can they type in 32 minutes?
    - (a) 80
    - (b) 65
    - (c) 70
    - (d) 75

12. R lends some money to S on which S pays. ₹ 17,000 more to R. S lends the same money to T, on which T pays 8.5% more to S. What should be the minimum amount (in ₹) that S must be borrow so that he does not incur any loss in the process?
    - (a) 2,00,000
    - (b) 2,25,000
    - (c) 1,80,000
    - (d) 1,70,000

13. Work done by 8 men is completed in 10 days. The same work can be completed in 12 days when done by 10 women. How many days will it take to complete when 4 men and 4 women are employed to perform the same job?
    - (a) 12
    - (b) 6
    - (c) 10
    - (d) 8

14. If $x^2 - 7x + 1 = 0$, and $0 < x < 1$, what is the value of $x^2 - \dfrac{1}{x^2}$
    - (a) $21\sqrt{5}$
    - (b) $-21\sqrt{5}$
    - (c) $28\sqrt{5}$
    - (d) $-28\sqrt{5}$

15. The marked price of a geyser is ₹9,400 and the shopkeeper allows a discount 4% on it. Find the selling price of the geyser.
    - (a) ₹ 9,024
    - (b) ₹ 9,124
    - (c) ₹ 9,324
    - (d) ₹ 9,224

16. In ₹150, B buys 10 pens for ₹8 each, 10 erasers for ₹5 each and some sharpeners for ₹4 each. What is the average price per item in ₹?
    - (a) 8
    - (b) 7
    - (c) 10
    - (d) 6

17. 10 women can do a work in 6 days and 6 men can do the same work in 5 days. If all these men and women work together, then how many days will they take to finish this work?
    - (a) $2\dfrac{8}{11}$
    - (b) $4\dfrac{6}{11}$
    - (c) $1\dfrac{2}{11}$
    - (d) $3\dfrac{4}{11}$

18. If $\triangle ABC \sim \triangle PQR$, AB = 4 cm, PQ = 6 cm QR = 5 cm and RP = 12 cm, then find the perimeter of $\triangle ABC$.
    - (a) 18 cm
    - (b) 16 cm
    - (c) 20 cm
    - (d) 22 cm

19. The third proportional between 25 and 35 is
    - (a) 35
    - (b) 49
    - (c) 40
    - (d) 25

1. Which number among 34623, 34716, 34782 and 34783 is NOT divisible by 3?
   (a) 34716   (b) 34783
   (c) 34623   (d) 34782

2. Two circles touch each other externally at P. AB is a direct common tangent to the two circles. If A and B are points of contact and $\angle PAB = 65°$, then $\angle ABP$ is _____.
   (a) 35°   (b) 15°
   (c) 5°   (d) 25°

3. Two persons started running on a circular track simultaneously with speeds of 20 m/s and 30 m/s in opposite directions. If the circumference of the circular track is 100 m, then find at how many distinct points they will cross each other?
   (a) 3   (b) 2
   (c) 10   (d) 5

4. If $(a + b + c) = 12$, and $(a^2 + b^2 + c^{2+}) = 50$, find the value of $(a^3 + b^3 + c^3 - 3abc)$.
   (a) 36   (b) 24
   (c) 42   (d) 48

5. A saree bought for ₹500 is marked at 16% profit and later on sold at a sales discount of x% on the marked price. If the selling price of the saree is ₹493, find the value of x.
   (a) 18   (b) 16
   (c) 17   (d) 15

6. The following pie - chart shows the different coloured dresses worn by 60 students in a college party. Study the pie chart and answer the question that follows.

Dress Colours

7. In a group of 32 students, the average weight was 18.5 kg. When 4 students left the group, the average came down to 15.5 kg. What was the average weight (in kg) of those 4 students?
   (a) 39.5   (b) 37.5
   (c) 27.5   (d) 36.5
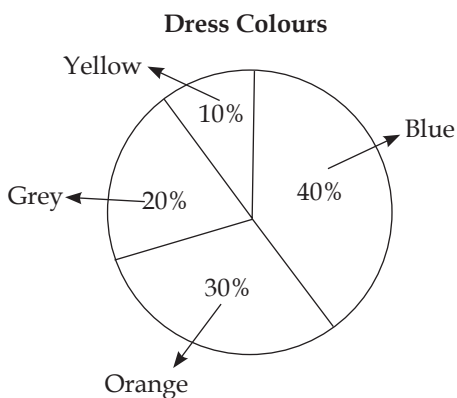
The degrees (central angle) for the blue coloured dress (sector which represents 40%) is:
   (a) 180°   (b) 60°
   (c) 120°   (d) 144°

8. If $\sec\theta = \dfrac{4}{3}$, what is the value of $\tan^2\theta + \tan^4\theta$?
   (a) $\dfrac{112}{81}$ (b) $\dfrac{256}{81}$
   (c) $\dfrac{64}{27}$ (d) $\dfrac{16}{81}$

9. The wages (in ₹) earned by a labourer in twelve months of a year are shown in the following bar graph.
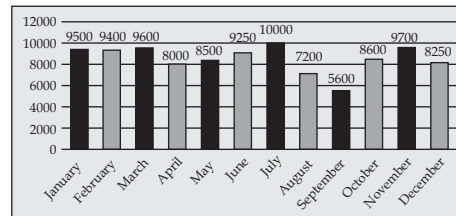
What is the average wage (in ₹) received by the labourer in the first five months of the year?
   (a) 9, 300   (b) 9, 000
   (c) 9, 100   (d) 9, 200

10. Simplify the following expression:
$$\frac{\left(12 + 5 - \dfrac{48}{16} + 71\right) + \left(\dfrac{\dfrac{72}{36} + 6 \times 7}{11}\right)}{232} \times \left[(51 + 4 - 13) + (13 - 12 \times 7)\right]$$
   (a) $\dfrac{-31}{233}$ (b) $\dfrac{31}{232}$
   (c) $\dfrac{41}{232}$ (d) $\dfrac{-31}{232}$

11. Using $\cot(A - B) = \dfrac{\cot A \cot B + 1}{\cot B - \cot A}$, find the value of $\cot 15°$
   (a) $2 + \sqrt{3}$ (b) $2 - \sqrt{3}$
   (c) $\sqrt{3} - 1$ (d) $\sqrt{3} + 1$

12. If $P \cos \alpha = 3$ and $4 \tan \alpha = Q$, then what is the relation between P and Q, which is independent of α?
   (a) $\dfrac{9}{P^2} + \dfrac{16}{Q^2} = 1$ (b) $\dfrac{9}{P^2} - \dfrac{16}{Q^2} = 1$
   (c) $\dfrac{P^2}{9} - \dfrac{Q^2}{16} = 1$ (d) $\dfrac{P^2}{9} + \dfrac{Q^2}{16} = 1$

13. In a $\triangle ABC$, the internal bisectors of $\angle B$ and $\angle C$ meet at O, if $\angle BAC = 72°$, then the value of $\angle BOC$ is:
   (a) 110°   (b) 126°
   (c) 136°   (d) 146°

14. The lateral area of a cylinder is 3168 cm² and its height is 48 cm. Find the volume.
   (a) 5244 cm³   (b) 5544 cm³
   (c) 5644 cm³   (d) 16632 cm³

15. A shopkeeper allows a discount of 10% on the printed price of his goods and thus gain 20%. What is the ratio between the cost price and the printed price of the item?
   (a) 3 : 4   (b) 2 : 3
   (c) 4 : 5   (d) 1 : 2

16. A can do a work in 4 days and B in 12 days. If they work on it together for 2 days, then the fraction of the work that will be left is:
   (a) $\dfrac{2}{3}$ (b) $\dfrac{2}{5}$
   (c) $\dfrac{1}{3}$ (d) $\dfrac{1}{5}$

17. Inlet Pipes A and B can together fill an empty tank in 1.5 hours. Outlet Pipe C, when opened alone, can empty the completely filled tank, in 4.5 hours. When only Pipes A and C are opened together, the empty tank is filled in 6 hours. Find the time taken by Pipe B, when opened alone, to fill the empty tank.
   (a) 3 hours 30 minutes
   (b) 3 hours 36 minutes
   (c) 3 hours 32 minutes
   (d) 3 hours 40 minutes

18. If $\left(3y - \dfrac{3}{y}\right) = 5$, find the value of $\left(y^2 + \dfrac{1}{y^2}\right)$.

1. An 11-digit number 7823326867X is divisible by 18. What is the value of X?
   - (a) 6
   - (b) 4
   - (c) 8
   - (d) 2

2. (N + 18) persons, each working for 7.5 hours a day, can complete 48% of a work in 20 days. (N + 12) persons can complete the remaining work in 30 days, if each of them works for 6.5 hours per day. Determine the value of N.
   - (a) 18
   - (b) 16
   - (c) 20
   - (d) 22

3. If Mohit can complete $\dfrac{2^{rd}}{3}$ of a work in 24 days, then in how many days can $\dfrac{1^{th}}{9}$ of the work be completed by him?
   - (a) 8
   - (b) 4
   - (c) 6
   - (d) 5

4. If $\left(x+\dfrac{1}{x}\right)=2\sqrt{2}$, and X > 1, what is the value of $\left(x^{6}+\dfrac{1}{x^{6}}\right)$?
   - (a) 198
   - (b) $116\sqrt{2}$
   - (c) $144\sqrt{2}$
   - (d) $128\sqrt{2}$

5. If $\dfrac{\sin x - \cos x}{\sin x + \cos x} = \dfrac{2}{5}$, then the value of $\dfrac{1+\cot^{2}x}{1-\cot^{2}x}$ is:
   - (a) 2.25
   - (b) 1.45
   - (c) 3.75
   - (d) 5.25

6. Study the given pie-chart and answer the question that follows. The pie-chart displays the percentage of fruits sold (in kg) by a fruit seller in one month.

   22.97%   22.98%
   8.11%
   8.11%
   6.76%   31.07%

   ■ Mangoes
   □ Grapes
   ■ Bemes
   ■ Oranges
   ■ Cherries
   □ Pomegranates
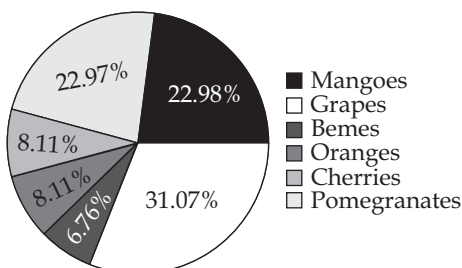
   If the total fruits sold by a fruit seller in one month was 50,000 kg, find the approximate different of the quantity, (in kg) of pomegranates and that of berries.
   - (a) 11,480
   - (b) 13,535
   - (c) 21,408
   - (d) 12,465

7. Simplify the given expression.
   $$\dfrac{432 \times 432 + 247 \times 247 - 432 \times 247}{432 \times 432 + 432 + 247 \times 247 \times 247}$$
   - (a) $\dfrac{1}{259}$
   - (b) $\dfrac{1}{185}$
   - (c) $\dfrac{1}{679}$
   - (d) $\dfrac{1}{450}$

8. Simplify the following.
   $$\dfrac{3a+b}{2} - \dfrac{a-3b}{3} + 2b$$
   - (a) $\dfrac{5(a+3b)}{6}$
   - (b) $\dfrac{7a+3b}{6}$
   - (c) $\dfrac{7(a+3b)}{6}$
   - (d) $\dfrac{a+3b}{6}$

9. Suhas mistakenly took as dividend a number which was 10% less than the original dividend. He also mistakenly took as divisor a number which was 20% less than the original divisor. If the correct quotient of the original question of division was 24 and the remainder was 0, then what quotient did Suhas obtain, assuming there was no error in his calculation?
   - (a) 27
   - (b) 21.6
   - (c) 26.4
   - (d) 30

10. On day one, with speed v, R covers distance x, in t time. On the next day, he covers a distance 2.5x in 0.75t time. What is his speed the next day?
    - (a) 3.5v
    - (b) $\dfrac{10}{3}$ v
    - (c) 4.5v
    - (d) $\dfrac{5}{3}$ v

11. In a 1170 m race, Raman reaches the final point in 65 seconds and Mohan reaches the final point in 90 seconds. By how much distance does Raman beat Mohan?
    - (a) 325 m
    - (b) 300 m
    - (c) 375 m
    - (d) 350 m

12. It takes A and B, 3 and 6 hours, respectively, to complete a certain work. If they work on the alternate hour. How long will it take them to accomplish the task?
    - (a) 3 hours
    - (b) 4 hours
    - (c) 2 hours
    - (d) 4.5 hours

13. Two chords of a circle. $\overline{AB}$ and $\overline{CD}$, meet outside the circle at the point P. If $m(\overline{AP}) = 200$ mm. $m(\overline{AB}) = 120$ mm, and $m(\overline{CP}) = 160$ mm, what is the length of $(\overline{CD})$?
    - (a) 100 mm
    - (b) 75 mm
    - (c) 60 mm
    - (d) 150 mm

14. Two circles of same radius 6 cm, intersect each other at P and Q. If PQ = 10cm, then what is the distance between the centres of the two circles?
    - (a) 10 cm
    - (b) 8 cm
    - (c) $6\sqrt{11}$ cm
    - (d) $2\sqrt{11}$ cm

15. Find the value of $(\sin\theta + \cos\theta)^{2} + (\sin\theta - \cos\theta)^{2}$
    - (a) 4
    - (b) 0
    - (c) 2
    - (d) 1

16. A grocer claims that he is selling sugar at ₹48/kg, which costs him ₹50/kg, but he is giving 900 g instead of 1000 g. What will be the approximate percentage profit?
    - (a) 7.5%
    - (b) 5.5%
    - (c) 8.5%
    - (d) 6.7%

17. Which of the following numbers is divisible by 36?
    - (a) 8840
    - (b) 1542
    - (c) 96272
    - (d) 55512

18. Find the length of the arc of the sector of a circle of diameter 7 cm with a central angle of 108°. [Use $\pi = \dfrac{22}{7}$]
    - (a) 6.6 cm
    - (b) 5.6 cm
    - (c) 13.2 cm
    - (d) 11.2 cm

19. How much simple interest will ₹6,000 earn in 21 months at 8% per annum?
    - (a) ₹750
    - (b) ₹880
    - (c) ₹620
    - (d) ₹840

1. Simplify the following expression.

   $[\sqrt{25} + 12 \div 3 - \{20 + (16 \text{ of } 8 \div 16) - (54 \div 18 \text{ of } \frac{1}{2})\}]$
   (a) -13 (b) 12
   (c) 22 (d) 0

2. If $a + b + c = 6$ and $a^2 + b^2 + c^2 = 14$, then what is the value of $(a - b)^2 + (b - c)^2 + (c - a)^2$?
   (a) -8 (b) 8
   (c) 10 (d) 6

3. An amount becomes double in 8 years on simple interest. In how many years would Rs. 25,000 become Rs. 1,00,000 with the same rate of interest?
   (a) 32 (b) 28
   (c) 16 (d) 24

4. The marked price on a book is ₹ 1,000. In a book fair, it is available for sale with a discount scheme offering two successive discounts of 12% and 8%. What is the final selling price (in ₹) of the book for a customer (rounded off to the nearest integer)?
   (a) 810 (b) 790
   (c) 825 (d) 800

5. A and B invested money in a business in the ratio of 7 : 5. If 15% of the total profit goes for charity, and A's share in the profit is Rs. 5,950, then what is the total profit?
   (a) Rs. 12,500   (b) Rs. 12,000
   (c) Rs. 10,500   (d) Rs. 11,750

6. A shopkeeper purchases six small cold drink bottles for ₹100. For how much should he sell one such bottle to get a profit of 20%?
   (a) ₹22   (b) ₹20
   (c) ₹21   (d) ₹23

7. Find the value of the given expression.

   $\frac{4}{3}\tan^2 45° + 3\cos^2 30° - 2\sec^2 30° - \frac{3}{4}\cot^2 60°$
   (a) $\frac{2}{3}$ (b) $\frac{3}{2}$
   (c) $\frac{\sqrt{2}}{3}$ (d) $\frac{3}{\sqrt{2}}$

8. Meenu is 38 years old. Her daughter is 8 years old. In how many years will Meenu be double her daughter's age?
   (a) 22 (b) 25
   (c) 20 (d) 24

9. Shatabdi Express train covers 700 km in 5 hours and another 1012 km in 11 hours. What is the average speed of the train (in metres/second)?
   (a) 107 (b) $385\frac{1}{5}$
   (c) $29\frac{13}{18}$ (d) 27

10. In a company, a piece of work can be completed in 4, 6 and 18 days alone by R, S and T, respectively. In how many days will the work be completed if they work together? (Rounded off to 2 decimal places)
    (a) 3.32 (b) 2.12
    (c) 3.42 (d) 3.21

11. In a $\triangle ABC$, if $\angle A = 90°$, $AC = 5$ cm, $BC = 9$ cm and in DPQR, $\angle P = 90°$, $PR = 3$ cm, $QR = 8$
    (a) $\triangle ABC \cong \triangle PQR$
    (b) $\triangle ABC \ncong \triangle PQR$
    (c) $\triangle ABC \neq \triangle PQR$
    (d) $\triangle ABC = \triangle PQR$

12. The following diagram shows the rainfall over two years. Which of the following months shows the highest percentage change in rainfall?
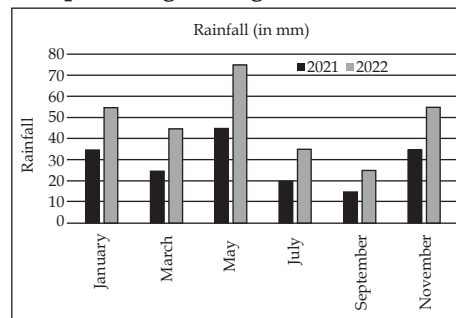
    (a) January   (b) September
    (c) May   (d) March

13. If $P = \frac{\sqrt{2}+1}{\sqrt{2}-1}$ and $q = \frac{\sqrt{2}-1}{\sqrt{2}+1}$ then find the value of $\frac{p^2}{q} + \frac{q^2}{p}$.

14. Find the exact value of cos 120°.
    (a) -0.5 (b) 0
    (c) 0.5 (d) 1

15. A cone and a cylinder with equal radii have equal volumes. The ratio of their heights is
    (a) $2 : 3$ (b) $3 : 4$
    (c) $1 : 2$ (d) $3 : 1$

16. Observe the given figure. The distance between the two centers AB is

    (a) 10 cm   (b) 11 cm
    (c) 13 cm   (d) 12 cm

(For questions 8/14 continuation)
(a) 200 (b) 196
(c) 198 (d) 188
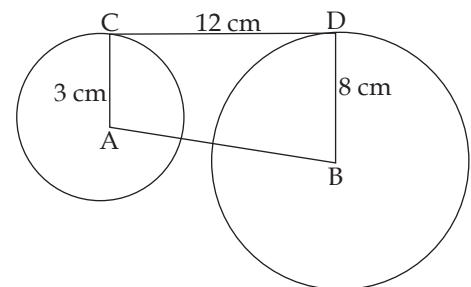
17. Quantity of various food items used by a restaurant during 4 months of a year (in kg).

Month	March	April	May	June
Food Item				
A	220	180	270	320
B	225	320	390	420
C	280	295	280	315
D	350	310	250	280
E	308	340	350	365

What is the average quantity of food item C used during all the 4 months together?
(a) 303.7 kg   (b) 295.5 kg
(c) 211.8 kg   (d) 253.6 kg

18. Find the fourth proportional of 144, 192 and 216.
    (a) 361 (b) 288
    (c) 324 (d) 289

19. Simplify the following expression.

    $\frac{7}{10} \div \frac{3}{7}\text{of}\left(2\frac{3}{10} + 2\frac{3}{5}\right) + \frac{1}{5} \div 1\frac{2}{5} - \frac{2}{7}$

1. If $a^2 + b^2 + c^2 = ab + bc + ac$, then the value of $\dfrac{11a^4 + 13b^4 + 17c^4}{17a^2b^2 + 9b^2c^2 + 15c^2a^2}$ is:
   - (a) 1
   - (b) 2
   - (c) 11
   - (d) 4

2. D and E are points on the sides AB and AC. respectively. Of $\triangle ABC$ such that DE is parallel to BC and AD : DB = 7 : 9. If CD and BE interest each other at F, then find the ratio of areas of $\triangle DEF$ and $\triangle CBF$.
   - (a) 49 : 144
   - (b) 49 : 81
   - (c) 49 : 256
   - (d) 256 : 49

3. A and B are equally efficient, and each could individually complete a piece of work in 30 days, if none took any holiday. A and B started working together on this piece of work, but A took a day off after every four days of work, while B took a day off after every five days of work. If the duo had started work on 01 August 2022, on which date was the work completed?
   - (a) 19 August 2022
   - (b) 17 August 2022
   - (c) 16 August 2022
   - (d) 18 Augus 2022

4. A conical tent with radius 6 units and height 8 units is to be made by canvas. How much canvas is needed to make the tent? (Rounded off to two places of decimals)
   - (a) 188.57 units
   - (b) 155.87 units
   - (c) 166.57 units
   - (d) 177.55 units

5. The smallest number added to 888 so that it is exactly divisible by 35 is:
   - (a) 22
   - (b) 23
   - (c) 20
   - (d) 21

6. The square of the difference between two given natural number is 324, while the product fo these two given numbers is 144. Find the positive difference between the squares of these two given numbers.
   - (a) 630
   - (b) 540
   - (c) 450
   - (d) 360

7. A alone can finish a work in 15 days. A works only for the first two days and last two days. The rest work is done by B and the work is completed in 20 days. In how many days A and B together can finish the work?
   - (a) $\dfrac{90}{8}$
   - (b) $\dfrac{80}{7}$
   - (c) $\dfrac{80}{9}$
   - (d) $\dfrac{70}{8}$

8. The value of
   $51 \div (25 + (25 \text{ of } 12 \div 30) - (5^4 \div 5 \text{ of } 125)$ is:
   - (a) $\dfrac{2}{3}$
   - (b) $\dfrac{3}{2}$
   - (c) $-\dfrac{2}{3}$
   - (d) $-\dfrac{3}{2}$

9. If $\sin(5x - 25°), = \cos(5y + 25°)$ where $5x - 25°$ and $5x + 25°$ are acute angles, then the value of (x + y) is:
   - (a) 50°
   - (b) 40°
   - (c) 18°
   - (d) 16°

10. A and B can finish a work in 10 days, B and C can finish it in 12 days and C and A can finish in 6 days. In how many days A lone can finish the work?
    - (a) $\dfrac{120}{9}$
    - (b) 12
    - (c) $\dfrac{120}{11}$
    - (d) $\dfrac{121}{12}$

11. A toffee company prepares toffee of two different flavours X and Y. The prodution of two flavours over a period of 4 years is expressed in the bar graph given below.

    Production of two different toffee flavours by a company over different years (in 1000 packs)

    What is the difference between the average production of flavour X in 2017 and 2018 and the average production of flavour Y in 2019 and 2020.
    - (a) 6000
    - (b) 6400
    - (c) 7500
    - (d) 7000

12. According to Raghav, his weight is more than 64 kg but less than 74 kg. His sister does not agree with Raghav and she thinks that his weight is more than 60 kg but less than 69 kg. His mother's view is that his weight cannot be more than 68 kg. His father's view is that his weight cannot be more than 67 kg. If all are them are correct in their estimation, then what is the average of different probable weights of Raghav measured (in kg)?
    - (a) 66
    - (b) 67
    - (c) 68
    - (d) 65

13. The marked price of a ceiling fan is ₹ 4,200 and the shopkeeper allows a discount of 5% on it. If his profit is 14%, then the cost price of the fan is:
    - (a) ₹3,200
    - (b) ₹3,800
    - (c) ₹3,000
    - (d) ₹3,500

14. Which of the following is a FALSE statement?
    - (a) $\tan^2 A = 1 - \sec^2 A$
    - (b) $\sin A = \tan A \times \cos A$
    - (c) $\csc^2 A - 1 = \cot^2 A$
    - (d) $\cos A \times \sec A = 1$

15. If in $\triangle XYZ$, XY = 4 and XZ = 5 cm, and Q is a point on YZ such that XQ bisects $\angle X$, then YQ : QZ is:
    - (a) 2 : 3
    - (b) 3 : 2
    - (c) 5 : 4
    - (d) 4 : 5

16. A train traveling 70 km/h crosses another train traveling in the same direction at 34 km/h in 25 seconds. What is the combined length of both the trains (in metres)?
    - (a) 225
    - (b) 250
    - (c) 325
    - (d) 500

17. In a constituency, 85% of the total number of people on the electroal roll cast their votes during an election. 10% of the votes cast were

1. If the areas of two similar triangles are in the ratio 196 : 625, what would be the ratio of the corresponding sides?
   (a) 14 : 25   (b) 13 : 20
   (c) 14 : 20   (d) 13 : 25

2. If $\sec\theta + \tan\theta = 5$, then find the value of $\tan\theta$.
   (a) $\dfrac{5}{12}$ (b) $\dfrac{13}{5}$
   (c) $\dfrac{13}{3}$ (d) $\dfrac{12}{5}$

3. The ratio of the length of each equal side and the third side of an isosceles triangle is 3 : 5. If the area of the triangle is $30\sqrt{11}$ cm², then the length of the third side (in cm) is:
   (a) $10\sqrt{6}$ (b) $5\sqrt{6}$
   (c) $13\sqrt{6}$ (d) $11\sqrt{6}$

4. In a factory, utensils are manufactured in three plants, plant A, B and C. How many plates are manufactured by plant B if total plates are 3260?

   Share in manufacturing

   (a) 1467   (b) 1304
   (c) 1254   (d) 1141

5. The value of
   $\left(\dfrac{1}{\sin\theta} + \dfrac{1}{\tan\theta}\right)\left(\dfrac{1}{\sin\theta} - \dfrac{1}{\tan\theta}\right)$ is:
   (a) 0   (b) 2
   (c) 3   (d) 1

6. The percentage profit earned by selling an article for ₹2,000 is the same as the percentage loss incurred by selling the same article for ₹1,200. At what price should that article be sold to make a profit of 20%?
   (a) ₹2,000   (b) ₹1,800
   (c) ₹1,920   (d) ₹1,840

7. Which number among 24963, 24973, 24983 and 24993 is divisible by 7?
   (a) 24973   (b) 24983
   (c) 24963   (d) 24993

8. Simplify the following:
   sin 2x + 2 sin 4x + sin 6x
   (a) 4 cos²x sin 4x
   (b) 4 cos²x sin x
   (c) 2 cos²x sin 4x
   (d) 4z sin²x sin 4x

9. If 405 : y :: y : 125, and y > 0, then find the value of y.
   (a) 225   (b) 205
   (c) 215   (d) 235

10. A policeman follows a thief who is 600 m ahead of the policeman. If the policeman and the thief run at speeds of 10 km/h and 8 km/h, respectively, in how much time (in minutes), will the policeman catch the thief?
    (a) 16   (b) 14
    (c) 18   (d) 12

11. Which of the following numbers is divisible by 36?
    (a) 47502   (b) 29412
    (c) 54732   (d) 87064

12. Amar can complete a work in 15 days, and Prem, 12 days. Starting with Amar, they work on alternate days. In how many days will the work be completed?
    (a) $13\dfrac{2}{5}$ (b) $12\dfrac{1}{6}$
    (c) $13\dfrac{1}{2}$ (d) 13

13. A and B alone can do a piece of work in 4 and 9 days, respectively. In how many days will the work be completed, if they both work on alternate days, starting with B?
    (a) $5\dfrac{1}{3}$ (b) $5\dfrac{2}{3}$
    (c) 5   (d) $5\dfrac{1}{4}$

14. If two qualities of pulses 'X' and 'Y' of prices ₹100 and ₹150 per kg are mixed in the ratio 7 : 20, then what is the price (in₹) of this mixture of pulses (correct to the nearest Rupee)?
    (a) 137   (b) 135
    (c) 134   (d) 136

15. If $X - \dfrac{1}{x} = -6$, what will be the value of $X^5 - \dfrac{1}{x^5}$?
    (a) –8898   (b) –8896
    (c) –8886   (d) –8892

16. Study the following bar chart and answer the question.
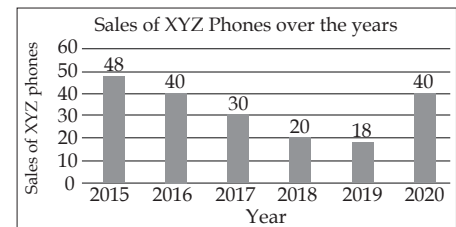
    Find the percentage increase of sales of XYZ phones from 2019 to 2020? (Rounded up to 2 decimal places)
    (a) 122.22 Percent
    (b) 110.11 Percent
    (c) 119.19 Percent
    (d) 121.89 Percent

17. In a factory, 48% of the number of male workers is equal to two-third of the number of female workers. What is the ratio of the number of males to that of the females in the factory?
    (a) 25 : 12   (b) 12 : 25
    (c) 18 : 25   (d) 25 : 18

18. If (a + b + c) = 19, and (a² + b² + c²) = 155, find the value of (a–b)² + (b–c)² + (c–a)².
    (a) 104   (b) 108
    (c) 100   (d) 98

19. The difference (in₹) between a discount of 35% on ₹3,600 and two successive discounts of 30% and 5% on the same amount is:
    (a) 54   (b) 78
    (c) 82   (d) 52

20. Raja and Rocky together can complete painting work in 5 days. Together they both start painting, but after 2 days, Rocky falls sick and leaves the work. If Raja completes the remaining painting in 4 days,

1. The cube of the difference between two given natural numbers is 1728, while the product of these two given numbers is 108. Find the sum of the cubes of these two given numbers.
   - (a) 6048
   - (b) 5616
   - (c) 6024
   - (d) 5832

2. 30 men can complete a work in 12 days. After 6 days, 24 more men joined them. How many days will they now take to complete the remaining work?
   - (a) $3\dfrac{1}{3}$ days
   - (b) $3\dfrac{2}{3}$ days
   - (c) $3\dfrac{1}{2}$ days
   - (d) $2\dfrac{1}{3}$ days

3. A thief is spotted by a policeman from a distance of 400m. When the policeman starts chasing, the thief also starts running. If the speed of thief is 32km/h and that of the policeman is 40 lm/h, then how far would the thief have run before he is overtaken?
   - (a) 1500m
   - (b) 1000m
   - (c) 1200m
   - (d) 1600m

4. The cube of the difference between two given natural numbers is 1728, while the product of these two given numbers is 108. Find the positive difference between the cubes of these two given numbers.
   - (a) 4104
   - (b) 5616
   - (c) 2160
   - (d) 5626

5. Study the following table and answer the question below.

School name	Total number of students enrolled	Percentage of enrolled students who opted for Biology	Ratio of male to female students who opted for Biology
A	900	30%	7 : 8
B	400	38%	9 : 10
C	1000	24%	5 : 19
D	800	18%	5 : 7

   What is the ratio of the number of male students to that of female students who opted for Biology in schools A and D together?
   - (a) 38 : 31
   - (b) 21 : 38
   - (c) 31 : 28
   - (d) 31 : 38

6. A conical tent of height 10m and base diameter 48m was erected by a company in a park. Find the curve surface area of the tent (in m²).
   - (a) 576π
   - (b) 1248π
   - (c) 1152π
   - (d) 624π

7. The number of sport bicycles sold by a shopkeeper in five years is shown in the following by graph.
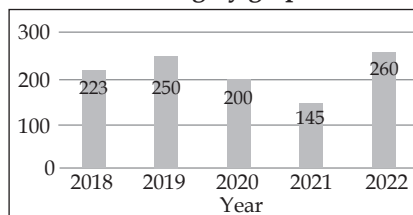
   What is the percentage of decrease in the sale of sport bicycles in the year 2021 over that in the previous year?
   - (a) 27.0%
   - (b) 26.5%
   - (c) 26.0%
   - (d) 27.5%

8. Using trigonometric formulas, find the value of $\left(\dfrac{\sin(x-y)}{\sin(x+y)}\right)\left(\dfrac{\tan x + \tan y}{\tan x - \tan y}\right)$
   - (a) –2
   - (b) 2
   - (c) 0
   - (d) 1

9. Simplify the given expression.
   $$\dfrac{(326+222)^2 - (326-222)^2}{(326 \times 222)}$$
   - (a) 1
   - (b) 4
   - (c) 3
   - (d) 2

10. The third proportional to $(x^2 - y^2)$ and $(x - y)$ is:
    - (a) $(x - y)$
    - (b) $\dfrac{x-y}{x+y}$
    - (c) $\dfrac{x+y}{x-y}$
    - (d) $(x + y)$

11. A shopkeeper offers the following two discount schemes.
    (A) Two successive discounts of 10% and 15%.
    (B) Buy 5 get 2 free.
    Which scheme has the maximum discount percentage?
    - (a) B does not give any discount
    - (b) B
    - (c) A and B both have the same discount percentage
    - (d) A

12. A can finish a work in 20 days and B can complete the same work in 15 days. B worked for 9 days and left the job. In how many days can A alone finish the remaining work?
    - (a) 10 days
    - (b) 8 days
    - (c) 9 days
    - (d) 7 days

13. Two trains P and Q of lengths 320 m and 540 m, respectively, are running in the same direction on parallel tracks at 108 km/h and 144 km/h, respectively. How much time will the trains take to cross each other completely?
    - (a) 86 s
    - (b) 54 s
    - (c) 32 s
    - (d) 68 s

14. 10 men can do a work in 25. After 12 days of work, 3 more men were engaged to finish the work. The number of days required to complete the remaining work is:
    - (a) 10
    - (b) 8
    - (c) 6
    - (d) 12

15. If the simple interest for 5 years is equal to 25% of the principal, then the interest will be equal to the principal after _____ years.
    - (a) 20
    - (b) 30
    - (c) 25
    - (d) 22

16. Which of the following numbers will completely divide $4^{12} + 4^{13} + 4^{14} + 4^{15}$?
    - (a) 3
    - (b) 7
    - (c) 11
    - (d) 17

17. If $\cot A = \dfrac{12}{5}$, then the value of (sin A + cos A)× cosec A is _____.
    - (a) $\dfrac{13}{5}$
    - (b) $\dfrac{17}{5}$
    - (c) $\dfrac{14}{5}$
    - (d) 1

18. Raj's income is ₹45,000 and his expenditure is ₹33,000. If his income is increased by 20% and expenditure by 12%, then what will be the percentage increase in saving?
    - (a) 48%
    - (b) 56%
    - (c) 36%
    - (d) 42%

19. Which of the following numbers is divisible by 24?

1. $18 \div \{(6 \text{ of } 2 - 4)\} \times 5(6 - 3) = $ _____.

   (a) $\dfrac{154}{4}$ (b) $\dfrac{145}{4}$

   (c) $\dfrac{153}{4}$ (d) $\dfrac{135}{4}$

2. Study the given pie-chart carefully and answer the following question.

   If scholarship has to be paid out of the donation fund, then what is the percentage of donation fund used for this purpose (rounded off to two decimal places)?

   The entire fund that school gets from different sources is equal to ₹10 lakh

   Govt. agencies 12%
   Internal sources 15%
   NGO's 38%
   Donation 35%

   Source of funds in school

   Payment 11%
   School Maintainance 30%
   Scholarship 26%
   Reserved 33%

   Uses of funds by school

   (a) 74.29%   (b) 72.15%
   (c) 80.25%   (d) 75.25%

3. 15 men and 21 women, working together, can do a job in 56 days, while 12 men and 24 women, working together, can do the same job in 64 days. In how many days can the same job be done by 18 men and 24 women, working together?

   (a) $47\dfrac{6}{19}$ (b) $47\dfrac{5}{19}$

   (c) $47\dfrac{9}{19}$ (d) $47\dfrac{3}{19}$

4. During a division, Pranjal mistakenly took as the dividend a number that was 10% more than the original dividend. He also mistakenly took 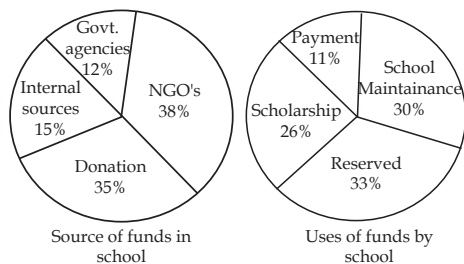as the divisor a number that was 25% more than the original divisor. If the correct quotient of the original division problem was 25 and the remainder was 0, what was the quotient of the Pranjal obtained, assuming his calculations had no error?

   (a) 21.75   (b) 21.25
   (c) 28.75   (d) 22

5. If the selling price of an article is doubled, then the profit becomes four times. What was the original profit percentage?

   (a) 75%   (b) 100%
   (c) 50%   (d) 25%

6. A person standing at a distance looks at a building having a height of 1000 metres. The angle between the top of the building and the ground is 30°. At what approximate distance (in metres) is the person standing away from the building.

   (a) 1000   (b) 936
   (c) 1732   (d) 1542

7. A can do 20% of a job in 7 days and B can do 25% of the job in 7 days if they worked alone. How much of the job (in percentage) can they complete in 7 days if they worked together?

   (a) 38%   (b) 52%
   (c) 56%   (d) 45%

8. $\dfrac{\sin^4\theta + \cos^4\theta}{1 - 2\sin^2\theta \cdot \cos^2\theta} = $ _____.

   (a) 1   (b) 2
   (c) –1   (d) 0

9. What is the value of $\dfrac{X}{Y}$ if $\dfrac{X-5Y}{X+5Y} = \dfrac{7}{13}$.

   (a) $\dfrac{23}{7}$ (b) $\dfrac{24}{9}$

   (c) $\dfrac{50}{3}$ (d) $\dfrac{100}{7}$

10. The following table shows the scores of three attempts of Archery players in a tournament. The player scoring the highest average score was declared the best player. Who was the best player?

Player	Score 1	Score 2	Score 3
Angela	62.50	65.00	64.50
Maria	69.05	70.00	67.52
Sareena	73.81	72.50	74.20
Preeti	74.30	75.00	77.50
Deepika	64.29	67.50	63.28

   (a) Angela   (b) Maria
   (c) Deepika   (d) Preeti

11. If $= \left(x + \dfrac{1}{x}\right) 10$, what is the value of $\left(x^4 + \dfrac{1}{x^4}\right)$?

   (a) 9604   (b) 9602
   (c) 9600   (d) 9606

12. A dealer marks his goods at 20% above the cost price and allows a discount of 15% on the marked price. What is his gain or loss percentage?

   (a) 4% gain   (b) 2% loss
   (c) 2% gain   (d) 4% loss

13. A six-digit number is divisible by 33. If 54 is added to the number, then the new number formed will also be divisible by:

   (a) 3   (b) 2
   (c) 5   (d) 7

14. In the given figure, If AD ⊥ BC, AC = 26 units, CD = 10 units, BC = 42 units, ∠DAC = x and ∠B = y, then the value of $\dfrac{6}{\cos x} - \dfrac{5}{\cos y} + 8\tan y$ is:
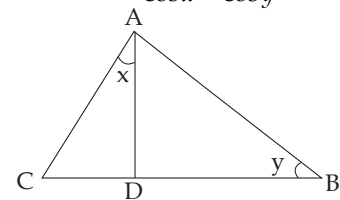
   (a) $\dfrac{16}{9}$ units   (b) $\dfrac{13}{6}$ units

   (c) $\dfrac{25}{4}$ units   (d) $\dfrac{15}{7}$ units

15. A sector of a circle of radius 10 cm is formed at 60° angle at the centre. What will be its area (take π = 3.14)?

   (a) 52.33 cm²   (b) 75.28 cm²
   (c) 60.67 cm²   (d) 55.00 cm²

16. A spherical ball of lead, 3 cm in diameter, is melted and recast into three spherical balls. The diameter of two of these balls $\dfrac{3}{2}$ are cm and 2 cm, respectively. Find the diameter of the third ball.

1. If $a\cot\theta + b\,\mathrm{cosec}\theta = p$ and $b\cot\theta + a\,\mathrm{cosec}\theta = q$ then $p^2 - q^2$ is equal to__.
   - (a) $a^2 + b^2$
   - (b) $a^2 - b^2$
   - (c) $b^2 - a^2$
   - (d) $b - a$

2. What is value of the given expression?
   $(a + b + c)^2 - a^2 - b^2 - c^2$
   - (a) $2abc$
   - (b) $2(ab + bc + ca)$
   - (c) $2(a + b + c)$
   - (d) $2ab + bc - 2ca$

3. Study the given table and answer the question that follows.

   The table shows the classification of 100 students based on the marks obtained by them in Statistics and Mathematics in an examination out of 50.

Subject	40 and above	30 and above	20 and above	10 and above	0 and above
Mathematics	8	33	90	82	100
Statistics	5	22	60	87	100

   If at least 60% marks in Mathematics are required for pursuing higher studies in Mathematics, then how many students will be eligible to pursue higher studies in Mathematics?
   - (a) 33
   - (b) 27
   - (c) 90
   - (d) 10

4. After allowing a discount of 15%, the value of a washing machine is ₹29,750. If no discount is allowed, then the shopkeeper gains 12%. The cost price of the washing machine is:
   - (a) ₹31,250
   - (b) ₹31,500
   - (c) ₹31,750
   - (d) ₹32,000

5. Pratima and Diksha can complete a typing work separately in 10 hours and 15 hours, respectively. After typing for 4 hours alone, Pratima leaves the work. In how many hours will Diksha complete the remaining typing work?
   - (a) 8
   - (b) 10
   - (c) 9
   - (d) 7

6. What is the volume of a cube if the perimeter of one face of the cube is 40 cm?
   - (a) 1000 cm³
   - (b) 820 cm³
   - (c) 600 cm³
   - (d) 800 cm³

7. The following table gives the information of the number of students (in thousands) placed in five different companies during six different years.

Year	Company				
	A	G	Y	T	F
2010	9.6	10.4	9.3	9.8	8.7
2011	10.4	12.6	7.2	13.8	6.2
2012	12.6	9.8	10.4	14.9	9.8
2013	16.8	15.4	11.4	16.3	11.3
2014	19.3	13.4	13.4	11.8	7.8
2015	18.7	16.7	12.7	15.7	13.7

   What is the difference (in thousands) between the students placed in all companies in the year 2014 and 2021?
   - (a) 9000
   - (b) 7800
   - (c) 8200
   - (d) 7500

8. One quality of rice at ₹45 per kg is mixed with another quality at a certain rate in the ratio of 3 : 2. If the mixture so formed is worth ₹50 per kg, what is the rate per kg of the second quality of rice?
   - (a) ₹57
   - (b) ₹57.5
   - (c) ₹58
   - (d) ₹58.5

9. What is the radius of circle which circumscribe the triangle ABC whose sides are 16, 30, 34 units, respectively?
   - (a) 16 units
   - (b) 17 units
   - (c) 28 units
   - (d) 34 units

10. How many of the following numbers are divisible by 132?
    660, 754, 924, 1452, 1526, 1980, 2045 and 2170
    - (a) 3
    - (b) 6
    - (c) 5
    - (d) 4

11. In a constituency, 90% of the total number of people on the electoral roll cast their votes during an election. 15% of the votes cast were declared invalid. Jeeta secured 60% of the valid votes. If Jeeta secured 91,800 valid votes, what was the total number of people on the electoral roll?
    - (a) 2,16,000
    - (b) 2,25,000
    - (c) 1,80,000
    - (d) 2,00,000

12. 12 men and 16 boys can do a piece of work in 5 days, while 13 men and 24 boys can do it in 4 days. In how many days can 29 men and 22 boys complete the work?
    - (a) 2.5
    - (b) 2.45
    - (c) 2.6
    - (d) 2.4

13. A bag contains ₹550 in the form of 50 p and 20 p coins in the ratio 2 : 3 : 5. The difference between the amounts that are contributed by the 50 p and the 20 p coins is:
    - (a) ₹30
    - (b) ₹20
    - (c) ₹10
    - (d) ₹0

14. The distance between the centres of two circles having radii 16 cm and 8 cm, is 26 cm. The length (in cm) of the direct common tangent of the two circles is:
    - (a) $2\sqrt{132}$
    - (b) $\sqrt{153}$
    - (c) $2\sqrt{153}$
    - (d) $\sqrt{132}$

15. Find the area of the sector of a circle with radius 5 cm and angle 60° (rounded off to one decimal).
    - (a) 12.8 cm²
    - (b) 14.1 cm²
    - (c) 13.1 cm²
    - (d) 15.1 cm²

16. Solve the following expression.
    $(-25) \times 8 + (-25) \times 2$
    - (a) –210
    - (b) 250
    - (c) –250
    - (d) 210

17. The product of 277 and 323 is:
    - (a) 89471
    - (b) 88471
    - (c) 91371
    - (d) 89391

18. If $\cos x = -\dfrac{1}{2}$, x lies in third quadrant, then $\tan x$ = ?
    - (a) $\sqrt{3}$
    - (b) $\dfrac{\sqrt{3}}{2}$
    - (c) $\dfrac{2}{\sqrt{3}}$
    - (d) $\dfrac{1}{\sqrt{3}}$

19. A person took a loan at 5% per annum simple interest during the first year and with an increase of 0.5% simple interest every year from the second year onwards. After 4 years, he paid ₹4,600 as a total interest to settle the loan completely. How much was the loan?
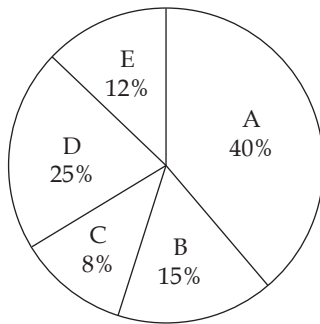
1. The lengths of the three sides of a triangle are 30 cm, 42 cm and x cm. Which of the following is correct?
   (a) $12 \leq x < 72$　(b) $12 > x > 72$
   (c) $12 < x < 72$　(d) $12 \leq x \leq 72$

2. The largest 5-digit number exactly divisible by 88 is:
   (a) 99990　(b) 99984
   (c) 99978　(d) 99968

3. The following pie chart shows the monthly sale of laptops of five companies A, B, C, D and E in a store.

   If 2,500 laptops were sold by the store in a month, then what is the difference between the number of laptops sold of Company A and that of Company C?
   (a) 750　(b) 650
   (c) 800　(d) 700

4. If $a + \dfrac{1}{a} = 7$, then $a^5 + \dfrac{1}{a^5}$ is equal to:
   (a) 15127　(b) 13127
   (c) 14527　(d) 11512

5. Find the value of cos47°sec133° + sin44°cosec136°.
   (a) $\dfrac{1}{2}$　(b) 1
   (c) 0　(d) –1

6. A, B and C run simultaneously, starting from a point, around a circular track of length 1200m, at respective speeds of 2m/s, 4m/s and 6m/s. A and B run in the same direction, while C runs in the opposite direction to the other two. After how much time will they meet for the first time?

   (a) 10 minutes　(b) 9 minutes
   (c) 12 minutes　(d) 11 minutes

7. A sum of money invested at a certain rate of simple interest per annum amounts to ₹14,522 in seven years and to ₹18,906 in eleven years. Find the sum invested (in ₹).
   (a) 6850　(b) 6900
   (c) 6800　(d) 6750

8. If the side of an equilateral triangle is increased by 34%, then by what percentage will its area increase?
   (a) 70.65%　(b) 79.56%
   (c) 68.25%　(d) 75.15%

9. Find the sum of $3 + 3^2 + 3^3 + ... + 3^8$.
   (a) 6561　(b) 6560
   (c) 9840　(d) 3280

10. A, B and C can do a piece work in 30 days, 40 days and 50 days, respectively. Beginning with A, if A, B and C do the work alternatively then in how many days will the work be finished?

    (a) $38\dfrac{1}{12}$　(b) $36\dfrac{1}{2}$
    (c) 36　(d) $39\dfrac{1}{12}$

11. A thief is spotted by a constable from 200m. When the constable starts the chase, the thief also starts running. If the speed of the constable is 8 km/h and thief runs at the speed of 6 km/h, then how far (in m) will the thief be able to run before he is overtaken?
    (a) 600　(b) 400
    (c) 550　(d) 500

12. In a bag containing red, green and blue pens, the ratio of red, blue and green pens, in the given order, was 7 : 4 : 9. If the total number of pens in the bag was 320, how many of them were red?
    (a) 112　(b) 105
    (c) 119　(d) 126

13. Ravi can do a piece of work in 40 days and Sudha can do the same piece of work in 60 days. If they work on alternative days starting with Sudha on the first day, then in how many days will the work be completed?

    (a) 40　(b) 60
    (c) 48　(d) 45

14. An arc of length 23.1 cm subtends an 18° angle at the centre. What is the area of the circle? $\left(\text{Use } \pi\ \dfrac{22}{7}\right)$
    (a) 16978.50 cm²　(b) 16988.50 cm²
    (c) 16878.50 cm²　(d) 16798.50 cm²

15. Study the given table and answer the question that follows.

    The table shows the number of candidates who appeared (App), qualified (Qual) and selected (Sel) in a competitive examination from four state Delhi, Goa, Karnataka and Maharashtra over the years 2012 to 2016.

Years	Delhi			Goa			Karnataka			Maharashtra		
	App	Qual	Sel	App	Qual	Sel	App	Qual	Sel	App	Qual	Sel
2012	8000	850	94	7800	810	82	7500	720	78	8200	680	85
2013	4800	500	48	7500	800	65	5600	620	85	6800	600	70
2014	9500	850	90	8800	920	86	7000	650	70	7800	720	84
2015	9000	800	70	7200	850	75	8500	950	80	5700	485	60
2016	7500	640	82	7400	560	70	4800	400	48	6500	525	65

    The number of candidates selected from Maharashtra during the period under review is approximately what percentage of the number selected from Delhi during this period?
    (a) 96.79%　(b) 92.79%
    (c) 93.39%　(d) 94.79%
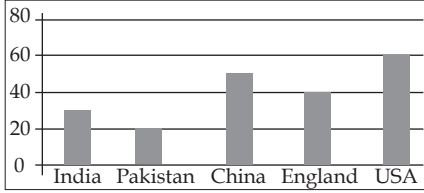
16. If $\tan\dfrac{\pi}{6} + \sec\dfrac{\pi}{6} = x$, then find x.
    (a) $\sqrt{3}$　(b) $\dfrac{1}{\sqrt{3}}$
    (c) $\dfrac{-1}{\sqrt{3}}$　(d) $\dfrac{2}{\sqrt{3}}$

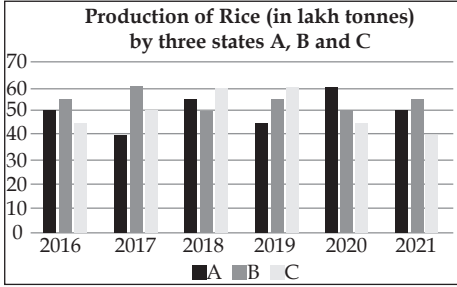17. What is the whole surface area of a cone of base radius 6 cm and height 8 cm?
    (a) 354.50 cm²　(b) 350.51 cm²
    (c) 301.71 cm²　(d) 364.61 cm²

18. 15 men can complete a work in 25 days, and 25 women can complete the same work in 40 days. If all the 15 men and 25 women work together, in how many days will the work get completed?

1. Simplify
$2.5 \times [144 \div 198 \times \{121 \times 81 \div (11 \times 9)\}]$
   (a) 180   (b) 175
   (c) 185   (d) 190

2. There are 3 members in a family. The average age of the father and mother is 40 years. The average age of the father, mother and daughter is 30 years. Find the age (in years) of the daughter.
   (a) 6   (b) 12
   (c) 10   (d) 8

3. A shopkeeper sells an item at a profit of 15% and uses a weight which is 20% less. Find his actual profit percentage.
   (a) 42.5%   (b) 50%
   (c) 40%   (d) 43.75%

4. Find the smallest number that can be subtracted from 148109326 so that it becomes divisible by 8.
   (a) 4   (b) 8
   (c) 6   (d) 10

5. Simplify the following expression.
$(3x + 5)^2 + (3x – 5)^2$
   (a) $500x$ (b) $450x$
   (c) $9x^2 + 50$ (d) $2(9x^2 + 25)$

6. The volume of a cone with height equal to radius, and slant height 5 cm is:
   (a) $\dfrac{125\pi}{12\sqrt{3}}$ cm^3 (b) $\dfrac{125\pi}{6\sqrt{3}}$ cm^3
   (c) $\dfrac{125\pi}{12\sqrt{2}}$ cm^3 (d) $\dfrac{125\pi}{6\sqrt{2}}$ cm^3

7. A policeman noticed a thief from 300 m. The thief started running and the policeman was chasing him. The thief and the policeman ran at the speeds of 8 km/h and 9 km/h, respectively. What was the distance between them after 3 minutes?
   (a) 225 m   (b) 250 m
   (c) 300 m   (d) 200 m

8. If $\sin t + \cos t = \dfrac{4}{5}$, then find $\sin t.\cos t$.
   (a) $\dfrac{9}{50}$ (b) $\dfrac{-9}{50}$
   (c) $\dfrac{9}{25}$ (d) $\dfrac{-9}{25}$

9. Simplify the given expression.
$y + 2x – [(y – (y – x + y) – (x + y) + y] – 2y$.
   (a) $–y$ (b) $–2x$
   (c) Y (d) $2x$

10. A, B and C, working alone, can complete a job in 16, 24 and 36 days, respectively. In how many days can they complete the job if they work together?
   (a) $7\dfrac{11}{19}$ (b) $5\dfrac{17}{19}$
   (c) $4\dfrac{13}{19}$ (d) $6\dfrac{7}{19}$

11. A person deposited ₹500 for 3 years, ₹650 for 5 years, and ₹1,250 for 7 years. He received a total simple interest of ₹1,620. The rate of interest per annum is:
   (a) 12%   (b) 13%
   (c) 10.8%   (d) 11%

12. Rakshit, Ajay and Satish are sanitation workers in a Municipal Corporation. Rakshit alone takes 20 hours to clean a drain while Ajay takes 12 hours when working alone to do the same. All three together take only 5 hours to clean the drain. In how many hours, can Satish complete the work alone?
   (a) 12   (b) 10
   (c) 15   (d) 18

13. $\triangle ABC \sim \triangle DEF$ and the perimeters of $\triangle ABC$ and $\triangle DEF$ are 40 cm and 12 cm, respectively. If DE = 6 cm, then AB is:
   (a) 12.6 cm   (b) 24 cm
   (c) 20 cm   (d) 10 cm

14. On a circular path of 693 m, Sujata and Anjali start walking from the same point but in the opposite directions at the speed of 2.85 km/h and 1.5 m/sec, respectively. When they will meet for the first time?
   (a) After 6.75 minutes
   (b) After 6.05 minutes
   (c) After 5.04 minutes
   (d) After 4.56 minutes

15. Select the INCORRECT formula from the following options.
   (a) $\sec^2\theta – \tan^2\theta = 1$
   (b) $\sin^0 2 + \cos^2\theta = 1$
   (c) $\csc^2\theta – \cot^2\theta = 1$
   (d) $\sec^2\theta + \cos^2\theta = 1$

16. 15 men and 25 women can complete a piece of work in 9.6 days. If 16 women can complete the same work in 27 days, find the number of days in which 16 men can complete the same work.
   (a) 22.50   (b) 20.25
   (c) 19.20   (d) 21.60

17. Industrial growth of different countries (in crores of ₹):

How many countries' industrial growth is more than the average industrial growth?
   (a) 3   (b) 4
   (c) 2   (d) 1

18. If the area of a circle is 616 cm^2 and a chord XY = 10 cm, then find the perpendicular distance from the center of the circle to the chord XY.
   (a) $\sqrt{171}$ cm   (b) $\sqrt{161}$ cm
   (c) $\sqrt{117}$ cm   (d) $\sqrt{181}$ cm

19. Find the value of $\sin^2 25 + \sin^2 65$.
   (a) $–1$ (b) $\dfrac{1}{2}$
   (c) 0   (d) 1

20. Select the correct statement with respect to the below bar graph.

Production of Rice (in lakh tonnes) by three states A, B and C

   (a) Rice production by A in 2016 is less than the rice production by C in 2020.

1. Study the given bar-graph and answer the question that follows. The bar graph shows the sales of cycles (in 1000 numbers) from four different companies during 2018.

Sales of cycles (in 1000 numbers) from four different companies in 2018
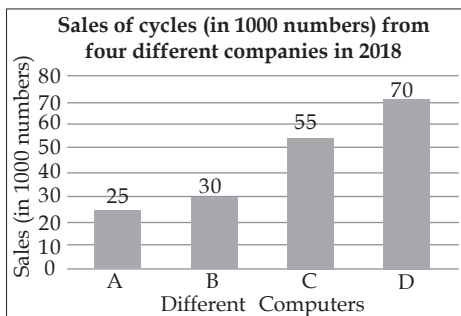
What is the average sales of all the companies (in 1000 numbers) for the year 2018?

(a) 45,000   (b) 34,000
(c) 54,000   (d) 24,000

2. The ratio of the number of boys to that the girls in a school is 11 : 15. If there are 200 more girls than boys in the school, what is the number of boys in that school?

(a) 550   (b) 750
(c) 506   (d) 605

3. The following table shows the number of sweets manufacture by six factories.

Year	Factory					
	P	Q	R	S	T	U
1996	196	145	254	169	291	220
1997	172	233	141	125	167	189
1998	178	240	150	130	177	192
1999	180	260	160	140	188	195

What is the respective ratio of sweets manufactured by factories P, Q and R together in the year 1998, to the sweets manufactured by factories S, T and U together in the same year?

(a) 568 : 499   (b) 61 : 72
(c) 61 : 42   (d) 40 : 51

4. The ratio between the monthly income and the expenditure of Vaidic is 8 : 5. If his income increases by 20% and his expenditure increases by 30%, then find the percentage increase or decrease in his monthly savings.

(a) $5\frac{2}{3}$% increase

(b) $5\frac{2}{3}$% decrease

(c) $3\frac{1}{3}$% increase

(d) $3\frac{1}{3}$% decrease

5. Simplify the following expression.
(2 × 7 – 5 + 9 ÷ 3) ÷ (4 + 2)² × 2

(a) 2   (b) $\frac{3}{2}$

(c) $\frac{2}{3}$ (d) 1.5

6. If ₹72 amounts to ₹104.4 in 3 years, what will ₹120 amount to in 5 years at the same rate percent per annum?

(a) ₹450   (b) ₹330
(c) ₹210   (d) ₹215

7. In the given figure, 'G' is the centre of the circle. Find the angle ACB when ∠AGB = 132°.
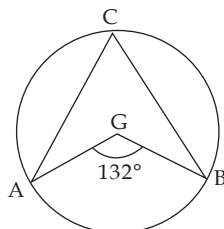
(a) 62°   (b) 66°
(c) 64°   (d) 60°

8. Three successive discounts of 15%, 20% and 25% are given. What will be the net discount in percentage?

(a) 52%   (b) 49%
(c) 46%   (d) 40%

9. Pipe A can fill an empty tank in 18 hours and pipe B can fill the same empty tank in 24 hours. If both the pipes are opened simultaneously, how much time (in hours) will they take to fill the empty tank?

(a) $11\frac{3}{7}$ (b) $10\frac{1}{7}$

(c) $10\frac{2}{7}$ (d) $11\frac{2}{7}$

10. In a mixture of 55 litres, fruit juice and water are in the ratio of 4 : 1. How much water (in litres) must be added to make the mixture ratio 2 : 1?

(a) 9   (b) 22
(c) 11   (d) 12

11. Ranu carries water to school in a cylindrical flask with diameter 12 cm and height 21 cm. Determine the amount of water that she can carry in the flask. $\left(\text{Use } \pi = \frac{22}{7} \right)$

(a) 2372 cm³   (b) 2370 cm³
(c) 2376 cm³   (d) 2374 cm³

12. A policeman follows a thief, who is 1250 m ahead of him. The policeman and the thief run at the speed of 10 km/h and 8 km/h, respectively. The distance (in km) run by the thief before he is nabbed by the policeman is:

(a) 7   (b) 4
(c) 5   (d) 6

13. If secθ + tanθ = 5, (θ ≠ 0), then sec is equal to:

(a) $\left(5 + \frac{1}{5} \right)$ (b) $\frac{1}{2}\left(3 + \frac{1}{3} \right)$

(c) $\frac{1}{2}\left(5 + \frac{1}{5} \right)$ (d) $\left(3 + \frac{1}{3} \right)$

14. In a circle, a 14 cm long chord is at 24 cm from the centre of the circle. Find the length of the radius of the circle.

(a) 30 cm   (b) 25 cm
(c) 50 cm   (d) 27 cm

15. A man takes 15 minutes to row 16 km downstream, which is 25% less than the time he takes to row the same distance upstream. How many kilometres can the man row in an hour in still water? (Rounded off to nearest whole number)

(a) 56   (b) 60
(c) 58   (d) 54

16. To do a certain work, Ajay and Bharat work on alternate days, with Bharat starting the work on the first day. Ajay can finish the work

1. Virat can complete a work in 30 days and Daniel is 60% more efficient than Virat to complete the same work. Find the total time taken by Daniel to complete the work.
   - (a) $16\frac{3}{5}$ days
   - (b) $18\frac{3}{4}$ days
   - (c) $19\frac{5}{3}$ days
   - (d) $17\frac{5}{3}$ days

2. The average of 36 numbers was found to be 45. Later, it was detected that 84 was misread as 48. Find the correct average of the given numbers.
   - (a) 58
   - (b) 48
   - (c) 46
   - (d) 56

3. If sin 23° = $\frac{a}{b}$, then the value of sec 23° − sin 67° is_____.
   - (a) $\frac{a^2}{\sqrt{b^2-a^2}}$
   - (b) $\frac{b^2-a^2}{ab}$
   - (c) $\frac{a^2}{b\sqrt{b^2+a^2}}$
   - (d) $\frac{a^2}{b\sqrt{b^2-a^2}}$

4. What is the central corresponding to the sector indicating the expenses incurred on Health?

   Amount spent on various expenses
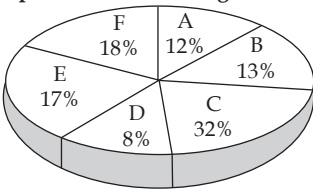
   - (a) 72°
   - (b) 54°
   - (c) 110°
   - (d) 108°

5. In an election between three candidates, Arjun, Bhaskar and Saral contested for a post. Arjun got 50% votes more than Saral, and Saral got 2% votes less than Bhaskar. The difference between the votes of Bhaskar and Saral is 1296. What is the half of the difference between the votes of Arjun and Bhaskar?
   - (a) 3,888
   - (b) 13,988
   - (c) 7,766
   - (d) 15,228

6. Solve the following expression [7 + 30 ÷ 6 − (6 + 6) + 7]
   - (a) 6
   - (b) 7
   - (c) 5
   - (d) 4

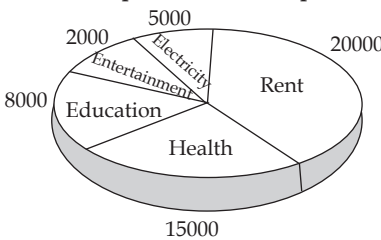7. In an office, a typing work can be finished by Monika in 6 hours, Anita in 8 hours and Manju in 5 hours if they work alone. How much time (in hours) will they take if they work together?
   - (a) $3\frac{3}{59}$
   - (b) $2\frac{2}{59}$
   - (c) $2\frac{2}{5}$
   - (d) $2\frac{2}{57}$

8. Which of the following statements is INCORRECT?
   - (a) If a chord is extended outside the circle on both ends then it is called secant.
   - (b) Tangent is perpendicular to the radius of the circle at the point of contact.
   - (c) A line which intersects two distinct points of a circle is called tangent.
   - (d) Tangent is a line touching only one point of the circle.

9. A's efficiency is twice that of B's. A can work only for 8 hours a day while B can work for 12 hours a day. If A can finish a work in 12 days, in how many days can B finish the same work?
   - (a) 8
   - (b) 10
   - (c) 16
   - (d) 12

10. Two friends P and Q simultaneously start running from same point around a circular track. They run in the same direction. P runs at 6 m/sec and Q runs at b m/sec. If they cross each other at exactly two points on the circular track and b is a natural number less than 6, then how many values can b take?
    - (a) 2
    - (b) 1
    - (c) 4
    - (d) 3

11. A dealer professing to sell his goods at cost price uses 950 grams weight for 1 kg. His gain percentage is: (rounded off to two decimal places)
    - (a) 5.35%
    - (b) 5.26%
    - (c) 5.86%
    - (d) 5.96%

12. A trader allows a 20% trade discount and a 30% cash discount. If the list price is ₹1,200, then the selling price (in ₹) is:
    - (a) 627
    - (b) 720
    - (c) 762
    - (d) 672

13. If x + $\frac{1}{x}$ = 7, then the value of $x^6 + \frac{1}{x^6}$ is:
    - (a) 113682
    - (b) 103682
    - (c) 103882
    - (d) 103862

14. The current ages of Sudhir and Ashish are in the ratio 5 : 7. Twelve years ago, the ratio of their ages was 1 : 2. What will be the age of Sudhir after five years from now?
    - (a) 20 years
    - (b) 25 years
    - (c) 33 years
    - (d) 28 years

15. A man invests a total sum of ₹10,000 in a company. A part of the sum was invested at 10% simple interest per annum and the remaining part at 15% simple interest per annum. If the total interest accrued to him in two years equals ₹2,400, the sum invested at 15% simple interest per annum is:
    - (a) ₹8,000
    - (b) ₹4,000
    - (c) ₹6,000
    - (d) ₹5,000

16. AB is the diameter of a circle with centre O. P be a point on it. If ∠AOP = 95°, then ∠OBP = ?
    - (a) 57.5°
    - (b) 45.5°
    - (c) 47.5°
    - (d) 55.5°

17. If $\frac{\cos\beta}{\sec\alpha}$ = 15 and $\frac{\sin\beta}{\sec\alpha}$ = 16, then the value of sin²β is_____.
    - (a) $\frac{256}{481}$
    - (b) $-\frac{256}{481}$
    - (c) $\frac{481}{256}$
    - (d) $-\frac{481}{256}$

18. What is the value of sin30° + cos30° + tan30°
    - (a) $\frac{5+\sqrt{3}}{2\sqrt{3}}$
    - (b) $\frac{5-\sqrt{3}}{2\sqrt{3}}$
    - (c) $\frac{5+\sqrt{3}}{\sqrt{3}}$
    - (d) $\frac{5-\sqrt{3}}{\sqrt{3}}$
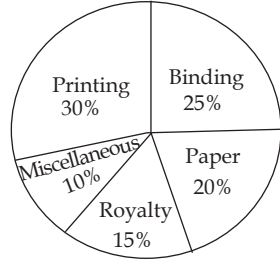
1. In a race around a circular cycling track of 75 km, two cyclists are riding at a speed of 30 km/h and 25 km/h. After what time (in hours) will they meet at the point from where they started their journey?
   (a) 16 (b) 7
   (c) 14 (d) 15

2. P is two times more efficient than Q. P is able to complete a piece of work in 40 days less than Q. Working together, the whole number of days taken by them to complete the work is: (Round off to the nearest integer)
   (a) 26 (b) 25
   (c) 27 (d) 28

3. In an election, 2% persons enrolled in the voter list did not participate and 500 votes were invalid. Two candidates A and B fought the election, and A defeated B by 200 votes. If 43% of the persons enrolled in the voter list casted their votes in favour of A, then what is the number of the total casted votes?
   (a) 2450 (b) 2800
   (c) 3000 (d) 3250

4. Evaluate the following.
   sin 25° sin 65° – cos 25° cos 65°
   (a) 40 (b) 4
   (c) 0 (d) 1

5. Study the given pie chart and answer the question that follows.

   Population of Six Villages in 2020

   The population of village D in 2020 was 10,500. What was the population of village A in 2020? Total population of these six villages is 100%.
   (a) 15,570 (b) 15,750
   (c) 17,550 (d) 7,875

6. What is the value of $64x^3 + 38x^2y + 20xy^2 + y^3$, when x = 3 and y = –4?

7. X and Y can complete a work in 9 days and 36 days, respectively. X begins to do the work and they work alternately one at a time for one day each. The whole work will be complete in:
   (a) $12\frac{1}{2}$ days (b) $14\frac{1}{4}$ days
   (c) $13\frac{1}{3}$ days (d) $15\frac{1}{5}$ days

8. A shopkeeper uses 940 gm weight in place of one kg weight. He sells it at 4% profit. What will be the actual profit percentage? (rounded off to two decimal places)
   (a) 9.25% (b) 10.32%
   (c) 10.64% (d) 10.96%

9. If D is the midpoint of BC in ∆ABC and ∠A = 90°, then AD = _____.
   (a) $\dfrac{BC}{4}$ (b) 2BC
   (c) $\dfrac{BC}{2}$ (d) BC

10. In what ratio must water be mixed with milk, costing ₹32 per litre, in order to get a mixture costing ₹28 per litre?
    (a) 8 : 1 (b) 1 : 7
    (c) 1 : 8 (d) 7 : 1

11. 5 women and 9 girls earn a total of ₹18,720 in 9 days, while 9 women and 16 girls earn a total of ₹52,080 in 14 days. How much will 12 women and 7 girls together earn (in ₹) in 13 days?
    (a) 42,510 (b) 41,990
    (c) 42,380 (d) 42,120

12. An electronic store owner allows two successive discounts of 20% and 25% on each item. The store has a reward points scheme which enables a customer to get free shopping worth ₹0.10 on every 1 reward point credited to the customer's account on previous purchases from the store. A customer decides to buy a laptop that is marked at ₹72,000. What will be its net selling price if he has 2850 reward points to his credit?
    (a) ₹43,200 (b) ₹42,915
    (c) ₹42,215 (d) ₹42,942

13. What is the value of $a^3 + b^3 + c^3$ if (a + b + c) = 0?
    (a) $a^2 + b^2 + c^2 – 3abc$
    (b) 0
    (c) 3abc
    (d) $a^2 + b^2 + c^2 – ab – bc – ca$

14. Evaluate the following:
    cos(36° + A).cos(36° − A) + cos(54° + A).cos(54° − A)
    (a) sin 2A (b) cos A
    (c) sin A (d) cos 2A

15. Study the given pie-chart and answer the question that follows.

    The pie-chart shows the expenditure incurred in the preparation of a book by a publisher, under various heads.

    Expenditure in book publishing

    What is the difference between the angle of pie-chart showing the expenditure incurred on binding and printing?
    (a) 15° (b) 20°
    (c) 18° (d) 22°

16. If the total surface area of a cube is 24 sq.units, then what is the volume of the cube?
    (a) 8 cu.units (b) 16 cu.units
    (c) 10 cu.units (d) 4 cu.units

17. Find the simplified value of the given expression.
    $4\frac{4}{5} \div \frac{3}{5}$ of $5 + \frac{4}{5} \times \frac{3}{10} - \frac{1}{5}$

(a) 1236 (b) 488
(c) 536 (d) 1256

1. If A is 95% of B, then what per cent of A is B?

   (a) $110\dfrac{3}{19}\%$ (b) $104\dfrac{7}{19}\%$

   (c) $108\dfrac{17}{19}\%$ (d) $105\dfrac{5}{19}\%$

2. The marked price of mustard oil is 25% more than its cost price. At what percentage less than the marked price should it be sold to have no profit and no loss?

   (a) 15%   (b) 20%
   (c) 18%   (d) 22%

3. A can complete a piece of work in 25 days while B can complete the same work in 30 days. They work on alternate basis, starting with A. Both A and B follow this pattern for 5 days and then A leaves the work. In how many days will B finish the remaining work?

   (a) $24\dfrac{2}{5}$ (b) $5\dfrac{2}{5}$

   (c) $5\dfrac{3}{5}$ (d) $24\dfrac{3}{5}$

4. As part of his journey, a person travels 120 km at 80 km/h, the next 100 km at 40 km/h, and comes back to the starting point at 75 km/h. The average speed of the person throughout the journey (approximately) is:

   (a) 63.46 km/h   (b) 58.74 km/h
   (c) 68.15 km/h   (d) 49.58 km/h

5. 8 men can complete a work in 45 days. 8 women can complete the same work in 18 days. In how many days will 5 men and 8 women, together, complete the same work?

   (a) $13\dfrac{1}{5}$ (b) $12\dfrac{4}{5}$

   (c) $14\dfrac{2}{5}$ (d) $15\dfrac{3}{5}$

6. $6^{25} + 6^{26} + 6^{27} + 6^{28}$ is divisible by:

   (a) 256   (b) 254
   (c) 255   (d) 259

7. Study the given table an answer the question that follows.

The table shows the classification of 100 students based on the marks obtained by them in History and Geography in an examination.

Subject	Marks out of 50				
	40 and above	30 and above	20 and above	10 and above	0 and above
History	9	32	80	92	100
Geography	4	21	66	81	100
Average (Aggregate)	7	27	73	87	100

Based on the table, what is the number of students scoring less than 20% marks in aggregate?

   (a) 13   (b) 11
   (c) 10   (d) 12

8. Two concentric circles are of radii 10 cm and 6 cm. Find the length of the chord of the larger circle which touches the smaller circle.

   (a) 8 cm   (b) 16 cm
   (c) 12 cm   (d) 9 cm

9. If sin (a + b) = 1 and cos (a – b) = $\dfrac{1}{2}$, then find a.

   (a) 75°   (b) 30°
   (c) 15°   (d) 45°

10. A train 900 m long is running at 108 km/h. How long will it take to clear a 900 m long platform completely?

    (a) 60 s   (b) 45 s
    (c) 30 s   (d) 18 s

11. If $7b - \dfrac{1}{4b} = 7$, then what is the value of $16b^2 + \dfrac{1}{49b^2}$?

    (a) $\dfrac{80}{49}$ (b) $\dfrac{104}{7}$

    (c) $\dfrac{120}{7}$ (d) $\dfrac{7}{2}$

12. If m ∠C = m ∠Z and AC = XZ, then which of the following conditions is necessary for ΔABC and ΔXYZ to be congruent?

    (a) AB = AC   (b) BC = YZ
    (c) AB = XY   (d) BC = AB

13. In the given figure, PAB is a secant and PT is a tangent to the circle from P. If PT = 8 cm, PA = 6 cm and AB = x cm, then the value of x is:
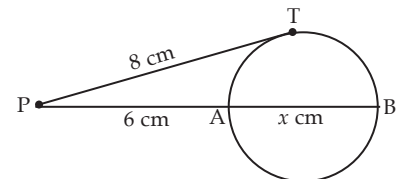
    (a) $\dfrac{14}{9}$ (b) $\dfrac{1}{3}$

    (c) $\dfrac{14}{3}$ (d) $\dfrac{4}{3}$

14. A shopkeeper offers the following two discount schemes.

    (A) Buy 3 get 4 free

    (B) Buy 5 get 6 free

    Which scheme has the maximum discount percentage?

    (a) A
    (b) A does not give any discount
    (c) A and B both have the same discount percentage
    (d) B

15. The following bar chart represents the gross amount (in ₹lakhs) an total cost (in ₹ lakhs) of a firm.
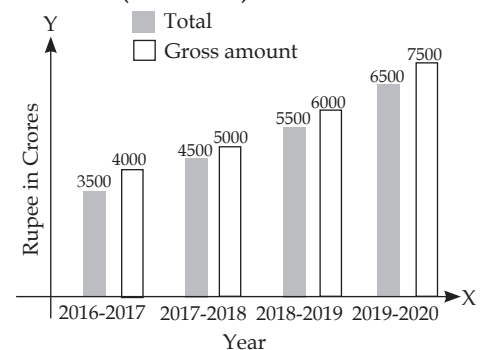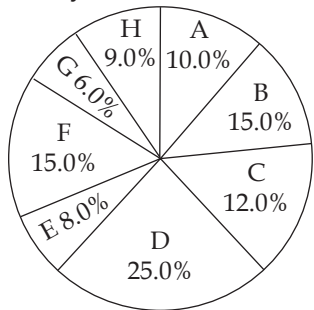
    In order to make a profit of 25%, what should the gross amount have been (in ₹crores) in 2019-2020, if the total cost remained the same?

    (a) 7800   (b) 8000
    (c) 8250   (d) 8125

16. In what time will ₹10,000 at 4% per annum, produce the same interest as ₹8,000 does in 4 years at 5% simple interest?

1. If $\sec \theta - 2 \cos \theta = \dfrac{7}{2}$, where θ is a positive acute angle, then the value of $\sec \theta$ is:
   (a) 6   (b) 8
   (c) 5   (d) 4

2. The sum of two numbers is 18 and their HCF and LCM are 3 and 54 respectively. What will be the sum of their reciprocals?
   (a) $\dfrac{1}{7}$ (b) $\dfrac{1}{11}$
   (c) $\dfrac{1}{6}$ (d) $\dfrac{1}{9}$

3. Rohan scored twice as many marks in English as he did in Science. His total marks in English, Science and Mathematics are 126. If the ratio of his marks in English and Mathematics is 2 : 3, his marks in English are:
   (a) 63   (b) 20
   (c) 21   (d) 42

4. The diagonal of the square is $8\sqrt{2}$ cm. Find the diagonal of another square whose area is triple that of the first square.
   (a) $8\sqrt{5}$ cm   (b) $8\sqrt{3}$ cm
   (c) $8\sqrt{2}$ cm   (d) $8\sqrt{6}$ cm

5. If $x + \dfrac{1}{x} = 2$, then the value of $x^{57} + \dfrac{1}{x^{57}}$ is :
   (a) 1   (b) –2
   (c) 0   (d) 2

6. Find the value of $\tan 3\theta$ if $\sec 3\theta = \csc(4\theta - 15°)$.
   (a) $\dfrac{1}{\sqrt{3}}$ (b) $\sqrt{3}$
   (c) –1   (d) 1

7. Three-fourth of a consignment was sold at a profit of 8% and the rest at a loss of 4%. If there was an overall profit of ₹ 600, then find the value of the consignment.
   (a) ₹ 15,000   (b) ₹ 6,000
   (c) ₹ 18,000   (d) ₹ 12,000

8. The number of parallel tangents of a circle with a given tangent is:
   (a) 1   (b) 2
   (c) 3   (d) 4

9. A man loses 20% of his money and after spending 85% of the remainder, he is left with ₹ 120. How much did he have at first?
   (a) ₹ 1,200   (b) ₹ 1,000
   (c) ₹ 800   (d) ₹ 500

10. If $mx^m - nx^n = 0$, then what is the value of $\dfrac{1}{x^m + x^n} + \dfrac{1}{x^m - x^n}$ terms of x^n is:
    Where x, m, n are > 0
    (a) $\dfrac{2mn}{(x^n(n^2 + m^2))}$
    (b) $\dfrac{2mn}{(x^n(m^2 - n^2))}$
    (c) $\dfrac{2mn}{(x^n(m^2 + n^2)}$
    (d) $\dfrac{2mn}{(x^n(n^2 - m^2)}$

11. What should be subtracted from 246837 to make it divisible by 13?
    (a) 4   (b) 5
    (c) 3   (d) 6

12. $\triangle PQR$ is an isosceles triangle and PQ = PR = 2a unit, QR = a unit. Draw PX $\perp$ QR, and find the length of PX.
    (a) $\sqrt{5}a$ (b) $\dfrac{\sqrt{5}a}{2}$
    (c) $\dfrac{\sqrt{10}a}{2}$ (d) $\dfrac{\sqrt{15}a}{2}$

13. The following pie chart shows the number of workers of different categories A, B, C, D, E, F, G and H in a factory in 1995.

14. If, for a non-zero x, $5x^2 + 7x + 5 = 0$, then the value of $x^3 + \dfrac{1}{x^3}$ is :
    (a) $\dfrac{496}{125}$ (b) $\dfrac{532}{343}$
    (c) $\dfrac{125}{532}$ (d) $\dfrac{182}{125}$

15. A person lent ₹ 23,000 to B for 3 years and ₹ 19,000 to C for 4 years on simple interest at the same rate of interest and received ₹ 3,625 in all from both of them as interest. What is the annual rate of interest?
    (a) 1.5 percent   (b) 3 percent
    (c) 2.5 percent   (d) 4 percent

16. The radius of a hemisphere is 6.3 cm. What will be its volume?
    (a) 572.80 cm³   (b) 643.50 cm³
    (c) 523.90 cm³   (d) 353.38 cm³

17. $\triangle ABC \sim \triangle DEF$ such that AB = 9.1 cm and DE = 6.5 cm. If the perimeter of $\triangle DEF$ = 25 cm, then the perimeter of $\triangle ABC$ is:
    (a) 40 cm   (b) 30 cm
    (c) 35 cm   (d) 45 cm

18. 1 man and 4 women can complete a work in $\dfrac{65}{4}$ days, while 3 men and 4 women can complete it in $\dfrac{13}{2}$ days. In how many days will 13 women complete the same?
    (a) 20   (b) 16
    (c) 14   (d) 18

19. The table given below shows the number of calculator sold by five shopkeepers.

Shopkeepers	Calculator
S1	40
S2	60
S3	55
S4	35
S5	80

What is the central angle (angular value) for category B of the pie chart?
(a) 55°   (b) 54°
(c) 57°   (d) 56°

1. Calculate the area of a sector of a circle with radius 10 metres and angle of 90 degrees at the centre.
   (a) 79.3 m²   (b) 79.5 m²
   (c) 78.5 m²   (d) 75 m²

2. In the figure, O is the centre of the circle. Its two chords AB and CD intersect each other at the point P within the circle. If AB = 20 cm, PB = 12 cm and CP = 8 cm, then find the measure of PD.
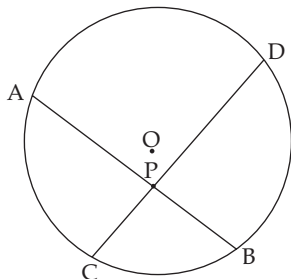
   (a) 12 cm   (b) 11 cm
   (c) 22 cm   (d) 14 cm

3. A dealer buys an article listed at ₹ 3,000 and gets successive discounts of 15% and 15%. He spends ₹ 250 on transportation and sells it at a profit of 20%. Find the selling price of the article.
   (a) ₹ 3,300   (b) ₹ 2,901
   (c) ₹ 3,250   (d) ₹ 3,200

4. In a linear race of 1000 m, A beats B by 50 m or 5 seconds. What is the difference between the speeds (in m/s) of A and B?
   (a) $1\dfrac{10}{19}$ (b) $\dfrac{10}{19}$
   (c) $\dfrac{9}{19}$ (d) $\dfrac{9}{10}$

5. The table given below shows the cost price and selling price of 5 different articles.

Article	Cost Price	Selling price
A1	350	450
A2	550	550
A3	450	650
A4	250	550
A5	150	650

   What is the ratio of cost price of A1 to the selling price of A4?
   (a) 1 : 2   (b) 1 : 3
   (c) 7 : 5   (d) 7 : 11

6. The selling price of 28 items is equal to the cost price of 17 items. What is the percentage of profit or loss?
   (a) $39\dfrac{2}{7}$% loss   (b) $39\dfrac{2}{7}$% profit
   (c) $33\dfrac{2}{7}$% profit (d) $33\dfrac{2}{7}$% loss

7. If the price of petrol is increased by 28%, by what percentage should the consumption be decreased by the consumer, if the expenditure on petrol remains unchanged?
   (Correct to 2 decimal places)
   (a) 12.35%   (b) 21.88%
   (c) 20.25%   (d) 25.75%

8. A sum of money amounts to ₹ 767 in 3 years, and to ₹ 806 in 4 years on simple interest at 6% annum. What is the sum?
   (a) ₹ 600   (b) ₹ 560
   (c) ₹ 675   (d) ₹ 650

9. Study the given pie-chart and answer the question that follows.

   The pie-chart represents the spending of a state on various sports during a particular year.
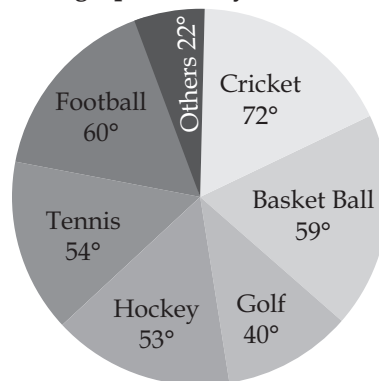
   How much percent more is spent on cricket than on tennis(correct up to 2 decimal places)?
   (a) 33.33%   (b) 32.75%
   (c) 30.35%   (d) 28.25%

10. Simplify the following.

    cot 13° cot 27° cot 45° cot 63° cot 77° = ?
    (a) 1   (b) $\sqrt{3}$
    (c) 2   (d) $\sqrt{2}$

11. The average of eight consecutive odd numbers is 48. Find the sum of the fifth and seventh numbers.
    (a) 102   (b) 86
    (c) 89   (d) 90

12. The sides of a triangle are in the ratio $\dfrac{1}{3}:\dfrac{1}{5}:\dfrac{1}{6}$. If the perimeter is 147 cm, then the length of the smallest side is _____.
    (a) 12 cm   (b) 25 cm
    (c) 30 cm   (d) 35 cm

13. Solve the following to find its value in terms of trigonometric ratios.
    (sin A + cos A) (1 – sin A cosA)
    (a) $\sin^3 A + \cos^3 A$
    (b) $\sin^2 A - \cos^2 A$
    (c) $[\cos A - \sin A] [\sin^2 A + \cos^2 A]$
    (d) $\sin^3 A - \cos^3 A$

14. The ratio of the outer and the inner circumference of a circular path is 5 : 4. If path is 50 metres wide, then what is the radius of the inner circle?
    (a) 250 metres   (b) 300 metres
    (c) 200 metres   (d) 210 metres

15. If 2a + 3b = 10 and ab = 3, then find the value of 4a² + 9b².
    (a) 60   (b) 62
    (c) 64   (d) 66

16. Study the following table and answer the question that follows.

School name	Total number of student enrolled	Percentage of students who opted for statistics
A	450	20
B	200	18
C	500	12
D	400	15

    What is the average number of students who opted for other than statistics subject in school A and D?
    (a) 7340   (b) 360
    (c) 355   (d) 350

1. How many circles can be drawn that pass(es) through two fixed points?
   - (a) Infinite
   - (b) Only two
   - (c) One or two
   - (d) Only one

2. If x is the mean proportional between 12.8 and 64.8, then the value of x is:
   - (a) 32
   - (b) 34
   - (c) 28.8
   - (d) 26.4

3. If $\cot A = \dfrac{15}{8}$, then what will be the value of tan 2A?
   - (a) $\dfrac{200}{161}$
   - (b) $\dfrac{240}{161}$
   - (c) $\dfrac{240}{173}$
   - (d) $\dfrac{220}{171}$

4. The table given below shows the number of persons participating in a survey from 6 different states.

States	Persons
J	200
K	300
L	500
M	600
N	700
P	900

   Number of persons participating in the survey from L is what percent of the number of persons participating in the survey from J?
   - (a) 200 percent
   - (b) 250 percent
   - (c) 80 percent
   - (d) 40 percent

5. The table given below shows the temperature recorded every day in a certain week.

Days	Temperature
Monday	20°
Tuesday	45°
Wednesday	30°
Thursday	50°
Friday	25°
Saturday	55°
Sunday	60°

   What is the difference between the temperature recorded on Monday and Tuesday together and the temperature recorded on Friday and Saturday together?
   - (a) 25 degree
   - (b) 20 degree
   - (c) 15 degree
   - (d) 10 degree

6. $3^{50} + 9^{26} + 27^{18} + 9^{28} + 9^{29}$ is divisible by which of the following integers?
   - (a) 11
   - (b) 5
   - (c) 7
   - (d) 2

7. A car with a price of ₹6,50,000 is bought by making some down payment. On the balance, a simple interest of 10% is charged in lump sum and the money is to be paid in 20 equal annual instalments of ₹25,000. How much is the down payment?
   - (a) ₹1,55,945
   - (b) ₹1,95,455
   - (c) ₹1,94,555
   - (d) ₹1,45,955

8. A shopkeeper has 2220 kg of rice. A part of which he sells at a 20% profit and the rest at a 12% profit. He gains 18% on the whole. The quantity (in kg) sold at a 12% profit is:
   - (a) 555
   - (b) 1210
   - (c) 1665
   - (d) 425

9. Choose the correct statement from the following.
   - (a) HCF is the least common multiple of the given numbers.
   - (b) HCF of two or more numbers is the highest number which perfectly divides all the given numbers.
   - (c) HCF is also called the least common divisor.
   - (d) In prime factorisation method of HCF, the multiples of all the given numbers are listed.

10. The pie chart given below shows the production of 6 different factories. The total production of all these 6 factories is 12,000. The production of a particular factory is shown as a percent of total production of all these 6 factories.
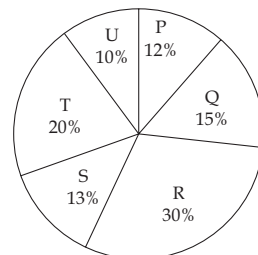
J1 = The value of average production of P and R.

J2 = The value of average production of Q and T.

What is the value of (J1 − J2)?
   - (a) 360
   - (b) 420
   - (c) 340
   - (d) 400

11. If $\dfrac{a}{b} + \dfrac{b}{a} = 1$ and a + b = 2, then the value of $a^3 + b^3$ is:
    - (a) 0
    - (b) 3
    - (c) 1
    - (d) 2

12. If 3 coconuts are offered free on purchase of 12 coconuts, priced ₹25 each, what is the effective discount on each coconut?
    - (a) 20%
    - (b) 24%
    - (c) 20.83%
    - (d) 15%

13. The population of country A decreased by p% and the population of country B decreased by q% from the year 2020 to 2021. Here 'p' is greater than 'q'. Let 'x' be the ratio of the population of country A to the population of country B in the given year. What is the percentage decrease in 'x' from 2020 to 2021?
    - (a) $\dfrac{100(p-q)}{(100-q)}$
    - (b) $\dfrac{100(p-q)}{100+p}$
    - (c) $\dfrac{100(p-q)}{100-p}$
    - (d) $\dfrac{100(p-q)}{100+q}$

14. A chord of length 40 cm is drawn in a circle having diameter 50 cm. What is the minimum distance of other parallel chord of length 30 cm in the same circle from 40 cm long chord?
    - (a) 10 cm
    - (b) 15 cm
    - (c) 5 cm
    - (d) 20 cm

15. If $4x^2 + y^2 = 40$ and xy = 6, find the positive value of 2x + y.
    - (a) 8
    - (b) 6
    - (c) 5
    - (d) 4

16. Piyush sold a guitar to Anuj at 16% gain and Anuj sold it to Mayank at 32% gain. If Mayank paid ₹3,828 for the guitar, what amount did Piyush pay for the same?

1. The value of 97 × 103 is _____.
   (a) 7999   (b) 9991
   (c) 8991   (d) 9981

2. The simple interest received on a sum is $\dfrac{25}{36}$ of the sum. The number of years is equal to the annual rate of interest. What is the annual rate of interest?
   (a) 9.25 percent   (b) 10.25 percent
   (c) 6.62 percent   (d) 8.33 percent

3. Two candidates P and Q contested in an election. 70% of the registered voters are P supporters. If 60% of the P supporters and 30% of the Q supporters are expected to vote for candidate P, then what percentage of the registered voters are expected to vote for candidate P?
   (a) 30%   (b) 51%
   (c) 26%   (d) 47%

4. If the length of certain rectangle is decreased by 4 cm and breadth is increased by 2 cm, it would result in a square of the same area. What is the perimeter of the original rectangle?
   (a) 15 cm   (b) 24 cm
   (c) 20 cm   (d) 10 cm

5. If $x+\dfrac{1}{x}=1$, then the value of $x^{12} + x^9 + x^6 + x^3 + 1$ is:
   (a) 1   (b) –1
   (c) 0   (d) 2

6. The mid points of AB and AC of a △ABC are X and Y, respectively. If BC + XY = 24 units, then the value of BC – XY is:
   (a) 5 cm   (b) 4 cm
   (c) 6 cm   (d) 8 cm

7. Sonali applied for a job of Science teacher in a school. In the test for job, she scored 8 in Physics, 8 in Chemistry, 6 in Biology, and 6.5 in the interview. For calculating the final score, weightage of 2, 3, 3, and 4 were assigned to Physics, Chemistry, Biology and interview, respectively. What is the weighted average score of Sonali?
   (a) 7   (b) 8.4
   (c) 7.2   (d) 21

8. The given pie-chart represents the survey report on the favourite games of a group of young people.
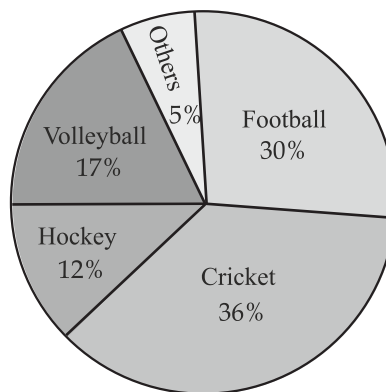
   If a total of 4980 persons were surveyed, how many of them said football is their favourite game?
   (a) 1324   (b) 1200
   (c) 1430   (d) 1494

9. Find the greatest number that will divide 49, 147 and 322 to leave the same remainder in each case.
   (a) 9   (b) 5
   (c) 7   (d) 8

10. If b sin θ = a, then sec θ + tan θ = ?
    (a) $\sqrt{\dfrac{b+a}{b-a}}$ (b) $\sqrt{\dfrac{1}{b+a}}$
    (c) $\sqrt{\dfrac{1}{b-a}}$ (d) $\sqrt{\dfrac{b-a}{b+a}}$

11. The mean proportional of a and b is c. What is the mean proportional of a^2c and b^2c?
    (a) c (b) $3c$
    (c) c^3 (d) c^2

12. Find the area of the sector of a circle with radius 4 cm and angle 30°.
    (a) 7.186 cm²   (b) 6.186 cm²
    (c) 4.186 cm²   (d) 5.186 cm²

13. $\dfrac{\cos20°}{\sin70°}+\dfrac{\cos\theta}{\sin(90-\theta)}=$ _____.
    (a) –2   (b) $\dfrac{1}{2}$
    (c) $-\dfrac{1}{2}$ (d) 2

14. A boat racer can row $21\dfrac{3}{2}$ km/h in still water. If the speed of river is 12.5 km/hr, it takes him 40 minutes to row to a place and back, how far off is the place (consider up to two decimals)?
    (a) $5\dfrac{5}{27}$ km   (b) $5\dfrac{2}{5}$ km
    (c) $4\dfrac{5}{27}$ km   (d) $3\dfrac{5}{27}$ km

15. The number of. mobiles sim-card owners in 4 states/UT are given in the bar diagram. Study the diagram and answer the question.
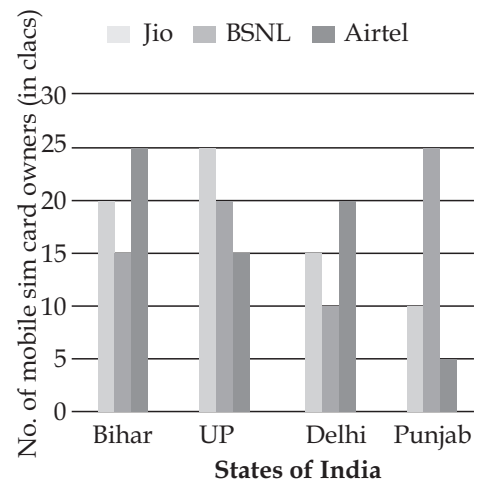
    The average of sim-card sold in the four States/UT in lakhs is:
    (a) 51.5   (b) 51.25
    (c) 50   (d) 55.25

16. A solid hemisphere has radius 21 cm. It is melted to form a cylinder such that the ratio of its curved surface area to total surface area is 2 : 5. What is the radius (in cm) of its base (take $\pi = \dfrac{22}{7}$) ?
    (a) 23   (b) 21
    (c) 17   (d) 19

1. Study the given graph and answer the following question.

Number of Lecturers recruited (in hundreds) in three different states in five different years
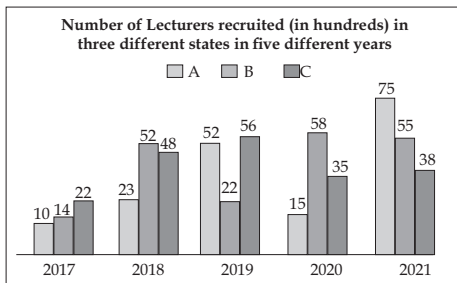
The number of lecturers recruited in state A in the year 2017 was what percentage of the number of lecturers recruited in state B in the year 2019? (Correct to 2 decimal places)

- (a) 42.50%
- (b) 36.25%
- (c) 45.45%
- (d) 56.23%

2. If $x^2 + y^2 + z^2 = xy + yz + zx$ and $x = 1$, then find the value of
$$\frac{10x^4 + 5y^4 + 7z^4}{13x^2y^2 + 6y^2z^2 + 3z^2x^2}$$

- (a) 2
- (b) 0
- (c) –1
- (d) 1

3. A cap having marked price ₹90 is sold for ₹68. What is the percent rate of discount (correct up to two decimal places)?

- (a) 24.44%
- (b) 25.37%
- (c) 22.00%
- (d) 23.22%

4. In $\triangle ABC \sim \triangle QRP$, $\frac{ar(\triangle ABC)}{ar(\triangle QRP)} = \frac{9}{4}$, AB = 18 cm, BC = 15 cm, then the length of PR is:

- (a) 16 cm
- (b) 14 cm
- (c) 10 cm
- (d) 12 cm

5. If $x + \frac{1}{2x} = 3$, then evaluate $8x^3 + \frac{1}{x^3}$.

- (a) 212
- (b) 216
- (c) 180
- (d) 196

6. $\sqrt{\frac{1+\sin A}{1-\sin A}} = $ _____.

- (a) cosec A – cot A
- (b) sec A – tan A
- (c) sec A + tan A
- (d) sec A

7. Two tourist buses start from the same point and move along two roads at right angles at speeds of 48 km/h and 36 km/h, respectively. The distance between the buses after 15 seconds is _____.

- (a) 175 m
- (b) 350 m
- (c) 250 m
- (d) 150 m

8. The table given below shows the earnings of two persons on five different days.

Days	Earnings	
	P	**Q**
Monday	105	150
Tuesday	96	110
Wednesday	65	122
Thursday	115	106
Friday	130	68

What is the ratio of total earnings of P to the total earnings of Q?

- (a) 511 : 556
- (b) 531 : 331
- (c) 556 : 511
- (d) 331 : 441

9. Five different companies, A, B, C, D and E, make robotic toys. The total number of robotic toys produced by these five companies is ₹8,00,000. The cost of production of each robotic toy is ₹25,000. The distribution of the total production is given by the following pie chart.

Angle given is in degrees
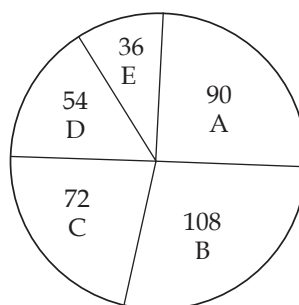
What is the total cost of production of the given item by companies A and E together?

- (a) ₹ 190 crores
- (b) ₹ 85 crores
- (c) ₹ 96 crores
- (d) ₹ 140 crores

10. If $\triangle ABC \sim \triangle DEF$, and BC = 4 cm, EF = 5 cm and the area of triangle ABC = 80 cm², then the area of the triangle DEF is:

- (a) 169 cm²
- (b) 80 cm²
- (c) 144 cm²
- (d) 125 cm²

11. A certain sum amounts to ₹3,640 in 2 years and ₹4,060 in 8 years at simple interest. Find the approximate rate percentage per annum?

- (a) 4%
- (b) 2%
- (c) 1%
- (d) 3%

12. If $8\cot\theta = 6$, then the value of $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta}$ is:

- (a) 12
- (b) 7
- (c) 2
- (d) 5

13. The following chart shows the scores of employees in a company's annual performance.

Scores of employees
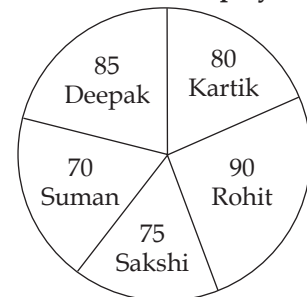
What is the percentage of Kartik's score out of the total score of all the employees?

- (a) 23.14%
- (b) 30%
- (c) 22%
- (d) 20%

14. Three cubes of equal volume are joined end to end. Find the surface area of the resulting cuboid if the diagonal of the cube is $6\sqrt{3}$ cm.

- (a) 509 cm²
- (b) 504 cm²
- (c) 516 cm²
- (d) 512 cm²

15. If $\tan A = \frac{5}{12}$, then the value of cosA = _____.

- (a) $\frac{12}{5}$
- (b) $\frac{13}{5}$
- (c) $\frac{5}{13}$
- (d) $\frac{12}{13}$

1. Simplify the following:
   $25^3 – 75^3 + 50^3$
   (a) –281250   (b) 281350
   (c) 271250   (d) –281450

2. Find the greatest 5-digit number which is divisible by 11, 33, 99 and 121.
   (a) 90099   (b) 99990
   (c) 99099   (d) 90909

3. If $\tan A = \dfrac{2}{3}$, then what is the value of the following?
   $(5\ \sin^2 A – 2\ \cos^2 A) ÷ (15\ \sin^2 A + 3 \cos^2 A)$

   (a) $\dfrac{21}{47}$ (b) $\dfrac{2}{87}$

   (c) $\dfrac{2}{5}$ (d) $\dfrac{3}{77}$

4. The given bar graph shows the data of production of pulses (in lakh tonnes) by three different countries X, Y and Z over the years. Study the bar graph and answer the question that follows.

   Production of pulses (in lakh tonnes) by three countries X, Y and Z over different years
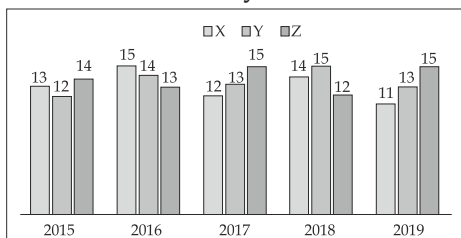
   For which country is the average production (in lakh tonnes) for five years the maximum?
   (a) X   (b) Y
   (c) Z   (d) Y and Z both

5. The fourth proportion to 12, 24 and 27 is the same as the third proportion to A and 36. What is the value of A?
   (a) 22   (b) 24
   (c) 26   (d) 20

6. If θ is an acute angle and tanθ + cotθ = 2, then the value of $\tan^2θ + \cot^2θ + 2\tan^5 θ \cot^4 θ$ is:
   (a) 3   (b) 4
   (c) 1   (d) 2

7. A shopkeeper offers three types of discount schemes for buyers. Which of them has the maximum discount percentage?
   I. Two successive discounts of 10% each.
   II. Successive discounts of 15% and 5%.
   III. 20% discount.
   (a) Only discount scheme I
   (b) Only discount scheme II
   (c) Only discount scheme III
   (d) All provide equal discount

8. The lengths (in cm) of three sides of a triangle are, respectively, 48, 55 and 73. What is the length (in cm) of the median joining the mid-point of the longest side to its opposite vertex?
   (a) 27.5   (b) 73
   (c) 24   (d) 36.5

9. What is the smallest number that should be added to 4567 so that the sum is divisible by 7?
   (a) 7   (b) 5
   (c) 6   (d) 4

10. A businessman cheats by using faulty weights, to the tune of 12% each time, when buying and selling material. What is the rise in his profit percentage using faulty weights only?
    (a) 22%   (b) 25.44%
    (c) 24%   (d) 26.32%

11. Study the given table (income in dollars) and answer the question that follows.

Source of Income	Adam	Brad	Christy	David
Salary	350	200	460	500
Bonus	90	40	115	130
Over time	160	65	170	185
Arrears	200	125	145	235
Total	800	430	890	1050

The income from bonus is how much per cent of the income from arrears in the case of Adam?

(a) 80%   (b) 40%
(c) 90%   (d) 45%

12. The following pie chart represents the total expenditure of ₹12,00,000 on several items in construction of a house in a village.
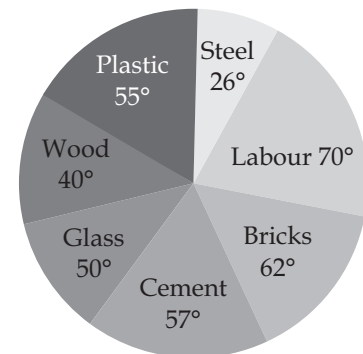
The percentage of the total expenditures spent on Cement, Wood and Plastic (correct to 2 decimal places) is:
(a) 18.65%   (b) 25.25%
(c) 30.25%   (d) 42.22%

13. Select the correct algebraic expression.
    (a) $ab – a – b + 1 = (a – 1)\ (b – 1)$
    (b) $ab + a – b + 1 = (1 – a)\ (1 – b)\ (1 – a)\ (1 + b)$
    (c) $ab – a – b + 1 = (1 – a)\ (b –1)$
    (d) $ab – a – b + 1 = (a – 1)\ (1 – b)$

14. What is the value of
    $100^2 – 99^2 + 98^2 – 97^2 + 96^2 – 95^2 + 94^2 – 93^2 + \ldots + 12^2 – 11^2$?
    (a) 5050   (b) 4985
    c) 4995   (d) 4950

15. Mr. X has a monthly income of $26,500 and his monthly expenditure is $20,500. The next year, his salary is increased by 12% and expenditure is increased by 6%. His savings increase by how much percent?
    (a) 32.5%   (b) 27.3%
    (c) 32.0%   (d) 34.7%

16. The given table shows the number of new employees who joined in different categories of employees in an organisation and also the number of employees from these categories who left the organisation every year since the foundation of the organisation in 2015. Study the table and answer the questions that follow.

1. $\cos^2 35° + \cos 55°.\sin 35° + \dfrac{\tan 34°}{\cot 56°} = $ _____.
   - (a) 2
   - (b) 3
   - (c) 4
   - (d) 1

2. The total surface area of a cube is 1536 m². Find its volume.
   - (a) 216 m³
   - (b) 125 m³
   - (c) 4096 m³
   - (d) 729 m³

3. A certain sum of money becomes triple of itself in 26 years at simple interest. In how many years it will becomes five times of itself?
   - (a) 64 years
   - (b) 52 years
   - (c) 56 years
   - (d) 60 years

4. On dividing a certain number by 363, we get 17 as the remainder. What will be the remainder when the same number is divided by 11?
   - (a) 7
   - (b) 8
   - (c) 6
   - (d) 9

5. If $a - b = 2$ and $a^3 - b^3 = 80$, then what will be the value of ab?
   - (a) 12
   - (b) –24
   - (c) 24
   - (d) –12

6. If $\dfrac{1}{x^2 + a^2} = x^2 - a^2$, then the value of x is :
   - (a) $\left(1 - a^4\right)^{\frac{1}{4}}$
   - (b) a
   - (c) $\left(a^4 - 1\right)^{\frac{1}{4}}$
   - (d) $\left(a^4 + 1\right)^{\frac{1}{4}}$

7. The following table shows the shares traded on Mumbai, Rajasthan, Uttar Pradesh and Uttarakhand stock exchanges:

   The average of the high rates of the shares in all the four stock exchanges for Kolgate is:

	Mumbai		Uttarakhand		Rajasthan		Uttar Pradesh	
Name of the company	High	Low	High	Low	High	Low	High	Low
Aata tea	540	395	450	4255	320	510	440	310
Kolgate	34	57	60	42	25	60	20	70
Jmbuja cement	150	155	120	125	160	135	145	170

   - (a) ₹ 34.75
   - (b) ₹ 51.07
   - (c) ₹ 52.04
   - (d) ₹ 63.21

8. The speed of a boat in still water is $5\dfrac{1}{3}$ km/h. It is found that the boat takes thrice as much time to row up than it does to row down the same distance in the river stream. Find the speed of the river stream.
   - (a) $\dfrac{23}{27}$ m/sec
   - (b) $\dfrac{22}{27}$ m/sec
   - (c) $\dfrac{20}{27}$ m/sec
   - (d) $\dfrac{19}{27}$ m/sec

9. The largest five-digit number which when divided by 7, 9 and 11, leaves the same remainder as 3 in each case, is:
   - (a) 95840
   - (b) 98685
   - (c) 96720
   - (d) 99795

10. If the ratio of area of two similar triangles is $\sqrt{3} : \sqrt{2}$ then what is the ratio of the corresponding sides of the two triangles?
   - (a) 9 : 4
   - (b) 3 : 2
   - (c) $\sqrt[3]{3} : \sqrt[3]{2}$
   - (d) $\sqrt[4]{3} : \sqrt[4]{2}$

11. The pie chart given below shows the sales of 7 different companies. The total sales of all these 7 companies is 2160. The sale of a particular company is shown in terms of degree with respect to the total sales of all these 7 companies.

   - (a) 3
   - (b) 1
   - (c) 2
   - (d) 4

The total sales of P, R and S are how much percent less than the total sales of Q, T and U?
   - (a) 56.42 percent
   - (b) 24.42 percent
   - (c) 46.53 percent
   - (d) 32.32 percent

12. $\sqrt{\dfrac{1 + \cos\theta}{1 - \cos\theta}} + \sqrt{\dfrac{1 - \cos\theta}{1 + \cos\theta}} = $ _____.
   - (a) 2 sin θ
   - (b) 2 cos θ
   - (c) 2 cosec θ
   - (d) 2 sec θ

13. The table given below shows the marks obtained by two students in 6 subjects.

	Students	
Subjects	A	B
P	180	90
Q	240	420
R	360	390
S	300	210
T	60	270
U	330	120

   What is the difference between the total marks obtained by A and B in all the 6 subjects?
   - (a) 40
   - (b) 30
   - (c) 20
   - (d) 50

14. ∆ABC and ∆DEF are congruent respectively. If AB = 6 = DE, BC = 8= EF and m ∠B = 30°, then m ∠D + m ∠C = _____.
   - (a) 160°
   - (b) 120°
   - (c) 130°
   - (d) 150°

15. The following table gives the percentage of marks obtained by six students in six different subjects in an

	English (100)	Science (100)	Mathematics (100)	Social Science (100)	Hindi (100)	Computer Science (100)
A	75	58	72	68	63	73
B	82	85	74	36	52	65
C	65	58	61	63	68	75
D	84	78	72	73	65	68
E	78	72	59	63	71	72
F	74	68	75	82	88	86

   The number of students who obtained 60% marks and above in all subjects is:
   - (a) 3
   - (b) 1
   - (c) 2
   - (d) 4

1. Find the number of common tangents, if $r_1 + r_2 = C_1 C_2$. (With usual notations, r_1 & r_2 and C_1 & C_2 are the radii and centres of the two circles.)
   (a) 1
   (b) 0
   (c) 3
   (d) 4

2. Which of the following pairs of non-zero values of p and q make 6-digit number 674pq0 divisible by both 3 and 11?
   (a) $p = 2$ and $q = 2$
   (b) $p = 5$ and $q = 4$
   (c) $p = 4$ and $q = 2$
   (d) $p = 5$ and $q = 2$

3. A policeman saw a thief from a distance of 450 m. When the policeman started chasing him, the thief also started running. The ratio of speeds of the thief to the policeman is 7 : 8. After running how much distance (in km) can the policeman catch the thief?
   (a) 3.75
   (b) 3.4
   (c) 3.6
   (d) 3.15

4. The length of the side of a cube is 5.6 cm. What is the volume of the largest sphere that can be taken out of the cube?
   (a) 91.98 cm^3
   (b) 99.96 cm^3
   (c) 96.98 cm^3
   (d) 90.69 cm^3

5. The curved surface area of the sphere is 154 cm^2. Find the volume of the sphere (rounded off to one digit after decimal).
   (a) 156.9 cm^3
   (b) 179.7 cm^3
   (c) 161.1 cm^3
   (d) 147.8 cm^3

6. If $x + \dfrac{1}{x} = -14$ what will be the value of $x^2 - \dfrac{1}{x^2}$?
   (a) $-112\sqrt{3}$
   (b) $112\sqrt{3}$
   (c) $-140\sqrt{3}$
   (d) $140\sqrt{3}$

7. Study the given table and answer the question that follows.

   The table shows the number of donuts sold by three different stores in five different months.

Store	Month				
	July	August	September	October	November
P	400	350	263	125	420
Q	660	170	465	905	180
R	342	182	700	960	235

   What is the ratio of the total number of donuts sold by stores P and R together in October to the total number of donuts sold by stores Q and R together in the same month
   (a) 353 : 217
   (b) 217 : 373
   (c) 373 : 217
   (d) 217 : 353

8. 0.5 is what percentage of 20?
   (a) 25%
   (b) 0.25%
   (c) 2.5%
   (d) 0.025%

9. In triangle ABC, AD is the angle bisector of angle A. If AB = 8.4 cm and AC = 5.6 cm and DC = 2.8 cm, then the length of side BC will be:
   (a) 4.2 cm
   (b) 5.6 cm
   (c) 7 cm
   (d) 2.8 cm

10. A hotel is giving a discount of 12% on the booking of 2 or more rooms. Additionally, the hotel is offering a 5% discount only on payment using any card of SBI. Rakesh booked 2 rooms in the hotel for a day at the rate of ₹1,500 per room per day. While checking out, he paid the bill using SBI Silver Card. How much amount did he have to pay?
    (a) ₹ 2,498
    (b) ₹ 1,254
    (c) ₹ 2,508
    (d) ₹ 2,618

11. R jogs at twice the speed of walking and runs at twice the speed of jogging. From his home to office, he covers half of the distance by walking and the rest by jogging. From his office to home, he covers half the distance jogging and the rest by running. What is his average speed (in km/h) in a complete round from his home to office and back home if the distance between his office and home is 10 km and he walks at the speed of 5 km/h?

    (a) $\dfrac{90}{8}$
    (b) $\dfrac{60}{8}$
    (c) $\dfrac{60}{9}$
    (d) $\dfrac{80}{9}$

12. The ratio of the present ages of Ram and Ramesh is 3 : 5. After 7 years the ratio of their ages will be 4 : 5. Find the present age of Ramesh.
    (a) 5 years
    (b) 15 years
    (c) 7 years
    (d) 12 years

13. If $k^4 + \dfrac{1}{k^4} = 47$ then what is the value of $k^3 + \dfrac{1}{k^3}$?
    (a) 4.5
    (b) 54
    (c) 18
    (d) 9

14. Ram sold a plot for ₹4,00,000 at a 20% loss. For what price should he sell the plot to gain a 5% profit?
    (a) ₹5,25,000
    (b) ₹5,20,000
    (c) ₹5,00,000
    (d) ₹5,05,000

15. The HCF of two numbers 110 and 1980 is:
    (a) 140
    (b) 110
    (c) 120
    (d) 180

16. The simplified form of $(x + 2y)^3 + (x – 2y)^3$ is :
    (a) $2x^3 + 24xy^2$
    (b) $2x^3 – 24xy^2$
    (c) $x^3 – 8y^3$
    (d) $x^3 + 8y^3$

17. In how much time will a sum of ₹5250 amounts to ₹9870 at the rate of 11 percent per annum at simple interest?
    (a) 8 years
    (b) 14 years
    (c) 12 years
    (d) 15 years

18. The table given below shows the production of bike and truck by five companies.

Companies	Production	
	Bike	Truck
G	800	600
H	550	400
I	600	300
J	350	700
K	400	750

    What is the ratio of the production of truck by company H and I

1. The value of $\sqrt{\dfrac{1+\cos A}{1-\cos A}}$
   - (a) sec A – tan A
   - (b) cosec A + cot A
   - (c) sec A + tan A
   - (d) cosec A – cot A

2. In a $\triangle ABC$, the median BE intersects AC at E. If BG = 12 cm, where G is the centroid, then BE is equal to:
   - (a) 16 cm
   - (b) 18 cm
   - (c) 15 cm
   - (d) 13 cm

3. The table given below shows the number of players participating in two games in six different schools?

School	Games	
	A	B
J	31	58
K	24	36
L	18	26
M	29	37
N	12	33
P	40	44

   What is the ratio of total number of players participating in game A to the total number of players participating in game B?
   - (a) 117 : 77
   - (b) 67 : 116
   - (c) 77 : 117
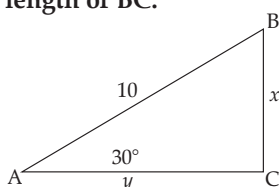   - (d) 116 : 57

4. (mx + n) is a factor of :
   - (a) $m^2 x^2 + 2nx + n^2$
   - (b) $m^2 x^2 + 2mnx + n^2$
   - (c) $m^2 x^2 + 2mx + n^2$
   - (d) $m^2 x^2 + 2mn + n^2$

5. $\triangle ABC$ is a right-angle triangle at B. If tan A = $\dfrac{5}{12}$ = then sin A+ sin B+ sin C will be equal to:
   - (a) $1\dfrac{5}{13}$
   - (b) $2\dfrac{4}{13}$
   - (c) $3\dfrac{1}{13}$
   - (d) $2\dfrac{1}{13}$

6. Study the given triangle and find the length of BC.

7. With an average speed of 45 km/h, a train reaches its destination on time. If it goes with an average speed of 30 km/h, it is late by 15 minutes. The total journey is:
   - (a) 20.5 km
   - (b) 40.5 km
   - (c) 22.5 km
   - (d) 30.5 km

8. The tax on the salary of C is $\dfrac{1}{4}$ of the salary and savings are $\dfrac{1}{3}$ of the salary. The ratio of the expenditures to the savings is _____.
   - (a) 4 : 5
   - (b) 4 : 3
   - (c) 5 : 4
   - (d) 3 : 4

9. Study the following table and answer the question that follows.

   A school has four sections A, B, C and D of Class IX students.

   The results of Science and Mathematics examinations are shown in the following table.

Result	No. of students			
	Section A	Section B	Section C	Section D
Failed in both	24	25	18	20
Failed in Science but passed in Mathematics	14	12	10	15
Passed in Science but failed in Mathematics	7	6	8	10
Passed in both	63	60	56	55

   What is the ratio of number of students who failed in Science but passed in Mathematics of section B and section D together to the number of students of section A that passed in both subjects?
   - (a) 9 : 17
   - (b) 3 : 7
   - (c) 4 : 9
   - (d) 5 : 11

10. In a 1200 m race, bike A beats bike B by 100 m. Bike B beats bike C by

(a) $\dfrac{5}{2}$ (b) 6
(c) 5   (d) 3

100 m in a 600 m race. If bike A beats bike C by 30 sec in a 720 m race, then what is the speed of bike C?
   - (a) $\dfrac{17}{3}$ m/sec
   - (b) $\dfrac{26}{9}$ m/sec
   - (c) $\dfrac{17}{9}$ m/sec
   - (d) $\dfrac{26}{3}$ m/sec

11. The following table gives information of panchayat elections held in six villages P, Q, R, S, T and U.

Village	Total number of votes (in hundreds)	Votes polled (in %)	Valid votes (in %)
P	50	80	80
Q	60	75	80
R	100	65	65
S	80	60	70
T	60	80	90
U	40	90	60

   Hint: (1) Percentage of votes polled
   $= \dfrac{\text{Total votes polled}}{\text{Total number of votes}} \times 100$
   (2) Percentage of valid votes
   $= \dfrac{\text{Total valid votes}}{\text{Total votes polled}} \times 100$

   Find the ratio of invalid votes of village R to that of village U?
   - (a) 455 : 268
   - (b) 321 : 107
   - (c) 455 : 288
   - (d) 423 : 755

12. A dishonest trader says to customers that he sells his goods at a cost price, but he uses a false weight and gains 12.5% as profit. How many grams does he use to weigh 1 kg?
   - (a) 900 g
   - (b) 880.5 g
   - (c) 850 g
   - (d) 888.8 g

13. Find the largest number of 3 digits divisible by 4 and 7.
   - (a) 960
   - (b) 980
   - (c) 990
   - (d) 970

14. A and B working separately can complete a piece of work in 10 and 16 days, respectively. If they work for a day alternately, with A beginning the work, in how many day(s) will the work be completed?
   - (a) $10\dfrac{1}{4}$
   - (b) $12\dfrac{1}{4}$
   - (c) $1\dfrac{1}{4}$
   - (d) $\dfrac{1}{4}$

1. The radius of a right circular cylinder is thrice of its height. If the height of the cylinder is 2.1 cm, then what is the volume of cylinder?
   (a) 224.65 cm^3 (b) 194.72 cm^3
   (c) 324.86 cm^3 (d) 261.95 cm^3

2. 5 men and 8 women can complete a work in 12 days working together, while 3 men and 7 women together can complete the same work in 15 days. In how many days will 11 women complete the same work?
   (a) 12   (b) 8
   (c) 6   (d) 16

3. Study the given table and answer the question that follows.

   The daily wages of 50 employees of a company is shown in the table.

Daily wages Interval	Frequency (No. of Employee)
80-90	9
90-100	3
100-110	31
110-120	5
120-130	2

   Select the correct statement from the following options.
   (a) The average wage of the employees lie between 80-90.
   (b) The average wage of the employees lie between 110-120.
   (c) The average wage of the employees lie between 100-110.
   (d) The average wage of the employees lie between 90-100.

4. If $\dfrac{k - k \cot^2 30°}{1 + \cot^2 30°} = \sin^2 60° + 4 \tan^2 45° - \text{cosec}^2 60°$, then the value of k (correct to two decimal places) is:
   (a) 5.55   (b) -6.83
   (c) -5.58 (d) 6.83

5. A man bought a watch for 12% discount. If he had bought it for 24% discount, he would have got the watch for ₹2400 less. The marked price of the watch is:

   (a) ₹30,000   (b) ₹22,500
   (c) ₹20,000   (d) ₹25,000

6. If the price of salt decreases by 20%, then by what percentage should consumption be increased to keep the expenditure same?
   (a) 26%   (b) 27%
   (c) 25%   (d) 24%

7. A solid copper sphere of radius 9 cm is hammered and moulded into a wire of radius 2 cm. What is the length of this wire?
   (a) 224 cm   (b) 183 cm
   (c) 198 cm   (d) 243 cm

8. Which smallest positive number should be subtracted from each of 9 and 13 so that 18 is the third proportion to them?
   (a) 2   (b) 4
   (c) 3   (d) 1

9. A company employed 700 men and 300 women and the average wage was ₹450 per day. If a man got ₹50 more than a woman, then the daily wage of the woman is:
   (a) ₹350   (b) ₹375
   (c) ₹415   (d) ₹435

10. A, B, C are three angles of a triangle. If A – B = 45° and B – C = 15° then $\angle A$ = ?
    (a) 83°   (b) 85°
    (c) 95°   (d) 75°

11. If $8a^3 + 27b^3 = 16$ and $2a + 3b = 4$, then find the value of $16a^4 + 81b^4$.
    (a) 26   (b) 30
    (c) 28   (d) 32

12. The import and export of a country (in lakhs rupees) during a certain period of time is given in the following bar-graph.
    Read the bar-graph carefully and answer the following question.
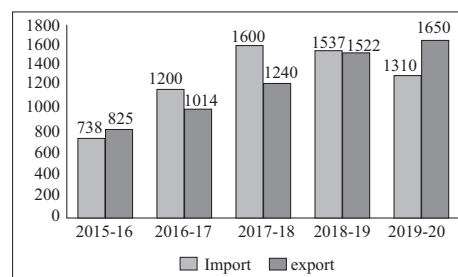
    What is the average of exports during the given period of time?
    (a) ₹1,250.2 lakhs
    (b) ₹1,240.0 lakhs
    (c) ₹1,248.2 lakhs
    (d) ₹1,115.4 lakhs

13. If the cost price is 72% of the selling price, then what is the percentage of profit? (Correct to 2 decimal places)
    (a) 38.89%   (b) 35.75%
    (c) 32.25%   (d) 28.75%

14. What would be the compound interest on ₹15,750 at 20% per annum, in two years, if the interest is compounded half yearly?
    (a) ₹5,213.25
    (b) ₹3,307.5
    (c) ₹7,305.975
    (d) ₹7,309.575

15. A policeman sees a chain snatcher at a distance of 500 m. He starts chasing the chain snatcher who is running at a speed of 5 m/s, while the policeman is chasing him at a speed of 15 m/s. How much distance will the chain snatcher have covered by the time he is caught by the policeman?
    (a) 200 m   (b) 180 m
    (c) 150 m   (d) 250 m

16. A number when divided by 7 leaves remainder of 4. If the square of the same number is divided by 7, then what is the remainder?
    (a) 3   (b) 1
    (c) 4   (d) 2

17. The given table shows the number of new employees joined in different categories of employees in an organisation and also the number of employees from these categories who left the organisation every year since the foundation of the organisation in 2015. Study the table and answer the question that follows:

1. In an equilateral triangle ABC, D is the midpoint of side BC. If the length of BC is 8 cm, then the height of the triangle is:
   (a) 5.5 cm
   (b) 4.5 cm
   (c) $6\sqrt{3}$ cm
   (d) $4\sqrt{3}$ cm

2. A thief steals a bike at 12:30 p.m. and drives it at 48 km/h. But the theft is discovered after half an hour. The bike owner starts to chase him on another bike at 58km/h. The thief will be caught at_____.
   (a) 3 : 40 p.m.
   (b) 3 : 54 p.m.
   (c) 3 : 10 p.m.
   (d) 3 : 24 p.m.

3. If ∆ABC ~ ∆FDE such that AB = 9 cm, AC = 11 cm, DF = 16 cm and DE = 12 cm, then the length of BC is:
   (a) $5\dfrac{3}{4}$ cm
   (b) $4\dfrac{3}{5}$ cm
   (c) $3\dfrac{5}{7}$ cm
   (d) $6\dfrac{3}{4}$ cm

4. The radii of two cylinders are in the ratio 1 : 4 and their heights are in the ratio 4: 3. Their volumes will be in the ratio_____.
   (a) 1 : 12
   (b) 2 : 9
   (c) 3 : 10
   (d) 1 : 9

5. If $x+\dfrac{1}{x}=2\cos\theta$, then $x^3+\dfrac{1}{x^3}=$?
   (a) 2 cos 2θ
   (b) cos 3θ
   (c) 2 cos 3θ
   (d) cos 2θ

6. A and B can do a certain work in 6 hours, and A, B and C together take 4 hours to do the same. How long will it take for C alone to accomplish the task?
   (a) 12 hours
   (b) 4 hours
   (c) 2 hours
   (d) 6 hours

7. The pie chart given below shows the expenditure incurred by a person on 7 articles.

   The total expenditure of all these 7 articles are 3600. Expenditure incurred on a particular article is shown in terms of degree with respect to the total expenditure incurred in all these 7 articles.
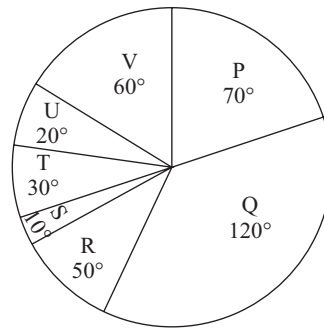
   What is the average expenditure incurred on article P and Q?
   (a) 875
   (b) 905
   (c) 885
   (d) 950

8. $\sin^4\theta + \cos^4\theta$ in terms of sin θ can be written as:
   (a) $2\sin^4\theta + 2\sin^2\theta - 1$
   (b) $2\sin^4\theta - 2\sin^2\theta$
   (c) $2\sin^4\theta - 2\sin^2\theta - 1$
   (d) $2\sin^4\theta - 2\sin^2\theta + 1$

9. Three circles of radius 6 cm are kept touching each other. The string is tightly tied around these three circles. What is the length of the string?
   (a) $36 + 12p$ cm
   (b) $36 + 18p$ cm
   (c) $24 + 36p$ cm
   (d) $36 + 20p$ cm

10. If $x = 3 + 2\sqrt{2}, x > 0$ then the value of $\sqrt{x} - \dfrac{1}{\sqrt{x}}$ is :
    (a) 1
    (b) $\sqrt{2}$
    (c) 2
    (d) $2\sqrt{2}$

11. Study the given graph and table and answer the following question.

    Data of different states regarding population of states in the year 1998
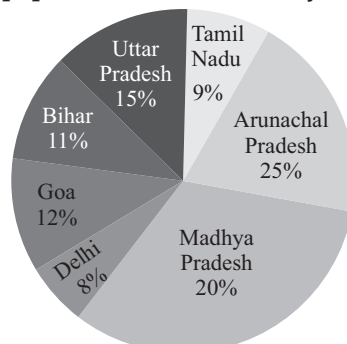
    Total population of the given states = 3,27,60,000

States	Sex and literacy wise Population Ratio			
	Sex		Literacy	
	M	F	Literate	Illiterate
Arunachal Pradesh	5	3	2	7
Madhya Pradesh	3	1	1	4
Delhi	2	3	2	1
Goa	3	5	3	2
Bihar	3	4	4	1
Uttar Pradesh	3	2	7	2
Tamil Nadu	3	4	9	4

   If in the year 1998, there was an increase of 20% in the population of Goa and 10% in the population of Arunachal Pradesh compared to the previous year, then what was the ratio of populations of Goa and Arunachal Pradesh in 1997?
   (a) 7 : 11
   (b) 11 : 25
   (c) 4 : 5
   (d) 25 : 11

12. Suman paid ₹9,600 in interest on a loan she obtained 5 years ago with a simple interest rate of 16%. What was the amount of the loan she had taken?
    (a) ₹ 13,250
    (b) ₹ 12,500
    (c) ₹ 12,000
    (d) ₹ 11,750

13. tan (θ – 14π) is equal to :
    (a) tan θ
    (b) – cot θ
    (c) cot θ
    (d) – tan θ

14. What will be the remainder when 7^{42} is divided by 48?
    (a) 2
    (b) 3
    (c) 1
    (d) 0

15. The following pie chart is represents the units of electricity sold to various categories in a month by an Electricity Supplier.

1. A car starts from point A towards point B, travelling at the speed of 20 km/h. $1\frac{1}{2}$ hours later, another car starts from point A and travelling at the speed of 30 km/h and reaches $2\frac{1}{2}$ hours before the first car. Find the distance between A and B.
   (a) 300 km
   (b) 240 km
   (c) 260 km
   (d) 280 km

2. The difference between a discount of 25% and two successive discounts of 15% and 10% on a certain bill was ₹25. Find the amount of the bill.
   (a) ₹ 3,333.33
   (b) ₹ 2,500
   (c) ₹ 833.33
   (d) ₹ 1,666.67

3. A trader has a weighing balance that shows 1300gm for a kg. He further marks up his cost price by 15%. The net profit percentage is:
   (a) 48.5%
   (b) 49.5%
   (c) 50%
   (d) 45%

4. The nearest number which is greater to 87501, and is completely divisible by 765 is
   (a) 88975
   (b) 87975
   (c) 87966
   (d) 87775

5. Simplify : $\dfrac{cosA}{1+tanA} - \dfrac{sinA}{1+cotA}$
   (a) tanA
   (b) cosA – sinA
   (c) cosA.sinA
   (d) cosA + sinA

6. In triangle ABC, the bisector of angle BAC cuts the side BC at D. If AB = 10 cm, and AC = 14 cm, then what is BD : BC ?
   (a) 10 : 7
   (b) 5 : 7
   (c) 7 : 5
   (d) 7 : 10

7. The table given below shows the number of people in different states.

States	Number of people
A	174
B	200
C	144
D	195
E	280

   What is the ratio of number of people in state C to the number of people in state E?
   (a) 31 : 17
   (b) 35 : 18
   (c) 18 : 35
   (d) 17 : 29

8. ₹ 5,000 is divided into two parts such that if one part is invested at 4% and the other at 5%, then the whole annual interest from both the sums is ₹223. How much was invested at 4%?
   (a) ₹2,600
   (b) ₹2,700
   (c) ₹2,400
   (d) ₹2,300

9. The table given below shows the number of truck sold by six companies.

Companies	Truck
J	40
K	60
L	80
M	110
N	120
O	80

   Number of trucks sold by L are what percent of number of trucks sold by J?
   (a) 100 percent
   (b) 250 percent
   (c) 200 percent
   (d) 150 percent

10. If the volume of a sphere is 24,416.64 cm³, find its surface area (take π = 3.14) correct to two places of decimal.
    (a) 3069.55 cm²
    (b) 4069.44 cm²
    (c) 5069.66 cm²
    (d) 6069.67 cm²

11. $\dfrac{1}{1+\cos(90°-\theta)} + \dfrac{1}{1-\cos(90°-\theta)} = ?$
    (a) $2\sec^2\theta$
    (b) 1
    (c) 0
    (d) $2\tan^2\theta$

12. If $\left(4a+\dfrac{5}{a}+5\right)=14$, what is the value of $\left(16a^2+\dfrac{25}{a^2}\right)?$
    (a) 25
    (b) 36
    (c) 41
    (d) 40

13. Study the following table and answer the question that follows.

    A school has four sections A, B, C and D of Class IX students.
    The results of Science and Mathematics examinations are shown in the following table.

    | Result | No. of Students | | | |
	Section A	Section B	Section C	Section D
Failed in both	24	25	18	20
Failed in Science but passed in Mathematics	14	12	10	15
Passed in Science but failed in Mathematics	7	6	8	10
Passed in both	63	60	56	55

    What percentage of students of section C Passed in Science but failed in Mathematics?
    (a) 8.70%
    (b) 9.20%
    (c) 9.85%
    (d) 10.30%

14. Ruchi, Khushi and Teju can do a piece of work in 30, 40 and 60 days respectively. In how many days can Ruchi do the work, if she is assisted by both Khushi and Teju on every third day?
    (a) $\dfrac{550}{12}$ days
    (b) $\dfrac{85}{4}$ days
    (c) $\dfrac{71}{2}$ days
    (d) $\dfrac{360}{17}$ days

15. If the diameter of a sphere is 3.5 cm, then what is the total surface area of the sphere?
    (a) 45.75 cm²
    (b) 42.6 cm²
    (c) 38.5 cm²
    (d) 34.25 cm²

16. Ram loses $12\frac{1}{2}$% of his money and after spending 75% of the remainder, is left with ₹630. How much money did Ram have initially?
    (a) ₹ 2,080
    (b) ₹ 2,880
    (c) ₹ 2,205
    (d) ₹ 2,808

17. If $x-\dfrac{1}{x}=13$, what will be the value of $x^4+\dfrac{1}{x^4}?$
    (a) 28561
    (b) 29243
    (c) 27887
    (d) 29239

1. By selling a car for ₹2,78,000, a dealer gains 25%. If the profit is reduced to 18%, then the selling price will be:
   - (a) ₹ 2,62,432
   - (b) ₹ 2,65,432
   - (c) ₹ 2,72,432
   - (d) ₹ 2,60,432

2. A and B together can do a piece of work in 50 days. If A is 40% less efficient than B, in how many days can A working alone complete 60% of the work?
   - (a) 70
   - (b) 110
   - (c) 80
   - (d) 105

3. The following pie chart shows the spending of a country on tourism in various states during the year 2012. Total spending of the country = ₹ 49,62,000
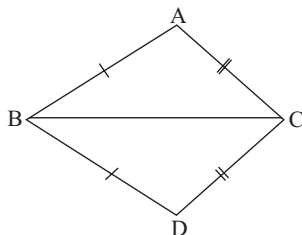
   Chart showing spending of a country on tourism in various states during the year 2012
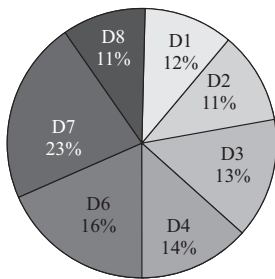
   The amount spent on state together D1 and D4 exceeds that spent on together D2 and D8 by:
   - (a) ₹ 1,89,760
   - (b) ₹ 1,97,890
   - (c) ₹ 1,98,480
   - (d) ₹ 1,78,960

4. In the given figure, AB = DB and AC = DC. If ∠ABD = 58° and ∠DBC = (2x – 4)°, ∠ACB = (y + 15)°and ∠DCB = 63°, then the value of 2x + 5y is:

   - (a) 325
   - (b) 273
   - (c) 259
   - (d) 268

5. Three numbers are in the ratio of 2: 3: 5 and their LCM is 90. Find their HCF.
   - (a) 9
   - (b) 1
   - (c) 6
   - (d) 3

6. Study the given table and answer the question that follows.
   The table shows the number of customers for different services in different cities.

Cities → Services ↓	X	Y	Z
A	250	175	350
B	220	190	240
C	260	200	270
D	245	185	330

   In which service is the average number of customers per city the highest?
   - (a) C
   - (b) A
   - (c) D
   - (d) B

7. On simple interest a sum of ₹640 becomes ₹832 in 2 years. What will ₹860 become in 4 years at the same rate of simple interest?
   - (a) ₹1,250
   - (b) ₹1,376
   - (c) ₹1,426
   - (d) ₹1,150

8. If $x + \dfrac{1}{x} = 8$, then find the value of $\dfrac{5}{x^2 - 8x + 2}$:
   - (a) 3
   - (b) 4
   - (c) 0
   - (d) 5

9. The average weight of 49 students in a class is 39 kg. Seven of them whose average weight is 40 kg leave the class and other seven students whose average weight is 54 kg join the class. What is the new average weight (in kg) of the class?
   - (a) 41
   - (b) 39
   - (c) 42
   - (d) 40

10. Study the table given below and answer the questions that follows.

Countries	Number of Tests	Positive cases	Number of patients for Ventilators
The US	14000	12%	20%
Spain	12000	8%	12.5%
Italy	10000	12%	16%
China	10000	11%	15%

    According to the table given above, which country has the maximum number of positive cases?
    - (a) The US
    - (b) China
    - (c) Spain
    - (d) Italy

11. If tan A + cot A = 2, then the value of 2 ($\tan^2$ A + $\cot^2$ A) is :
    - (a) 1
    - (b) 4
    - (c) 2
    - (d) 3

12. A shopkeeper gives two successive discounts on a watch marked ₹2,750. The first discount given is 10%. If the customer pays ₹2,103.75 for the watch, then what is the second discount?
    - (a) 15%
    - (b) 30%
    - (c) 12%
    - (d) 10%

13. Which of the following numbers are divisible by 2, 3 and 5?
    - (a) 5467760
    - (b) 1345678
    - (c) 2345760
    - (d) 2456732

14. Two trains P and Q start from stations S and T towards each other. Train P takes 4 hours 48 minutes and train Q takes 3 hours 20 minutes to reach T and S, respectively, after they meet. If the speed of train P is 45 km/h, what is the speed of train Q?
    - (a) 48 km/h
    - (b) 50 km/h
    - (c) 54 km/h
    - (d) 55 km/h

15. If $\left(\dfrac{1 - \cos\theta}{\sin\theta}\right) = \dfrac{1}{5}$, then what will be the value of $\dfrac{(1 + \cos\theta)}{\sin\theta}$?
    - (a) 5
    - (b) $\dfrac{2}{5}$
    - (c) $\dfrac{4}{5}$
    - (d) $\dfrac{1}{5}$

16. If $K + \dfrac{1}{K} = 3$, then what is the value of $\dfrac{1}{K^3} + K^3$?
    - (a) 36
    - (b) 10
    - (c) 18
    - (d) 54

17. In the given figure, a square ABCD is inscribed in a quadrant APCQ. If AB = 16 cm, find the area of the shaded region (take p = 3.14) correct to two places of decimal.
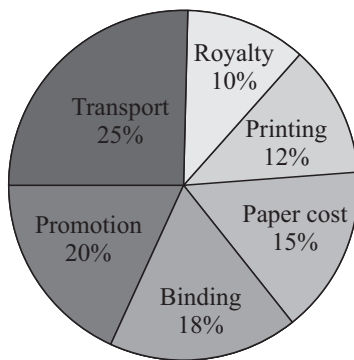
1. If the ratio of corresponding sides of two similar triangles is $\sqrt{3}:\sqrt{2}$ then what is the ratio of the area of the two triangles?
   (a) $3:2$ (b) $9:4$
   (c) $\sqrt{3}:\sqrt{2}$ (d) $27:8$

2. Various expenditures incurred by a publishing company for publishing a book in 2018 are given in the following pie-chart. Study the chart and answer the question.
   Expenditures of the company

   Price printed on a book is 15% above the cost price. If the price printed on a book is ₹ 942, then the cost of paper for a single copy in ₹ is (rounded off to one decimal place)
   (a) ₹ 122.9   (b) ₹ 188.5
   (c) ₹ 182.5   (d) ₹ 220.6

3. In a 100m race, A beats B by 20 m and B beats C by 20 m. By how much distance does A beat C?
   (a) 64 m   (b) 24 m
   (c) 25 m   (d) 36 m

4. If one man or two women or four boys or five girls can finish a work in 39 days, then how many days will one man, one woman, one boy and one girl together take to finish the same work?
   (a) 40   (b) 10
   (c) 30   (d) 20

5. The value of cot 15° cot 25° cot 45° cot 75° cot 65° is:
   (a) 1   (b) $\sqrt{3}$
   (c) 2   (d) $\sqrt{2}$

6. In triangle PQR, right angled at Q, if cot P = $\sqrt{3}$, then the value of sin P is:
   (a) 1   (b) $\dfrac{1}{\sqrt{3}}$
   (c) $\dfrac{\sqrt{3}}{2}$ (d) $\dfrac{1}{2}$

7. The difference of two numbers is 1564. After dividing the larger number by the smaller, we get 6 as quotient and 19 as remainder. What is the smaller number?
   (a) 456   (b) 287
   (c) 623   (d) 309

8. If $a + b + c = 6$, $a^2 + b^2 + c^2 = 14$ and $ab + bc + ca = 11$, then what is the value of $a^3 + b^3 + c^3 - 3abc$?
   (a) 31   (b) 12
   (c) 18   (d) 42

9. The length of the tangent to a circle from a point P is 15 cm. Point P is 17 cm away from the centre. What is the radius of the circle?
   (a) 7 cm   (b) 9 cm
   (c) 8 cm   (d) 4 cm

10. Side of an equilateral triangle is 24 cm. What will be the radius of in circle of this equilateral triangle?
    (a) $6\sqrt{2}$ cm   (b) 12 cm
    (c) $4\sqrt{3}$ cm   (d) 3 cm

11. The radius of a right circular cylinder is five times of its height. If the height of the cylinder is 3.5 cm, then what is the volume of cylinder?
    (a) 3368.75 cm³   (b) 3872.75 cm³
    (c) 3146.75 cm³   (d) 3524.25 cm³

12. In an election between two candidates, 12% of voters did not cast their votes. The winner by obtaining 68% of the total votes defeated his contestant by 2880 votes. What was the total number of voters who cast their votes in the election?
    (a) 5280   (b) 8000
    (c) 4000   (d) 6000

13. A cuboid of length 36 m, breadth 18 m and height 9 m is melted and recast into a cube. Find the length of the diagonal of the cube.
    (a) $18\sqrt{3}$ m   (b) $15\sqrt{3}$ m
    (c) $12\sqrt{3}$ m   (d) $17\sqrt{3}$ m

14. The following table shows the number of delivery partners (in thousands) who joined five different companies during six different years.

Year	Companies				
	Emazon	Clipkart	Twiggy	Tomato	Pyntra
2016	2.4	4.5	1.2	0.9	4.2
2017	1.8	5.4	1.5	1.2	5.6
2018	3.2	7.2	2.4	2.1	6.3
2019	3.9	5.6	2.8	2.7	6.5
2020	4.2	6.4	3.2	3.3	7.0
2021	5.0	7.2	3.6	3.6	7.2

   Find the percentage increase in the number of delivery partners that joined Pyntra from 2017 to 2021.
   (a) 26.57%   (b) 25.87%
   (c) 27.58%   (d) 28.57%

15. Simplify the following.
    $$\dfrac{762\times762\times762+316\times316\times316}{762\times762-762\times316+316\times316}$$
    (a) 1064   (b) 1056
    (c) 1042   (d) 1078

16. The price of some wooden furniture increases by 65% when it passes through three hands. If the first and second sellers made a profit of 20% and 25%, respectively, then find the profit percentage of the third seller.
    (a) 10%   (b) 12.5%
    (c) 16%   (d) 8%

17. What is the ratio of the fourth proportional of 2, 5, 6 and the fourth proportional of 6, 8, 9 ?
    (a) $3:2$ (b) $5:3$
    (c) $3:4$ (d) $5:4$

18. If a man travels at $\dfrac{1}{x}$ km/h on a journey and returns at $\dfrac{1}{x^2}$ km/h, then his average speed for the journey is:

1. In an election between two candidates, the defeated candidate secured 42% of the valid votes polled and lost the election by 7,68,400 votes. If 82,560 votes were declared invalid and 20% people did NOT cast their vote, then the invalid votes were what percentage (rounded off to 1 decimal place) of the votes which people did NOT cast?
   (a) 10.6 percent   (b) 9.8 percent
   (c) 12.9 percent   (d) 6.8 percent

2. If the side of an equilateral triangle is 24 cm, then what is its area?
   (a) $169\sqrt{3}$ cm^2 (b) $125\sqrt{3}$ cm^2
   (c) $256\sqrt{3}$ cm^2 (d) $144\sqrt{3}$ cm^2

3. Study the following chart and answer the question that follows.
   The chart shows the quantity of substances (P1, P2, P3) in different drugs (A, B, C, D).


   Quantity in mg

   Which substance is/are most used in terms of quantity in all drugs?
   (a) P1 and P3   (b) P3
   (c) P2   (d) P1

4. Find the weighted arithmetic mean of the first 'n' natural numbers, the weights being the corresponding numbers.
   (a) $\dfrac{(n(n+1)(2n+1))}{6}$
   (b) $\dfrac{(n(n+1))}{2}$
   (c) $\dfrac{(2n+1)}{3}$
   (d) n

5. A district has 10,24,000 inhabitants. If the population increase at the rate 2.5% per annum, find the number of inhabitants at the end of three years.
   (a) 11,20,736   (b) 11,02,736
   (c) 10,75,840   (d) 10,64,850

6. A takes twice as much time as B and thrice as much time as C to finalise a task. Working together, they can complete the task in 8 days. The time (in days) taken by A, B and C, respectively, to complete the task is:
   (a) 42, 21, 14   (b) 60, 30, 20
   (c) 54, 27, 18   (d) 48, 24, 16

7. Simplify $\dfrac{x^2 + 2x + y^2}{x^3 - 5x^2}$ if $x + \dfrac{y^2}{x} = 5$.
   (a) $\dfrac{5}{y^2}$ (b) $\dfrac{7}{y^2}$
   (c) $-\dfrac{5}{y^2}$ (d) $-\dfrac{7}{y^2}$

8. If the diameter of a hemisphere is 28 cm, then what is the volume of hemisphere?
   (a) 5749.33 cm^3 (b) 6349.22 cm^3
   (c) 6728.11 cm^3 (d) 5124.44 cm^3

9. If a + b = 5 and ab = 6, then find 3 (a^2 + b^2).
   (a) 39   (b) 48
   (c) 26   (d) 13

10. In DABC, AB = AC, O is a point on BC such that BO = CO and OD is perpendicular to AB and OE is perpendicular to AC. If ∠BOD = 60°, then measure of ∠AOE is:
    (a) 120°   (b) 60°
    (c) 30°   (d) 90°

11. The reduction of 20% in the price of rice enables a person to obtain 50 kg more for ₹ 450. Find the original price of rice per kg.
    (a) ₹ 1   (b) ₹ 2
    (c) ₹ 1.25   (d) ₹ 2.25

12. The surface area of a cube is 864 cm2. The volume of the cube is _____.
    (a) 1728 cm^3 (b) 2197 cm^3
    (c) 1331 cm^3 (d) 729 cm^3

13. In a class of students, the first student has 2 toffees, second has 4 toffees, third has 6 toffees and so on. If the number of students in the class is 25, then the total number of toffees are divisible by
    (a) 5 and 7   (b) 5 and 13
    (c) 11 and 13   (d) 7 and 11

14. A laptop is sold for ₹ 65,520 after a discount of 25%. What was the marked price of the laptop?
    (a) ₹ 87,630   (b) ₹ 87,360
    (c) ₹ 87,370   (d) ₹ 83,760

15. What will be the least number which when doubled will be exactly divisible by 15, 18, 25 and 32?
    (a) 3600   (b) 7200
    (c) 6400   (d) 3200

16. The distance covered by a train in (5y – 1) hours is (125 y^3 – 1) km. The speed of the train is:
    (a) $(5y^3 – 1)$ km/h
    (b) $(25y^2 – 5y + 1)$ km/h
    (c) $(5y + 1)$ km/h
    (d) $(25 y^2 + 5y + 1)$ km/h

17. The sides of a triangle are in the ratio 4 : 6 : 8. The triangle is a/an:
    (a) isosceles triangle
    (b) obtuse-angled
    (c) acute-angled
    (d) right-angled

18. The table given below shows the marks obtained by six students in two subjects.

Students	Subject	
	P	Q
A	150	200
B	160	180
C	200	300
D	120	400
E	300	570
F	100	220

    If the maximum marks for subject P is 900 then what percentage of marks are obtained by A in subject P?

1. In the given figure, a circle is inscribed in ∆PQR, such that it touches the sides PQ, QR and RP at points D, E, F, respectively. If the lengths of the sides PQ = 15 cm, QR = 11 cm and RP = 13 cm, then find the length of PD.
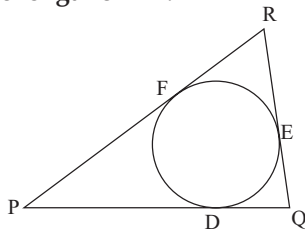

   (a) 9 cm   (b) 8 cm
   (c) 7.5 cm   (d) 8.5 cm

2. If $\cot x - \tan x = \dfrac{3}{2}$, then what will be the value of $\cot x + \tan x$?

   (a) 3   (b) 2
   (c) $\dfrac{5}{2}$ (d) $\dfrac{7}{2}$

3. The table given below shows the production of beauty products by five different companies.

Companies	Production
P	80
Q	120
R	84
S	50
T	70

   The production of beauty product by T is what percent of the production of beauty product by S?

   (a) 40 percent   (b) 140 percent
   (c) 240 percent   (d) 120 percent

4. Observe the given graph and answer the following question.
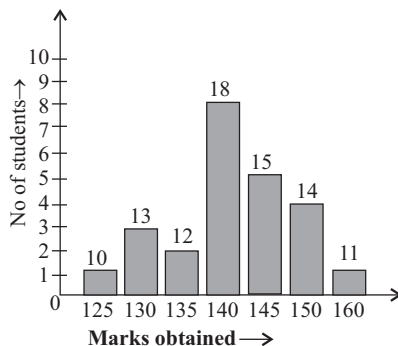
   How many students obtained more than 135 marks?
   (a) 56   (b) 55
   (c) 57   (d) 58

5. A sum of ₹6,000 is to be paid back in two equal annual instalments; each instalment is to be paid at the end of every year. How much is each instalment if the interest is compounded annually at 2% p.a.? (Rounded off up to two decimal places)

   (a) ₹ 2,092.29   (b) ₹ 3,090,.30
   (c) ₹ 2,291.29   (d) ₹ 3,589.30

6. A pen was sold for ₹166.44 with a profit of 14%. If it were sold for ₹154.76, then what would have been the percentage of profit or loss?

   (a) 5% loss   (b) 6% profit
   (c) 5% profit   (d) 6% loss

7. If $x = \dfrac{\sqrt{5}-2}{\sqrt{5}+2}$, then the value of $x^2 + x^{-2}$ is :

   (a) 350   (b) 345
   (c) 284   (d) 322

8. The table given below shows the number of pencils sold by 7 shops.

Shops	Pencils
S1	54
S2	68
S3	70
S4	120
S5	84
S6	130
S7	36

   What is the ratio of number of pencils sold by S3 to the number of pencils sold by S6?

   (a) 8 : 15   (b) 13 : 7
   (c) 15 : 7   (d) 7 : 13

9. If x > 0, and $x^4 + \dfrac{1}{x^4} = 2207$, what is the value of $x^7 + \dfrac{1}{x^7}$?

   (a) 710649   (b) 710647
   (c) 710654   (d) 710661

10. Which of the following two will provide more volume?

    I.   A cuboid of edges 6 cm, 7 cm and 8 cm
    II. A cube of edge 7 cm
    (a) Cube will have more volume
    (b) Both will have equal volume
    (c) Cuboid will have more volume
    (d) Cannot be determined

11. What is the single percentage discount equivalent to two successive discounts of 15% and 5%?
    (a) 19.00%   (b) 19.25%
    (c) 18.00%   (d) 18.25%

12. Simplify x + 3 (y + x – 2) – (x + y).
    (a) $x + 2y - 6$ (b) $2x + y - 6$
    (c) $2x + 3y - 6$ (d) $3x + 2y - 6$

13. A thief is noticed by a policeman from a distance of 97 m. The thief starts running and the policeman chases him. The thief and the policeman run at a speed of 21 m/sec and 23 m/sec respectively. What is the time taken by the policeman to catch the thief?
    (a) 40 sec   (b) 45 sec
    (c) 62.5 sec   (d) 48.5 sec

14. If $\sec^2 A + \tan^2 A = \dfrac{4}{17}$, then $\sec^4 A - \tan^4 A$ is equal to :
    (a) $\dfrac{13}{17}$ (b) $\dfrac{4}{13}$
    (c) $\dfrac{4}{17}$ (d) $\dfrac{5}{17}$

15. If sin (A + B) = cos (A + B), what is the value of tan A?
    (a) $\dfrac{1-\tan B}{1+\tan B}$ (b) $\dfrac{1+\tan B}{1-\tan B}$
    (c) $\dfrac{1+\sec B}{1-\sec B}$ (d) $\dfrac{1-\ \cosec B}{1+\cosec B}$

16. If the diameter of a sphere is 63 cm, then what is the total surface area of the sphere?
    (a) 11824 cm^2 (b) 12836 cm^2
    (c) 12474 cm^2 (d) 11248 cm^2

17. A circular clock has the hour hand of length 6 inch. Find the length of the distance it covers by it's tip from 9 p.m. to 3 a.m.

1. $16 \cos^3 \dfrac{\pi}{6} - 12\cos \dfrac{\pi}{6} =$ _____.
   (a) 0   (b) 2
   (c) 1   (d) –1

2. Two equal circles of radius 8 cm intersect each other in such a way that each passes through the centre of the other. The length of the common chord is:
   (a) $8\sqrt{3}$ cm   (b) $\sqrt{3}$ cm
   (c) $2\sqrt{3}$ cm   (d) $4\sqrt{3}$ cm

3. The table given below shows the number of bicycle sold by six companies.

Companies	Bicycle
A	60
B	90
C	120
D	165
E	180
F	120

   What are the ratio of number of bicycle sold by B to the number of bicycle sold by D?
   (a) 11 : 5   (b) 11 : 6
   (c) 5 : 13   (d) 6 : 11

4. A chord of length 42 cm is drawn in a circle having diameter 58 cm. What is the minimum distance of other parallel chord of length 40 cm in the same circle from 42 cm long chord?
   (a) 4 cm   (b) 1 cm
   (c) 3 cm   (d) 2 cm

5. 6 men and 8 women can do a piece of work in 10 days, whereas 26 men and 48 women can do the same work in 2 days. What will be the time taken by 15 men and 20 women to do the same work?
   (a) 6 days   (b) 10 days
   (c) 4 days   (d) 8 days

6. The following table gives the subscription of different schemes of a Mutual Fund Company over the months.

   (Rupees in crores)

Month	Schemes					Total
	V	W	X	Y	Z	
September	200	70	30	290	10	600
October	120	130	70	150	290	760
November	45	35	25	125	160	390
December	160	110	40	115	130	555
January	80	90	70	100	140	480
February	130	150	30	40	390	740

   What is the difference in the subscription of scheme X between December and February?
   (a) 10 crores   (b) 18 crores
   (c) 8 crores   (d) 25 crores

7. The value of
   $$\dfrac{428 \times 428 \times 428 + 348 \times 348 \times 348}{428 \times 428 - 428 \times 348 + 348 \times 348}$$ is:
   (a) 776   (b) 62080
   (c) 80   (d) 40

8. If the 5-digit number 750PQ is divisible by 3, 7 and 11, then what is the value of P + 2Q?
   (a) 17   (b) 15
   (c) 18   (d) 16

9. Raju, Ravi and Ashok contested an election. 5% votes polled were invalid. Raju got 30% of the total votes. Ravi got 32% of the total votes. The winner got 5136 more votes than the person who received the least number of votes. Find the total number of votes polled.
   (a) 171200   (b) 64200
   (c) 171220   (d) 172100

10. A horse was sold for ₹ 60,000 at a profit of 20%. For what price should he have sold to gain a 30% profit?
    (a) ₹ 64,000   (b) ₹ 65,000
    (c) ₹ 50,000   (d) ₹ 55,000

11. If $\dfrac{a^2 + b^2 + c^2 - 1024}{ab - bc - ca} = -2$ and $a + b = 5c$, where $c > 0$, then the value of c is
    (a) 8   (b) 4
    (c) 12   (d) 5

12. The pie chart given below shows the production of 6 different factories. The total production of all these 6 factories are 22000. The production of a particular factory is shown as a percent of total production of all these 6 factories.
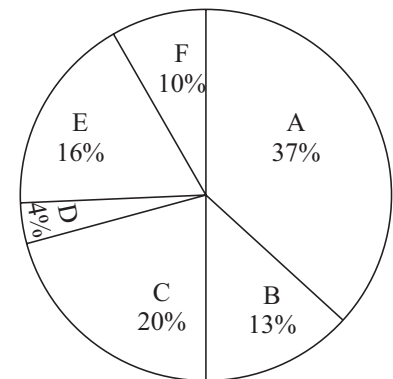
    P1 = The value of average production of A, C, D and F.

    P2 = The difference between the production of B and E. What is the value of (P1 + P2)?
    (a) 2525   (b) 6545
    (c) 3525   (d) 4565

13. If p + q = 6 and pq = 4, then what is the value of $p^3 + q^3$?
    (a) 81   (b) 64
    (c) 144   (d) 256

14. The ratio of two numbers is 5 : 4 and their HCF is 4. What is their LCM?
    (a) 80   (b) 48
    (c) 36   (d) 60

15. If $\cos A = \dfrac{9}{41}$, find cot A.
    (a) $\dfrac{9}{40}$ (b) $\dfrac{41}{40}$
    (c) $\dfrac{40}{9}$ (d) $\dfrac{9}{41}$

16. A truck runs 492 km on 36 Litter of diesel. How many kilometres can it run on 33 Litter of diesel?
    (a) 454 km   (b) 453 km
    (c) 451 km   (d) 452 km

1. The simple interest on a certain sum for 3 years at 14% p.a. is ₹ 4,200 less than the simple interest on the same sum for 5 years at the same rate. Find the sum.
   (a) ₹ 16,000   (b) ₹ 10,000
   (c) ₹ 15,000   (d) ₹ 12,000

2. If 450 men can finish construction of an apartment in 20 days, then how many men are needed to complete the same work in 30 days?
   (a) 150   (b) 300
   (c) 400   (d) 250

3. If a + b = 11 and ab = 35, then what is the value of $(a^4 + b^4)$?
   (a) 151   (b) 261
   (c) 124   (d) 102

4. Two numbers are in the ratio of 6 : 5. If their HCF is 3, then what is the LCM of the two numbers?
   (a) 64   (b) 110
   (c) 90   (d) 80

5. A container contains 25 litre of milk. From this container, 5 litre of milk is taken out and replaced by water. This process is further repeated two times. How much milk is there in the container now?
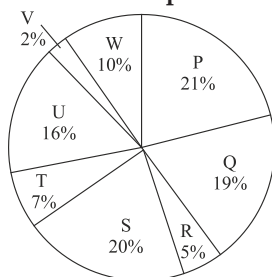   (a) 11.5 litre   (b) 14.8 litre
   (c) 13.5 litre   (d) 12.8 litre

6. If x + y = 36, then find $(x – 27)^3 + (y – 9)^3$.
   (a) 1   (b) 81
   (c) 2y   (d) 0

7. The pie chart given below shows the number of bike sold by 8 different companies. The total number of bike sold by all these 8 companies are 2000. Number of bikes sold by a particular company is shown as a percent of total number of bike sold by all these 8 companies.

What is the difference between the average number of bikes sold by P, Q, R and S and the average number of bikes sold by T, U, V and W?
(a) 150   (b) 200
(c) 175   (d) 125

8. In the figure, AB = AD = 7 cm and AC = AE and BC = 11 cm, then find the length of ED.
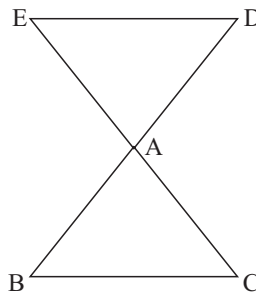
(a) 12   (b) 10
(c) 11   (d) 2

9. If $y + \dfrac{1}{y} = 3,$ then what is the value of $\dfrac{1}{y^3} + y^3 + 2?$
   (a) 24   (b) 18
   (c) 20   (d) 29

10. The value of $\dfrac{2\tan 60°}{1 + \tan^2 60°}$ is:
    (a) cos 60°   (b) tan 60°
    (c) sin 60°   (d) sin 30°

11. The bar graph shows the percentage distribution of the expenditure of a company under various expense heads during 2003.
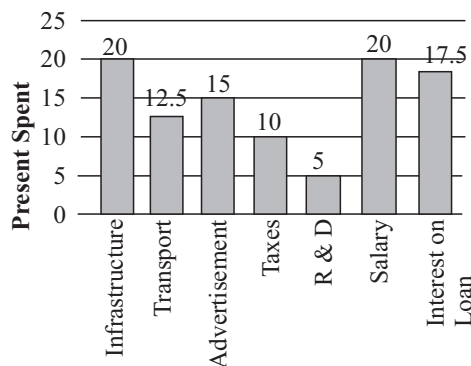
If the interest on loans amounted to ₹ 3.15 crores, then the total amount of expenditure on salary, taxes and infrastructure is:
(a) 9 crores   (b) 7.8 crores
(c) 5.5 crores   (d) 8.5 crores

12. What is the value of tan 240°?
    (a) $\sqrt{2}$ (b) $(-)\sqrt{3}$
    (c) $\sqrt{3}$ (d) 3

13. The table given below shows the income of two companies C1 and C2 in 6 years.

Year	Company	
	C1	C2
P	750	850
Q	200	250
R	330	350
S	550	650
T	530	270
U	370	390

Which of the following statement is NOT correct?
I. The income of C1 in year P is 33.33 percent of the income of C2 in year Q.
II. The average income of C1 and C2 in year T is 400.
(a) Only I
(b) Both I and II
(c) Neither I nor II
(d) Only II

14. The single discount equivalent to two successive discounts of 15% and 12% on an article is:
    (a) 3%   (b) 25.2%
    (c) 74.8%   (d) 27%

15. A copper sphere of diameter 18 cm is drawn into a wire of diameter 6 mm. Find the length of the wire.
    (a) 143 m   (b) 108 m
    (c) 324 m   (d) 234 m

16. A solid metallic sphere of radius 13 cm is melted and recast into a cone having diameter of the base as 13 cm. What is the height of the cone?
    (a) 246 cm   (b) 152 cm
    (c) 174 cm   (d) 208 cm

1. k is a negative number such that k + k−1 = −2, then what is the value of $\dfrac{k^2 + 4k - 2}{k^2 + k - 5}$?
   (a) 7   (b) 1
   (c) −7   (d) −1

2. If $\left(x + \dfrac{1}{x}\right) = 5\sqrt{2}$, then what is the value of $(x^4 + x^{-4})$?
   (a) 2542   (b) 2650
   (c) 2452   (d) 2302

3. A man rows a boat a certain distance downstream in 9 hours, while it takes 18 hours to row the same distance upstream. How many hours will it take him to row three-fifth of the same distance in still water?
   (a) 9.5   (b) 7.2
   (c) 10   (d) 12

4. Study the given chart and answer the following question.

   Production of steel (in mn units)

   What is the central angle corresponding to the production steel by Kerala?
   (a) 82°   (b) 65.8°
   (c) 75.2°   (d) 72°

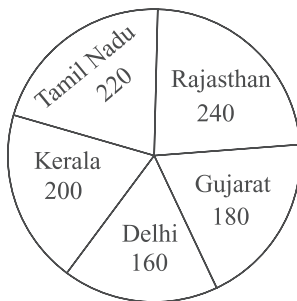5. A shopkeeper makes a net profit of 44% on selling an article at successive discounts of 10% and 20%. Find the net profit percentage, if the shopkeeper sells the same article at a discount of 15%.
   (a) 50%   (b) 70%
   (c) 30%   (d) 40%

6. What will be the value of $\dfrac{\sin 30° \sin 40° \sin 50° \sin 60°}{\cos 30° \cos 40° \cos 50° \cos 60°}$?
   (a) $\dfrac{1}{\sqrt{2}}$ (b) $\sqrt{3}$
   (c) 1   (d) $\dfrac{1}{\sqrt{3}}$

7. What is the ratio between the HCF and LCM of the numbers whose LCM is 48 and the product of the numbers is 384?
   (a) 1 : 4   (b) 1 : 6
   (c) 1 : 3   (d) 2 : 5

8. The price of a scooter increases successively by 10%, 5% and 15%. What is the total percentage increase in price of scooter?
   (a) $32\dfrac{33}{40}\%$ (b) $34\dfrac{21}{40}\%$
   (c) $30\dfrac{11}{40}\%$ (d) $36\dfrac{31}{40}\%$

9. If areas of similar triangles ∆ABC and ∆DEF are $x^?$ cm² and y^2 cm² respectively, and EF = a cm, then BC (in cm) is:
   (a) $\dfrac{y^2}{a^2 x^2}$ (b) $\dfrac{y}{ax}$
   (c) $\dfrac{ax}{y}$ (d) $\dfrac{a^2 x^2}{y^2}$

10. The average of the marks of 25 students in a class, in an examination was calculated to be 19. Later, the teacher realized that the marks of two students were taken as 18 and 19 respectively, instead of 14 and 15. Find the new actual average marks of the class.
    (a) 17.43   (b) 16.56
    (c) 18.68   (d) 17.65

11. Simplify $x^9 \times x^5 \times x^{-4} \times x^0 \times x^{-6}$.
    (a) x^4 (b) x^{-4}
    (c) x^{-6} (d) x^6

12. The value of $(\sin 30° \cos 60° - \cos 30° \sin 60°)$ is equal to:
    (a) $-\cos 30°$ (b) $-\sin 30°$
    (c) $\cos 30°$ (d) $\sin 30°$

13. What is the ratio of the mean proportional between 1.6 and 3.6 and the third proportional of 5 and 8?
    (a) 2 : 15   (b) 5 : 16
    (c) 3 : 16   (d) 4 : 15

14. The difference between the cost price and selling price of a pair of shoes is ₹ 1,200. If the profit is 15%, the selling price is:
    (a) ₹ 8,200   (b) ₹ 9,200
    (c) ₹ 8,000   (d) ₹ 9,000

15. A person lent certain sum of money at the annual rate of 25 percent on simple interest. In 6 years the interest amounted to ₹ 360 more than the sum lent. What is the sum lent?
    (a) ₹ 600   (b) ₹ 360
    (c) ₹ 720   (d) ₹ 540

16. The side of an equilateral triangle is 12 cm. What is the radius of the circle circumscribing this equilateral triangle?
    (a) $6\sqrt{3}$ cm   (b) $4\sqrt{3}$ cm
    (c) $9\sqrt{3}$ cm   (d) $5\sqrt{3}$ cm

17. The following table shows the number of different items in different shops and their respective selling prices per unit.

Shops	Total No. of Items	AC : Cooler : Fan	Selling Price per unit		
			Cooler	AC	Fan
A	5000	4 : 5 : 1	8000	25000	8500
B	1800	3 : 2 : 4	10000	20000	16000
C	3400	6 : 4 : 7	6000	42000	15000
D	3600	4 : 2 : 3	12000	32000	8000
E	4000	5 : 1 : 4	8000	26500	12200
F	1210	2 : 4 : 5	11000	28000	11100

Find the percentage of total revenue which come from Cooler from shop E, considering all given items are being sold from shop E and from all the given shops only given three items are being sold. (Rounded off to three decimal places)
(a) 4.226%   (b) 3.516%
(c) 10.45%   (d) 8.910%

1. A dishonest merchant sells goods at a 12.5% loss on the cost price, but uses 28g weight instead of 36g. What is his percentage profit or loss?
   (a) 6.25% loss (b) 12.5% gain
   (c) 18.75% gain (d) 10.5% loss

2. The HCF of two numbers is 12. Which one of the following can never be their LCM?
   (a) 72 (b) 60
   (c) 90 (d) 84

3. Two circles touch each other externally at P. AB is a direct common tangent to the two circles, A and B are points of contact, and ∠PAB = 40°. The measure of ∠ABP is:
   (a) 45º (b) 55º
   (c) 50º (d) 40º

4. The mean proportion of 169 and 144 is:
   (a) 156 (b) 147
   (c) 126 (d) 165

5. The length and breadth of a rectangle are increased by 8% and 5%, respectively. By how much percentage will the area of the rectangle increase?
   (a) 13.4% (b) 15.4%
   (c) 12.4% (d) 16.4%

6. Simplify: $\dfrac{\cos45°}{\sec30° + \csc30°}$
   (a) $\dfrac{3\sqrt{2} + \sqrt{6}}{8}$ (b) $\dfrac{\sqrt{3}}{2\sqrt{2} - 2\sqrt{6}}$
   (c) $\dfrac{3\sqrt{2} - \sqrt{6}}{8}$ (d) $\dfrac{\sqrt{3}}{2\sqrt{6} - 2\sqrt{2}}$

7. Which of the following numbers is a divisor of $(49^{15} – 1)$?
   (a) 46 (b) 14
   (c) 8 (d) 50

8. In a 1500 m race, Anil beats Bakul by 150 m and in the same race Bakul beats Charles by 75 m. By what distance does Anil beat Charles?

   (a) 217.50 m (b) 200.15 m
   (c) 293.50 m (d) 313.75 m

9. ₹2,500, when invested for 8 years at a given rate of simple interest per year, amounted to ₹3,725 on maturity. What was the rate of simple interest that was paid per annum?
   (a) 6% (b) 6.125%
   (c) 6.25% (d) 5.875%

10. The following table shows the number of pages printed by 3 printers during 3 days.

Printers / Days	X	Y	Z
Monday	130	140	210
Tuesday	110	145	160
Wednesday	180	90	218

What is the average number of pages printed by printer Z during the 3 days?
   (a) 196 (b) 194
   (c) 192 (d) 190

11. The batting average for 27 innings of a cricket player is 47 runs. His highest score in an innings exceeds his lowest score by 157 runs. If the two innings are excluded, the average score of the remaining 25 innings is 42 runs. Find his highest score in an innings.
   (a) 176 (b) 188
   (c) 186 (d) 174

12. P and Q can complete a project in 15 days and 10 days, respectively. They started doing the work together, but after 2 days, Q had to leave and P alone completed the remaining work. In how many days was the whole work completed?
   (a) 11 (b) 12
   (c) 13 (d) 10

13. The pie chart given below shows the number of truck sold by 8 different companies.

The total number of trucks sold by all these 8 companies are 4000. Number of trucks sold by a particular company is shown as a percent of total number of trucks sold by all these 8 companies.
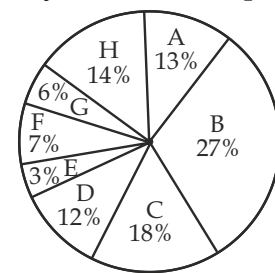
The number of trucks sold by B, C, F and H is how much percent less than the number of trucks sold by all these 8 companies?
   (a) 46 percent (b) 22 percent
   (c) 34 percent (d) 14 percent

14. If $x^2 – 5x + 1 = 0$, then the value of $\dfrac{x^6 + x^4 + x^2 + 1}{5x^3} = ?$
   (a) 30 (b) 25
   (c) 23 (d) 28

15. In a right-angled triangle PQR, right-angled at Q, the length of the side PR is 17 units, length of the base QR is 8 units, and length of the side PQ is 15 units. If ∠RPQ = α, then sin α + cos α is :
   (a) $\dfrac{18}{17}$ (b) $\dfrac{23}{17}$
   (c) $\dfrac{21}{17}$ (d) $\dfrac{15}{17}$

16. If $\dfrac{(17)^3 + (7)^3}{(17^2 + 7^2 - k)}$, then what is the value of k?
   (a) 119 (b) 128
   (c) 24 (d) 109

17. The circumference of the two circles is 198 cm and 352 cm respectively. What is the difference between their radii?

1. What is the coefficient of x^2 in the expansion of $\left(5-\dfrac{x^2}{3}\right)^3$?

   (a) $-\dfrac{25}{3}$ (b) -25

   (c) $-\dfrac{5}{3}$ (d) 25

2. Table shows District-wise data of number of primary school teachers posted in schools of a city.

   Study the table and answer the question:

District	Male Teacher	Female Teacher
East	1650	2375
North	1075	2651
West	1280	1520
South	1170	1085
Central	690	859

   What is the difference between the total number of male teachers in the districts East, North, West taken together and the total number of female teachers in the districts East and South?

   (a) 545   (b) 110
   (c) 735   (d) 771

3. If $\sec 31° = x$, then $\sin^2 59° + \dfrac{1}{\sec^2 31°}$
   $-\dfrac{1}{\sin^2 59° \operatorname{cosec}^2 59°}$ is equal to:

   (a) $\dfrac{x^2-2}{x}$ (b) $\dfrac{2-x^2}{x^2}$

   (c) $\dfrac{x^2-2}{x^2}$ (d) $\dfrac{2-x^2}{x}$

4. In the table, the production and table sale (in 1000 tonnes) of a certain product of a company over 5 years is given.

Years	Production (in 1000 tonnes)	Sale (in 1000 tonnes)
2015	1250	1000
2016	1400	1290
2017	1450	1100
2018	1500	1450
2019	1600	1390

   In which year(s) the production increases by more than 10% of that in the previous year?

   (a) 2016   (b) 2018, 2019
   (c) 2019   (d) 2017, 2018

5. Study the following table and answer the question:

   Percentage of marks obtained by six students A, B, C, D, E and F in five subjects.

Subjects \ Students	A	B	C	D	E	F
English (Out of 50)	70	84	66	62	54	72
Math (Out of 150)	90	92	80	74	64	84
Science (Out of 80)	65	75	85	75	55	65
Hindi (Out of 75)	64	68	80	88	72	60
Social Science (Out of 100)	88	49	84	60	85	65

   Total marks obtained by student E in all the five subjects are ?

   (a) 340   (b) 316
   (c) 330   (d) 306

6. What is the difference between the compound interest (in ₹) compounded yearly and compounded half yearly for 18 months at 20% per annum on a sum of ₹12,000?

   (a) 145   (b) 165
   (c) 121   (d) 132

7. Simplify:

   $\dfrac{(\sin\theta+\sec\theta)^2 + (\cos\theta+\operatorname{cosec}\theta)^2}{(1+\sec\theta\,\operatorname{cosec}\theta)^2}$,

   $0° < \theta < 90°$

   (a) 0   (b) 2
   (c) -1 (d) 1

8. A shopkeeper marks an article at a price such that after giving a discount of $x\%$, he gains 20%. If the cost price and the marked price of the article are ₹920 and ₹1472 respectively, then what is the value of x?

   (a) 18   (b) 20
   (c) 25   (d) 30

9. The surface area of a cube is 13.5 m². What is the length (in m) of its diagonal?

   (a) $2\sqrt{3}$ (b) 1.5
   (c) 2   (d) $1.5\sqrt{3}$

10. If $x^4 - 62x^2 + 1 = 0$, where $x > 0$, then the value of $x^3 + x^{-3}$ is:

    (a) 488   (b) 364
    (c) 512   (d) 500

11. In a circle with centre O, a diameter AB is produced to a point P lying outside the circle and PT is a tangent to the circle at a point C on it. If $\angle BPT = 28°$, then what is the measure of $\angle BCP$?

    (a) 28°   (b) 31°
    (c) 62°   (d) 45°

12. Given that $x^8 - 34x^4 + 1 = 0$, $x > 0$, What is the value of $(x^3 - x^{-3})$?

    (a) 12   (b) 14
    (c) 18   (d) 16

13. A shopkeeper sold an article for ₹455 at a loss (in ₹). If he sells it for ₹490, then he would gain an amount four times the loss. At what price (in ₹) should he sell the article to gain 25%?

    (a) 577.50   (b) 575
    (c) 570.50   (d) 115.50

14. A tank is filled in 4 hours by three pipes A, B and C. The pipe C is $1\dfrac{1}{2}$ times as fast as B and B is 3 times as fast as A. How many hours will pipe A alone take to fill the tank?

    (a) 17   (b) 34
    (c) 30   (d) 15

15. Study the following table and answer the question:

    Percentage of marks obtained by six students A, B, C, D, E and F in five subjects.

Subjects \ Students	A	B	C	D	E	F
English (Out of 50)	70	84	66	62	54	72
Math (Out of 150)	90	92	80	74	64	84
Science (Out of 80)	65	75	85	75	55	65
Hindi (Out of 75)	64	68	80	88	72	60
Social Science (Out of 100)	88	49	84	60	85	65

1. ABCD is a cyclic quadrilateral such that when sides AB and DC are produced, they meet at E, and sides AD and BC meet at F, when produced. If $\angle ADE = 80°$ and $\angle AED = 50°$, then what is the measure of $\angle AFB$?
   (a) 50°   (b) 40°
   (c) 20°   (d) 30°

2. Table shows the number of trees planted in 4 cities from 2016 to 2020.

Years	Chandigarh	Ahmadabad	Pune	Kolkata
2016	1800	2500	1800	2000
2017	2500	2300	1850	1800
2018	2300	2400	1840	1760
2019	2440	1950	1900	1600
2020	2250	2100	2000	1750

   What is the total number of trees planted in Chandigarh in 2017 and in Kolkata in 2020?
   (a) 3550   (b) 4750
   (c) 4250   (d) 4500

3. A customer wanted to purchase an item marked for ₹10,000. Shopkeeper offered two types of discounts. 25% flat discount or successive discounts of 14% and 12%. Which is the better offer for the customers and by how much?
   (a) first offer by ₹ 32
   (b) second offer by ₹ 68
   (c) second offer by ₹ 100
   (d) first offer by ₹ 68

4. Simplify
$$\sec^2\alpha\left(1+\frac{1}{\csc\alpha}\right)\left(1-\frac{1}{\csc\alpha}\right)$$
   (a) $\sin^2\alpha$ (b) 1
   (c) –1   (d) $\tan^4\alpha$

5. If $2x + 3y + 1 = 0$, then what is the value of $(8x^3 + 8 + 27y^3 – 18xy)$?
   (a) – 7   (b) – 9
   (c) 7   (d) 9

6. A sum of ₹ 9,500 amounts to ₹ 11,495 in 2 years at a certain rate percent per annum, interest compounded yearly. What is the simple interest (in ₹) on the same sum for the same time and double the rate?

7. Let $\Delta ABC \sim \Delta RPQ$ and $\frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \frac{16}{25}$. If PQ = 4 cm, QR= 6 cm and PR = 7 cm, then AC (in cm) is equal to:
   (a) 4.8   (b) 6
   (c) 3.6   (d) 7.2

8. In a triangle ABC, length of the side AC is 4 cm more than 2 times the length of the side AB. Length of the side BC is 4 cm less than the three times the length of the side AB. If the perimeter of ΔABC is 60 cm, then its area (in cm^2) is:
   (a) 144   (b) 150
   (c) 120   (d) 100

9. The average of 23 numbers is 51. The average of first 12 numbers is 49 and the average of last 12 numbers is 54. If the twelfth number is removed, then the average of the remaining numbers (correct to two decimal places) is:
   (a) 50.45   (b) 53.25
   (c) 51.75   (d) 52.65

10. A can complete a work in $11\frac{1}{2}$ days. B is 25% more efficient than A and C is 50% efficient than B. Working together A, B and C will complete the same work
    (a) 4 days   (b) 8 days
    (c) 3 days   (d) 5 days

11. If selling price of 75 articles is equal to cost price of 60 articles, then the approximate loss or gain percent is :
    (a) No profit no loss
    (b) Loss of 30%
    (c) Profit of 25%
    (d) Loss of 20%

12. In ΔABC, right angled at B, if cot A = $\frac{1}{2}$, then the value of $\frac{sinA(cosC+cosA)}{cosC(sinC-sinA)}$ is
    (a) – 3   (b) 3
    (c) 2   (d) – 2

13. The area of a table top in the shape of an equilateral triangle is $9\sqrt{3}$ cm^2. What is the length (in cm) of each side of the table?
    (a) 6   (b) 4
    (c) 3   (d) 2

14. The total number of students in a school is 1400, out of which 35% of the students are girls and the rest are boys. If 80% of the boys and 90% of the girls passed in an annual examination, then the percentage of the students who failed is:
    (a) 21.5   (b) 15.8
    (c) 16.5   (d) 17.4

15. The vertices of a ΔABC lie on a circle with centre O. AO is produced to meet the circle at the point P. D is a point on BC such that AD $\perp$ BC. If $\angle B = 68°$ and $\angle C = 52°$, then the measure of $\angle DAP$ is:
    (a) 12°   (b) 18°
    (c) 16°   (d) 28°

16. Study the following table and answer the question:

    Number of students Appeared (A) and Passed (P) in an annual examination from four schools Q, R, S & T in five years (2014 to 2 018)

School Year	Q		R		R		T	
	A	P	A	P	A	P	A	P
2014	320	240	400	340	420	273	250	225
2015	400	320	380	285	350	280	300	228
2016	440	286	360	288	330	264	320	256
2017	350	252	420	294	380	247	350	315
2018	375	320	450	405	400	344	375	300

    The difference between the average number of students passed from school R in 2015 to 2017 and the number of students passed from school Q in 2015 is x . The value of x lies between:
    (a) 20 and 25   (b) 35 and 40
    (c) 30 and 35   (d) 25 and 30

17. If tan θ + 3 cot θ – $2\sqrt{3}$ = 0, 0° < θ < 90°, then what is the value of (cosec^2 θ + cos^2 θ)?
    (a) $\frac{19}{12}$ (b) $\frac{11}{12}$
    (c) $\frac{2}{3}$ (d) $\frac{14}{3}$

1. If $8 + 2px^2 - 36x - 27x^3 = (2 - 3x)^3$, then what is the value of p?
   (a) 27   (b) 9
   (c) – 27   (d) 54

2. The area of a square shaped field is 1764 m². The breadth of a rectangular park is $\frac{1}{6}$ th of the side of the square field and the length is four times its breadth. What is the cost (in ₹) of levelling the park at ₹ 30 per m²?
   (a) 6342   (b) 4768
   (c) 5880   (d) 2940

3. Table shows the number of trees planted in 4 cities from 2016 to 2020.

Years	Chandigarh	Ahmedabad	Pune	Kolkata
2016	1800	2500	1800	2000
2017	2500	2300	1850	1800
2018	2300	2400	1840	1760
2019	2440	1950	1900	1600
2020	2250	2100	2000	1750

   In which city were maximum trees planted in 2016 and 2019 taken together?
   (a) Ahmedabad
   (b) Kolkata
   (c) Chandigarh
   (d) Pune

4. If $2x^2 - 7x + 5 = 0$, then what is the value of $x^3 + \frac{125}{8x^3}$?
   (a) $12\frac{5}{8}$ (b) $16\frac{5}{8}$
   (c) $18\frac{5}{8}$ (d) $10\frac{5}{8}$

5. Study the following table and answer the question:
   Percentage of marks obtained by six students in five subjects A, B, C, D & E.

Subject \ Student	Manju	Amit	Rekha	Anuj	Abhi	Vikram
A (Out of 75)	68	64	88	80	72	60
B (Out of 80)	85	65	75	55	65	70
C (Out of 100)	86	80	65	68	72	73
D (Out of 50)	72	96	74	66	54	84
E (Out of 150)	92	80	90	84	74	86

The average marks of Manju, Rekha and Abhi in subject B are?
   (a) 54   (b) 60
   (c) 62   (d) 56

6. Radha saves x% of her income. If her income increases by 28% and the expenditure increases by 20%, then her savings increase by 40%. What is the value of x?
   (a) 25   (b) 40
   (c) 50   (d) 35

7. Simplify the following expression:
   $7 \times 4 \div 21$ of $4 - 5 \div 4 \times (9 - 13)$
   $+ 2 - 2 \div 8$
   (a) $5\frac{1}{16}$ (b) $7\frac{1}{12}$
   (c) $5\frac{1}{3}$ (d) $12\frac{1}{2}$

8. If $\sin^2\theta - \cos^2\theta - 3\sin\theta + 2 = 0$, $0° < \theta < 90°$, then what is the value of $\frac{1}{\sqrt{\sec\theta - \tan\theta}}$ is:
   (a) $\sqrt[2]{3}$ (b) $\sqrt[2]{2}$
   (c) $\sqrt[4]{3}$ (d) $\sqrt[4]{2}$

9. Find the value of
   $\frac{\tan^2 30°}{\sec^2 30°} + \frac{\csc^2 45°}{\cot^2 45°} - \frac{\sec^2 60°}{\csc^2 60°}$.
   (a) $\frac{23}{12}$ (b) $\frac{13}{4}$
   (c) $\frac{5}{4}$ (d) $-\frac{3}{4}$

10. If $x + \frac{1}{x} = \frac{17}{4}$, $x > 1$, then what is the value of $x - \frac{1}{x}$?
    (a) $\frac{8}{3}$ (b) $\frac{15}{4}$
    (c) $\frac{3}{2}$ (d) $\frac{9}{4}$

11. Vertices A, B, C and D of a quadrilateral ABCD lie on a circle. ∠A is three times ∠C and ∠D is two times ∠B. What is the difference between the measures of ∠D and ∠C?
    (a) 65°   (b) 45°
    (c) 75°   (d) 55°

12. In an examination, the average score of a student was 67.6. If he would have got 27 more marks in Mathematics. 10 more marks in Computer Science, 18 more marks in History and retained the same marks in other subjects, then his average score would have been 72.6. How many papers were there in the examination?
    (a) 10   (b) 11
    (c) 12   (d) 9

13. Pipes A and B can fill a tank in 12 hours and 16 hours respectively and pipe C can empty the full tank in 24 hours. All three pipes are opened together, but after 4 hours pipe B is closed. In how many hours, the empty tank will be completely filled?
    (a) 32   (b) 28
    (c) 18   (d) 14

14. If x is a real quantity, what is the minimum value of $(25 \cos^2 x + 9 \sec^2 x)$?
    (a) 30   (b) 15
    (c) 20   (d) 40

15. In ∆ABC, ∠A= 50°. If the bisectors of the angle B and angle C, meet at a point O, then ∠BOC is equal to:
    (a) 115°   (b) 50°
    (c) 65°   (d) 130°

16. A circle is inscribed in a quadrilateral ABCD, touching sides AB, BC, CD and DA at P, Q, R and S, respectively. If AS = 6 cm, BC = 12 cm, and CR = 5 cm, then the length of AB (in cm) is:
    (a) 15   (b) 11
    (c) 12   (d) 13

17. If the 5 - digit number 593ab is divisible by 3, 7 and 11, then what is the value of $(a^2 - b^2 + ab)$?
    (a) 29   (b) 31
    (c) 25   (d) 35

18. A sum of ₹25600 is invested on simple interest partly at 7% per annum and the remaining at 9% per annum. The total interest at the end of 3 years is ₹ 5832. How much money (in ₹) was invested at 9% per annum?
    (a) 16000   (b) 7600
    (c) 9600   (d) 18000

1. A can do a piece of work in 2 days, and B can do five times the same work in 15 days when they work for ten hours a day. If they work together, then how many hours in addition to a days' work will they require to complete the work?
   (a) 0
   (b) 2
   (c) 1
   (d) 3

2. The area of a triangular plot having sides 12 m, 35 m and 37 m is equal to the area of a rectangular field whose sides are in the ratio 7 : 3. The perimeter (in m) of the field is;
   (a) $24\sqrt{10}$
   (b) $24\sqrt{5}$
   (c) $20\sqrt{5}$
   (d) $20\sqrt{10}$

3. Two numbers are in the ratio 2 : 3. If 5 is subtracted from the first number and six is added to the second number, then the ratio becomes 5 : 12. What would the ratio become when eight is added to each number?
   (a) 14 : 19
   (b) 19 : 14
   (c) 14 : 11
   (d) 11 : 14

4. If $x - y = 4$ and $x^3 - y^3 = 316$, $y > 0$ then the value of $x^4 - y^4$ is:
   (a) 2320
   (b) 2500
   (c) 2482
   (d) 2401

5. The number 823p2q is exactly divisible by 7, 11 and 13, what is the value of $(p - q)$?
   (a) 3
   (b) 8
   (c) 5
   (d) 11

6. A loan is to be returned in two equal yearly instalments. If the rate of interest is 10% p.a., compounded annually and each instalment is ₹6,534, then the total interest charged (in₹) is:
   (a) 1,579
   (b) 1,728
   (c) 1,867
   (d) 1,642

7. What is the coefficient of x in the expansion of $(3x - 4)^3$?
   (a) – 144
   (b) 144
   (c) – 108
   (d) 108

8. In the table, production and sale (in 1000 tonnes) of a certain product of a company over 5 years is given. Study the table and answer the question.

Years	Production in (1000 tonnes)	Sale in (1000 tonnes)
2015	1250	1000
2016	1400	1290
2017	1450	1100
2018	1500	1450
2019	1600	1390

   In which year(s) sale is 80% or more but less than 90% of the production?
   (a) 2015, 2016
   (b) 2019
   (c) 2015, 2019
   (d) 2016, 2018

9. The average weight of a certain number of students in a class is 55.5 kg. If 4 students with average weight 60 kg join the class, then the average weight of all students in the class increases by 360 g. The number of students in the class, initially, is :
   (a) 31
   (b) 41
   (c) 36
   (d) 46

10. Study the following table and answer the question:

   Percentage of marks obtained by six students A, B, C, D, E and F in five subjects.

Subject \ Student	A	B	C	D	E	F
English (Out of 50)	70	84	66	62	54	72
Math (Out of 150)	90	92	80	74	64	84
Science (Out of 80)	65	75	85	75	55	65
Hindi (Out of 75)	64	68	80	88	72	60
Social Science (Out of 100)	88	49	84	60	85	65

   What are the average marks of students B, C, D and F in Math?
   (a) 125.5
   (b) 123.75
   (c) 82.5
   (d) 120.75

11. Simplify the following expression:
   8 ÷ 4 of 2 –15 ÷ 2 of 5 – 6 ÷ 5 × (– 7 + 5) of 2

   (a) $31\dfrac{7}{10}$
   (b) $4\dfrac{3}{10}$
   (c) $7\dfrac{3}{10}$
   (d) $-\dfrac{1}{5}$

12. The side of an equilateral ∆ABC is $3\sqrt{7}$ cm. P is a point on side BC such that BP : PC = 1 : 2. The length (in cm) of AP is:
   (a) 6
   (b) 7
   (c) $7\sqrt{3}$
   (d) $6\sqrt{3}$

13. The marked price of an article is ₹5,320. It is subject to two successive discounts, the first being 15%, and the second at a rate of 20% of the first. What is the selling price (to nearest ₹) of the article?
   (a) ₹4,386
   (b) ₹4,127
   (c) ₹4,522
   (d) ₹4,000

14. Hari suffered a loss of 8% by selling an article. If he had sold it for ₹300 more, be would have made a profit of 4%. Find his CP (in ₹)
   (a) 2250
   (b) 2400
   (c) 2575
   (d) 2500

15. Table shows District-wise data of number of primary school teachers posted in schools of a city. Study the table and answer the question.

District	Male Teacher	Female Teacher
East	1650	2375
North	1075	2651
West	1280	1520
South	1170	1085
Central	690	859

   In which district(s) is the number of female teachers exceed the number of male teachers by more than 500?
   (a) East and North
   (b) East and West
   (c) West and South
   (d) North and South

16. Price of a one gram gold coin decreased by 10% on its initial price on Monday and increased by 20% on Tuesday and again increased by 8% on Wednesday and 5% increase on Thursday. If the final price on Tuesday is ₹5,511.24, then the initial

1. Fourteen persons can do a work in 18 days. After 5 days of work, 6 workers left the work, and joined back on the last day of the work. In how many days the work got completed?
(a) 27   (b) 21
(c) 24   (d) 12

2. The table shows the daily income of 50 persons. Study the table and answer the question.

Income (₹)	No. of persons
less than 200	12
less than 250	26
less than 300	34
less than 350	40
less than 400	50

What is the ratio of the number of persons earning less than ₹ 200 to the number of persons earning ₹ 300 or more?
(a) 6 : 17   (b) 3 : 4
(c) 3 : 10   (d) 6 : 5

3. An article is marked 27% above its cost price. If x% discount is allowed on the marked price and still there is a profit of 6.68%, then what is the value of x?
(a) 20   (b) 12.5
(c) 15   (d) 16

4. The ratio of two numbers A and B is 5 : 8. If 5 is added to each of A and B, then the ratio becomes 2 : 3. The difference in A and B is:
(a) 20   (b) 10
(c) 15   (d) 12

5. A takes 2 hours more than B to cover a distance of 40 km. If A doubles his speed, he takes $1\frac{1}{2}$ hour more than B to cover 80 km. To cover a distance of 120 km, how much time (in hours) will B take travelling at his same speed?
(a) $1\frac{1}{4}$ (b) $1\frac{2}{3}$
(c) $1\frac{1}{3}$ (d) $1\frac{1}{2}$

6. Simplify the following expression:
3 × 8 ÷ 9 of 6 – 2 ÷ 3 × (5 – 2) × 2 + 18 ÷ 3 of 3
(a) $2\frac{1}{3}$ (b) – 4
(c) $2\frac{12}{13}$ (d) $-1\frac{5}{9}$

7. In a circle, chords AB and CD intersect internally, at E. If CD = 16 cm, DE = 6 cm, AE = 12 cm, and BE = x cm then the value of x is:
(a) 6   (b) 17
(c) 5   (d) 9

8. If $a^2 + b^2 + c^2 + 216 = 12(a + b - 2c)$, then $\sqrt{ab - bc - ca}$ is:
(a) $8\sqrt{5}$ (b) $6\sqrt{5}$
(c) $3\sqrt{5}$ (d) $4\sqrt{5}$

9. Triangle ABC is an equilateral triangle. D and E are points on AB and AC respectively such that DE is parallel to BC and is equal to half the length of BC. If AD + CE + BC = 30 cm, then find the perimeter (in cm) of the quadrilateral BCED.
(a) 25   (b) 45
(c) 37.5   (d) 35

10. Find the value of tan 35° cot 40° tan 45° cot 50° tan 55°.
(a) 1   (b) $\frac{1}{2}$
(c) $\frac{1}{\sqrt{2}}$ (d) – 1

11. A sold an article to B at a profit of 25%. B sold it to C at a profit of 15%. The profit made by B is ₹ 40 less than the profit made by A. What is the cost price (in ₹) of the article for A?
(a) 640   (b) 546
(c) 240   (d) 400

12. The data given in the table shows the number of students studying in four different disciplines in 5 institutes. Study the table and answer the question

Institute	Arts	Science	Commerce	Computer Science
A	36	48	59	57
B	45	54	55	48
C	55	36	56	51
D	45	48	55	53
E	48	44	52	55

Number of student studying Computer Science in the institutes A and C taken together is what percent of the number of students studying Arts in the institutes B and D taken together?
(a) 83.3   (b) 120
(c) 200   (d) 108

13. Weight of A is 20% more than weight of B, whose weight is 30% more than weight of C. By how much percent weight of A is more than weight of C?
(a) 44   (b) 69
(c) 56   (d) 35.89

14. A certain sum amount to ₹ 81840 in 3 years and to ₹ 92400 in 5 years at x%, p.a. under simple interest. If the rate of interest is becomes (x + 2)%, then in how many years will the same sum double itself?
(a) 10   (b) 8
(c) 20   (d) $12\frac{1}{2}$

15. The average of squares of five consecutive odd natural numbers is 233. What is the average of the largest number and the smallest number
(a) 15   (b) 13
(c) 11   (d) 17

16. In ΔABC, D is a point on side AB such that BD = 3 cm and DA = 4 cm. E is a point on BC such that DE ∥ AC. Then Area of ΔBDE : Area of trapezium ACED =
(a) 16 : 33   (b) 33 : 16
(c) 40 : 9   (d) 9 : 40

17. Simplify $(x - y + z)^2 - (x - y - z)^2$.
(a) $2xz + 2yz$ (b) $4xz + 4yz$
(c) $4yz - 4xz$ (d) $4xz - 4yz$

18. The area of a quadrant of a circle is $\frac{\pi}{9}$ m². Its radius (in metres) is equal to:
(a) $\frac{3}{2}$ (b) $\frac{1}{2}$
(c) $\frac{2}{3}$ (d) $\frac{1}{3}$

19. Bar graph shows the number of males and females in five organizations A, B, C, D and E.

1. In $\triangle ABC$, AB and AC are produced to points D and E respectively. If the bisectors of angle CBD and angle BCE meet at point O, such that $\angle BOC = 63°$, then $\angle A = ?$
   (a) $36°$ (b) $27°$
   (c) $63°$ (d) $54°$

2. If $\sin^6 \theta + \cos^6 \theta = \dfrac{1}{3}$; $0° < \theta < 90°$, then what is the value of $\sin \theta \cos \theta$?
   (a) $\dfrac{2}{9}$ (b) $\dfrac{\sqrt{6}}{6}$
   (c) $\dfrac{\sqrt{2}}{3}$ (d) $\dfrac{\sqrt{2}}{\sqrt{3}}$

3. Points A and B are on a circle with centre O. Point C is on the major are AB. If $\angle OAC = 35°$ and $\angle OBC = 45°$, then what is the measure (in degrees) of the angle subtended by the minor arc AB at the centre?
   (a) 160   (b) 80
   (c) 100   (d) 70

4. Study the table and answer the question.

   The data given in the table shows the number of students studying in four different disciplines in 5 institutes.

Institute	Arts	Science	Commerce	Computer Science
A	36	48	59	57
B	45	54	55	48
C	55	36	56	51
D	45	48	55	53
E	48	44	52	55

   Number of students studying commerce in institute D is what percent of the total number of students of the 5 institutes?
   (a) 5.3   (b) 27.7
   (c) 5.5   (d) 20.1

5. What is the length (in cm) of the smallest altitude of the triangle whose sides are 5 cm, 12 cm and 13 cm? (correct to one decimal place)
   (a) 12.0   (b) 5.1
   (c) 2.6   (d) 4.6

6. Five men can complete a work in 20 days. Tea women can complete the same work in 15 days. Two men and six women started working together. After 5 days, three women left the work and a new man joined the work. The group continued working together till the end of the work. In how many days will they be able to do the remaining work?
   (a) 19   (b) $16\dfrac{2}{3}$
   (c) $18\dfrac{1}{3}$ (d) 14

7. In a circle with centre O, AB and CD are parallel chords on the opposite sides of a diameter. If AB = 12 cm, CD = 18 cm and the distance between the chords AB and CD is 15 cm, then find the radius of the circle (in cm).
   (a) 12   (b) 9
   (c) $9\sqrt{13}$ (d) $3\sqrt{13}$

8. The following table shows the daily seats occupancy in different classes of a train. Numbers in bracket represent the total seats available for a particular class.

Day	2nd Class Non-AC (900)	1st Class Non-AC (500)	AC III Tier (500)	AC II Tier (250)	AC 1st Class (150)
Monday	850	460	480	240	145
Tuesday	840	400	450	230	120
Wednesday	830	390	480	220	130
Thursday	790	480	490	250	125
Friday	840	470	500	210	130

   What is the ratio of number of seats that remained vacant in all the Non-AC classes on Wednesday and Thursday taken together to number of seats remained vacant in AC classes on Monday, Tuesday and Friday?
   (a) 62 : 35   (b) 35 : 62
   (c) 39 : 62   (d) 62 : 39

9. $(\sec \theta + \tan \theta)^2 + \dfrac{1 + \operatorname{cosec}\theta}{1 - \operatorname{cosec}\theta}$, $0° < \theta < 90°$ is:
   (a) 0   (b) 1
   (c) -2 (d) 2

10. Study the table and answer the question.

The table shows the daily income of 50 persons.

Income (₹)	No. of persons
Less than 200	12
Less than 250	26
Less than 300	34
Less than 350	40
Less than 400	50

How many persons earn ₹250 or more but less than ₹350 daily?
(a) 18   (b) 28
(c) 14   (d) 24

11. A sum of money was lent in two parts in the ratio 4 : 5 for 4 years and 5 years respectively, both at the rate of 8% per annum simple interest. If the difference between the interests earned from the two parts is ₹4680, then what was the total sum lent (in ₹)?
    (a) 42120   (b) 58500
    (c) 65000   (d) 46800

12. Alloy A contains metals x and y in the ratio 5 : 2 and alloy B contains these metals in the ratio 3 : 4. Alloy C is prepared by mixing A and B in the ratio 4 : 5. The percentage of y in alloy C is:
    (a) $33\dfrac{4}{9}$ %   (b) $66\dfrac{4}{9}$ %
    (c) $44\dfrac{4}{9}$ %   (d) $55\dfrac{5}{9}$ %

13. Keshav, Surjeet and Thomas started a business with investments in the ratio 2 : 3 : 4. The ratio of their period of investments is 5 : 6 : 9. Twenty percent of the profit was spent on rent and maintenance of the office. Remaining profit was distributed among themselves. If the difference in the shares of profit of Keshav and Surjeet is ₹7264, then how much is the total profit (in ₹)?
    (a) 72640   (b) 58112
    (c) 46490   (d) 51060

14. In a right angled triangle ABC, the lengths of the sides containing the right angle are 5 cm and 12 cm respectively. A circle is inscribed in the triangle ABC. What is the radius of the circle (in cm)?

1. The cost of tiling the floor of a rectangular room is ₹9,100 at ₹65 per m². The ratio of the length and breadth of the floor is 7 : 5. The perimeter (in m) of the floor of the room is;
   (a) 28.8   (b) 48
   (c) 24   (d) 36

2. By selling an article for ₹131.25, a trader gains as much percent as the number representing the cost price of the article. In order to earn 40% profit, at what price (in ₹) should he sell the article?
   (a) 100   (b) 105
   (c) 75   (d) 140

3. ΔABC is an equilateral triangle. D is a point on side BC such that BD : BC = 1 : 3. If AD = 5√7 cm, then the side of the triangle is:
   (a) 18 cm   (b) 15 cm
   (c) 12 cm   (d) 20 cm

4. Study the following table and answer the question:

   Number of cars sold by dealers A, B, C, D & E during first six months of 2018.

 | Dealer | Month | | | | | |
   |---|---|---|---|---|---|---|
   | | January | February | March | April | May | June |
   | A | 620 | 640 | 628 | 635 | 430 | 625 |
   | B | 600 | 642 | 635 | 580 | 450 | 620 |
   | C | 640 | 635 | 640 | 540 | 625 | 740 |
   | D | 520 | 645 | 722 | 740 | 600 | 780 |
   | E | 548 | 638 | 720 | 740 | 650 | 800 |

   The average number of cars sold by dealer C in February. April and May exceeds the number of cars sold by the dealer E in January by x. The value of x lies between
   (a) 40 and 55   (b) 50 and 55
   (c) 55 and 60   (d) 45 and 50

5. In a trapezium PQRS, PQ is parallel to RS and diagonals PR and QS intersect at O. If PQ = 4 cm, SR = 10 cm, then what is area (ΔPOQ) : area (ΔSOR)?
   (a) 2 : 3   (b) 4 : 9
   (c) 2 : 5   (d) 4 : 25

6. Medicines of three different flavors - A, B and C (in lakh bottles) manufactured by a pharmaceutical company over a period of five years from 2010 to 2014 is given in the bar graph.
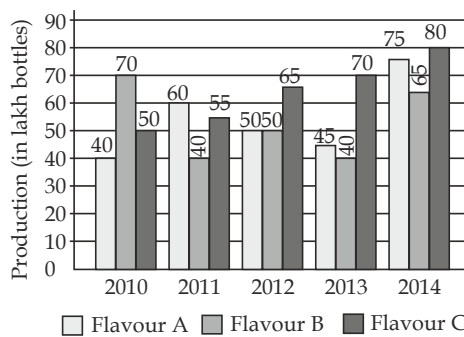
   Production of flavor A in 2012 is what percent less than the average production of flavor B in all the years (correct to 2 decimal places)?
   (a) 5.66   (b) 3.87
   (c) 6.98   (d) 4.66

7. ABCD is a cyclic quadrilateral. AB and DC meet at F, when produced. AD and BC meet at E, when produced. If ∠BAD = 68° and ∠AEB = 27°, then what is the measure of ∠BFC?
   (a) 22°   (b) 17°
   (c) 15°   (d) 27°

8. If tan θ = √5, then the value of
   $$\frac{cosec^2\theta + sec^2\theta}{cosec^2\theta - sec^2\theta} \text{ is}$$
   (a) $\frac{3}{2}$ (b) $-\frac{7}{5}$
   (c) $-\frac{3}{2}$ (d) $\frac{7}{5}$

9. A sum of ₹ 6,342 is divided amongst A, B, C and D i.n the ratio 3 : 4 : 8 : 6. What is the difference between the shares of B and D?
   (a) ₹ 302   (b) ₹ 906
   (c) ₹ 604   (d) ₹ 1,510

10. If 5 sin² θ – 4 cos θ – 4 = 0, 0° < θ < 90°, then the value of (cot θ + cosec θ) is:
   (a) $\frac{\sqrt{6}}{2}$ (b) $\frac{\sqrt{6}}{3}$
   (c) $\frac{2}{3}$ (d) $\frac{3}{2}$

11. A sum of ₹ 3,125 amounts to ₹ 3,515.20 in 3 years at x% p.a., interest being compounded yearly. What will be the simple interest (in ₹) on the same sum and for the same time at (x + 2)% p.a.?
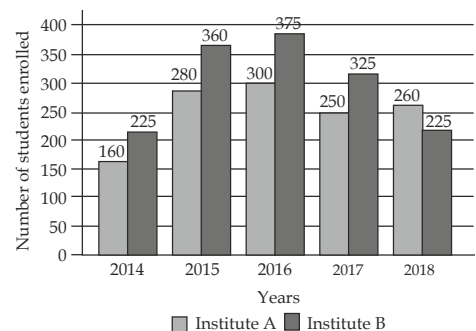   (a) 565.50   (b) 562.50
   (c) 554   (d) 550

12. Simplify the following expression:
   6 ÷ 4 of 3 – 4 ÷ 6 × (13 – 10) – 2 × 15 ÷ 6 × 6
   (a) $-31\frac{1}{2}$ (b) $-19\frac{1}{2}$
   (c) $-29\frac{14}{17}$ (d) $-27\frac{1}{2}$

13. Bar graph shows the number of students enrolled for a vocational course in institutes A and B during 5 years.

   The average number of students enrolled in institute A during 2014, 2016 and 2018 is what percent less than the number of students enrolled in institute B during 2017 (correct to two decimal places)?
   (a) 32.75%   (b) 26.15%
   (c) 22.46%   (d) 29.17%

14. The income of A is 20% less than the income of B and the income of C is 70% of the sum of incomes of A and B. The income of D is 25% more than the income of C. If the difference between the incomes of B and D is ₹23,000, then what is the income (in ₹) of A?
   (a) 32,000   (b) 28,000
   (c) 25,000   (d) 26,000

1. Study the following table and answer the question:

   Number of students Appeared (A) and Passed (P) in an annual examination from four schools Q, R, S & T in five years (2014 to 2018).

School	P		R		S		T	
Year	A	P	A	P	A	P	A	P
2014	320	240	400	340	420	273	250	225
2015	400	320	380	285	350	280	300	228
2016	440	286	360	288	330	264	320	256
2017	350	252	420	294	380	247	350	315
2018	375	320	450	405	400	344	375	300

   The ratio of the total number of students appeared from school Q in 2017 and from school S in 2018 to the total number of students passed from school R in 2018 and school T in 2014, is:
   (a) 16 : 9
   (b) 5 : 7
   (c) 7 : 8
   (d) 25 : 21

2. The value of $(\sin 37° \cos 53° + \cos 37° \sin 53°) - \dfrac{4\cos^2 37° - 7 + 4\cos^2 53°}{\tan^2 47° + 4 - \text{cosec}^2 43°}$ is
   (a) 1
   (b) – 2
   (c) 0
   (d) 2

3. AB is a chord of a circle in minor segment with center O. C is a point on the minor arc of the circle between the points A and B. The tangents to the circle at A and B meet at the point P. If ∠ACB = 102°, then what is the measure of ∠APB?
   (a) 27°
   (b) 29°
   (c) 24°
   (d) 23°

4. A shopkeeper marked every item 25% above the cost price and allowed 10% discount. Shruti being a regular customer got 5% additional discount on the bill and paid ₹2,394 for the item purchased. What is the cost price of the item (in ₹)?
   (a) 2,440
   (b) 2,240
   (c) 2,220
   (d) 2,420

5. The average of x occurring 5 times and y occurring 7 times is 37. Also, the average of x occurring 7 times and y occurring 5 times is 35. The value of y is :

(a) 30
(b) 27
(c) 42
(d) 45

6. In an examination. 45% of all the students who appeared are boys and the rest are girls. If 60% of the boys and 70% of the girls passed, then what is the percentage of students who failed?
   (a) 36
   (b) 35.4
   (c) 40
   (d) 34.5

7. The value of 18 ÷ [26 – {25 – (15 – 5) ÷ 2}] of 12 + 2 – 2 ÷ 4 × 16 is :
   (a) $\dfrac{9}{4}$
   (b) $\dfrac{3}{2}$
   (c) $-\dfrac{25}{2}$
   (d) $-\dfrac{23}{4}$

8. What is the difference (in ₹) between the simple interest and the compound interest on a sum of ₹8,000 for $2\frac{2}{5}$ years at the rate of 10% p.a., when the interest is compounded yearly?
   (a) 152.80
   (b) 150
   (c) 155
   (d) 147.20

9. If $x^4 + y^4 + x^2 y^2 = 21$ and $x^2 + y^2 - xy = 7$, then what is the value of $\dfrac{x}{y} + \dfrac{y}{x}$?
   (a) $\dfrac{3}{4}$
   (b) $-\dfrac{3}{2}$
   (c) $-\dfrac{5}{2}$
   (d) $\dfrac{5}{4}$

10. The data given in the table shows the number of boys and girls enrolled in three different streams in a school over 5 years. (2012 to 2020)

Years	Arts		Science		Commerce	
	Boys	Girls	Boys	Girls	Boys	Girls
2012	48	36	40	35	35	45
2014	42	43	42	32	32	42
2016	45	42	38	30	36	38
2018	39	46	41	23	28	34
2020	36	43	39	30	39	41

    What is the difference between the average of the number of boys in the Commerce stream for the 5 years and the average of the number of girls in the Arts stream for the 5 years?

(a) 40
(b) 12
(c) 10
(d) 8

11. Study the following table and answer the question:

    Number of students Appeared (A) and Passed (P) in an annual examination from four schools Q, R, S & T in the years (2014 to 2018)

School	P		R		S		T	
Year	A	P	A	P	A	P	A	P
2014	320	240	400	340	420	273	250	225
2015	400	320	380	285	350	280	300	228
2016	440	286	360	288	330	264	320	256
2017	350	252	420	294	380	247	350	315
2018	375	320	450	405	400	344	375	300

    The total number of students passed from school Q in 2014 and 2018 is what percent less than the total number of students appeared from schools R and S in 2017?
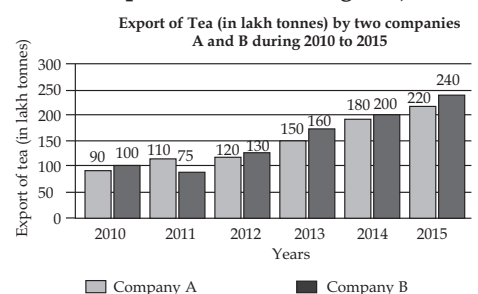   (a) 35.4%
    (b) 30%
    (c) 25%
    (d) 42.9%

12. If $3\sin^2\theta - \cos\theta - 1 = 0, 0° < \theta < 90°$, then what is the value of $\cot\theta + \text{cosec}\theta$?
    (a) $2\sqrt{5}$
    (b) $2\sqrt{3}$
    (c) $\dfrac{3\sqrt{2}}{2}$
    (d) $\sqrt{5}$

13. The following Bar Graphs represent the Export of Tea (in lakh tonnes) by two companies A and B during the years 2010 to 2015.

    Study the chart and answer the question written below:

    (Note: The data shown below is only for mathematical exercise. They do not represent the actual figures).

    Export of Tea (in lakh tonnes) by two companies A and B during 2010 to 2015

    Company A   Company B
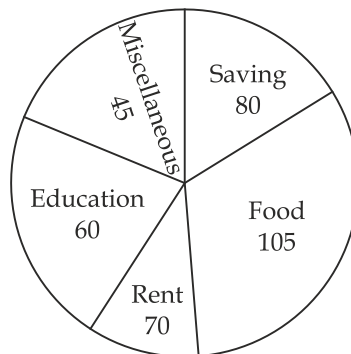
1. The marked price of an article is ₹2710. If a shopkeeper sold the article at 15% loss after giving 25% discount, then the cost price (in ₹) of the article is:
   - (a) 2,400
   - (b) 1,200
   - (c) 2,000
   - (d) 1,800

2. ABCD is a cyclic quadrilateral such that AB is the diameter of the circle and $\angle ADC = 145°$, then what is the measure of $\angle BAC$?
   - (a) 45°
   - (b) 65°
   - (c) 35°
   - (d) 55°

3. If $(x + y)^3 + 27(x – y)^3 = (Ax – 2y)(Bx^2 + Cxy + 13y^2)$, then the value of A – B – C is:
   - (a) 15
   - (b) 13
   - (c) 20
   - (d) 27

4. If $x^2 – \sqrt{11}\, x + 1 = 0$, then $(x^3 + x^{-3}) =$
   - (a) $10\sqrt{11}$
   - (b) $4\sqrt{11}$
   - (c) $8\sqrt{11}$
   - (d) $7\sqrt{11}$

5. A shopkeeper bought 20 kg of sugar at ₹45 per kg, 25 kg of sugar at ₹50 per kg and 35 kg of sugar at ₹40 per kg. He spent a sum of ₹450 on transportation and other expenses. He mixed all the three types of sugar and sold all the stock at ₹52.50 per kg. His profit percent in the entire transaction is:
   - (a) 4.25%
   - (b) 6.5%
   - (c) 7.25%
   - (d) 5%

6. In the table, production and sale (in 1000 tonnes) of a certain product of a company over 5 years is given. Study the table and answer the question:

Years	Production (in 1000 tonnes)	Sale (in 1000 tonnes)
2015	1250	1000
2016	1400	1290
2017	1450	1100
2018	1500	1450
2019	1600	1390

In which year(s) the sale increases by more than 25% of the previous year?
   - (a) 2018
   - (b) 2017 and 2019
   - (c) 2016 and 2018
   - (d) 2017

7. If $x^8 – 433x^4 + 16 = 0, x > 0$, then what is the value of $\left(x + \dfrac{2}{x}\right)$?
   - (a) 4
   - (b) 5
   - (c) 7
   - (d) 9

8. Points P, Q, R, S and T lie in this order on a circle with centre O. If chord TS is parallel to diameter PR and $\angle RQT = 58°$, then find the measure (in degrees) of $\angle RTS$.
   - (a) 45
   - (b) 29
   - (c) 32
   - (d) 58

9. In a class the ratio of rural to urban students is 4 : 7. In an examination the average percentage marks of the rural and the urban students are respectively 65 and 63. What is the overall average percentage marks of the class (correct to two decimal places)?
   - (a) 65.87%
   - (b) 73.63%
   - (c) 63.73%
   - (d) 64.37%

10. What is the difference in the mean proportional between 1.8 and 3.2 and the third proportional to 5 and 3?
   - (a) 0.6
   - (b) 0.7
   - (c) 0.4
   - (d) 0.5

11. The given Pie-Chart shows the degree wise breakup of expenditure of a family in a month. Total income of a family is ₹43,200.

Degree of Amount incurred in different expenditure (Total ₹43,000)

The amount spent on food is what percent of the savings and miscellaneous expenses?
   - (a) 60%
   - (b) 90%
   - (c) 75%
   - (d) 84%

12. Find the smallest value of a, so that 42a48b (a > b) is divisible by 11.
   - (a) 9
   - (b) 5
   - (c) 0
   - (d) 4

13. In $\triangle ABC$, AD $\perp$ BC at D and AE is the bisector of $\angle A$ If $\angle B = 62°$ and $\angle C = 36°$, then what is the measure of $\angle DAE$?
   - (a) 54°
   - (b) 13°
   - (c) 23°
   - (d) 27°

14. There are two water taps in a tank which can fill the empty tank in 12 hours and 18 hours respectively. It is seen that there is a leakage point at the bottom of the tank which can empty the completely filled tank in 36 hours. If both the water taps are opened at the same time to fill the empty tank and the leakage point was repaired after 1 hour, then in how much time the empty tank will be completely filled?
   - (a) 7 hours 12 minutes
   - (b) 7 hours 24 minutes
   - (c) 8 hours 24 minutes
   - (d) 7 hours

15. A borrowed a sum of ₹1,60,000 from B at 10% per annum simple interest. At the same time he lent the same sum to C at the same rate on compound interest, compounded semi-annually for 2 years. Find the amount (in₹) earned by A in the whole transaction.
   - (a) 4,281
   - (b) 4,280
   - (c) 2,481
   - (d) 2,840

16. Pie-chart shows the distribution of percentage of students in various courses. Total number of students is 1400
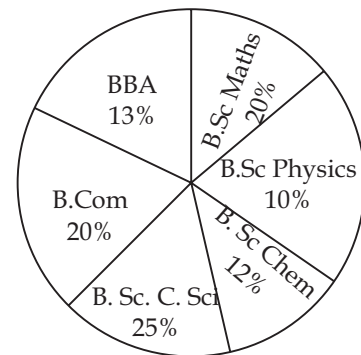
Percentage-wise distribution of number of boys:

1. A sum of ₹ 31,866 is divided between A, B and C such that the ratio of shares of A and B is 9 : 8 and that of A and C is 4 : 5. The share (in ₹) of B is:
   (a) 10,152 (b) 12,690
   (c) 8,460 (d) 9,024

2. A takes 8 hours more than the time taken by B to cover a distance of 160 km. If A doubles his speed, he takes 3 hours more than B to cover the same distance. The speed (in km/h) of B is:
   (a) 75 (b) 70
   (c) 72 (d) 80

3. $(\sqrt{\sec^2\theta + \csc^2\theta})\left(\dfrac{\sin\theta(1+\cos\theta)}{1+\cos\theta - \sin^2\theta}\right)$
   $0° < \theta < 90°$ is equal to:
   (a) $\cot\theta$ (b) $\tan\theta$
   (c) $\sec^2\theta$ (d) $\csc^2\theta$

4. By selling an article for ₹640, a person loses 15% of its selling price. At what price (in ₹) should he sell it to gain 15% on its cost price?
   (a) 846.40 (b) 836.60
   (c) 832 (d) 835

5. The curved surface area of a cylinder is 462 cm² and its base area is 346.5 cm². What is the volume (in cm³) of the cylinder? $\left(\text{Take } \pi = \dfrac{22}{7}\right)$
   (a) 2400 (b) 4800
   (c) 4850 (d) 2425.5

6. Find the value of $\dfrac{3}{4}\cot^2 30° + \cos^2 30° - 3\csc^2 60° + \tan^2 60°$.
   (a) – 4 (b) 2
   (c) 10 (d) $\dfrac{\sqrt{3}}{4}$

7. If $x + y + z = 7$, $x^2 + y^2 + z^2 = 85$ and $x^3 + y^3 + z^3 = 913$, then the value of $\sqrt[3]{xyz}$ is
   (a) 1 (b) 2
   (c) 4 (d) 8

8. A ∆ABC has sides 5 cm, 6 cm and 7 cm. AB extended touches a circle at P and AC extended touches the same circle at Q. Find the length (in cm) of AQ.

   (a) 13 (b) 11
   (c) 12 (d) 9

9. In a triangle ABC, a point D lies on AB and points E and F lie on BC such that DF is parallel to AC and DE is parallel to AF. If BE = 4 cm, EF = 6 cm, then find the length (in cm) of BC.
   (a) 30 (b) 20
   (c) 25 (d) 15

10. Study the following table and answer the question:

    Number of students enrolled for Vocational Courses (VC) in institutes A, B, C, D, E & F.

Institute \ Year	2014	2015	2016	2017	2018
A	110	150	165	180	205
B	120	180	176	200	220
C	140	220	180	175	225
D	125	210	175	180	230
E	150	200	160	200	240
F	165	230	200	220	210

    The ratio of the total number of students enrolled for VC in institutes A, C and E in 2015 to the total number of students enrolled in institutes B and D in 2017 is:
    (a) 9 : 10 (b) 3 : 2
    (c) 10 : 11 (d) 3 : 4

11. In ∆ABC, D and E are the points on sides AB and AC, respectively and DE∥BC. BC = 8 cm and DE = 5 cm. If the area of ∆ADE = 45 cm² then what is the area (in cm²) of ∆ABC?
    (a) 125 (b) 115.2
    (c) 105.2 (d) 64

12. The table shows the daily income (in ₹) of 50 persons.

    Study the table and answer the question:

Income (₹)	No. of persons
Less than 200	12
Less than 250	26
Less than 300	34
Less than 350	40
Less than 400	50

    How many persons earn ₹200 or more but less than ₹300?

13. The average of 8 consecutive even numbers written in ascending order is 17. What is the average of the last three numbers, 36 and 53.
    (a) 31 (b) 29.8
    (c) 31.6 (d) 32.2

14. If $(54\sqrt{2}\,x^3 + 24\sqrt{3}\,y^3) \div (\sqrt{18}\,x + \sqrt{12}\,y) = Ax^2 + By^2 + Cxy$, then what is the value of $A^2 - (B^2 + C^2)$?
    (a) 12 (b) 24
    (c) – 36 (d) – 24

15. The marked price of an article is ₹1,500. A shopkeeper sells it by giving 20% discount on its marked price. If the cost price of the article is ₹991, then his profit (in ₹) is :
    (a) 209 (b) 189
    (c) 229 (d) 319

16. Study the following table and answer the question:

    Number of students enrolled for Vocational Courses (VC) in institutes A, B, C, D, E & F.

Institute \ Year	2014	2015	2016	2017	2018
A	110	150	165	180	205
B	120	180	176	200	220
C	140	220	180	175	225
D	125	210	175	180	230
E	150	200	160	200	240
F	165	230	200	220	210

    The total number of students enrolled for VC in institutes B, C and E in 2015 is x% more than the total number of students enrolled in institutes A, D and F in 2016. The value of x is closest to:
   (a) 10.3 (b) 11.1
    (c) 10.8 (d) 11.8

17. The data given in the table shows the number of students studying in four different disciplines in 5 institutes.

    Study the table and answer the question:

1. The average height of some students in a group is 156 cm. If 5 students of average height 160 cm join the group, then the average height of all the students in the group increases by 0.8 cm. What is the number of students in the group, initially?
   (a) 20   (b) 15
   (c) 25   (d) 10

2. A trader bought two articles for ₹490. He sold one at a loss of 20% and the other at a profit of 16%. If the selling price of both articles is same, then the cost price (in ₹) of the article sold at 20% loss is:
   (a) 300   (b) 280
   (c) 310   (d) 290

3. The value of $4(\sin^4 30° + \cos^4 30°) - 3(\sin^2 45° - 2\cos^2 45°)$ is:
   (a) 2   (b) 1
   (c) 4   (d) 0

4. If $x^2 + 4y^2 = 53$ and $x - 2y = 5$, then what is the value of $x^3 - 8y^3$?
   (a) – 85   (b) 85
   (c) 155   (d) 335

5. The value of
   $$\frac{\tan^2 30° + \sin^2 90° + \cot^2 60° + \sin^2 30° \cos^2 45°}{\sin 60° \cos 30° - \cos 60° \sin 30°}$$
   is :
   (a) $\dfrac{47}{12}$ (b) $\dfrac{37}{12}$
   (c) $\dfrac{25}{12}$ (d) $\dfrac{43}{12}$

6. If $x + y = 2$ and $\dfrac{1}{x} + \dfrac{1}{y} = \dfrac{18}{5}$, then the value of $(x^3 + y^3)$ is:
   (a) $3\dfrac{1}{3}$ (b) $4\dfrac{3}{5}$
   (c) $3\dfrac{1}{5}$ (d) $4\dfrac{2}{3}$

7. In a factory, there are 39 workers who have been categorised into five groups (A, B, C, D, E) on the basis of the range of their daily wages (in multiples of ₹100). It is ensured that the daily wage of no worker is an exact multiple of ₹100. The distribution is presented through the given histogram.
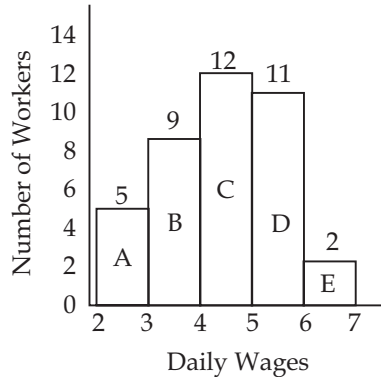

If two Managers are engaged to supervise the workers, with daily wages ranging between ₹700 and ₹800, then what will be the average daily wage (nearest to a ₹) of all members of staff of the factory?
   (a) ₹445   (b) ₹400
   (c) ₹455   (d) ₹467

8. The area of a square shaped field is 1764 m². The breadth of a rectangular park is $\dfrac{1}{3}$rd the side of the square field and its length is two times its breadth. What is the cost (in ₹) of levelling the park at ₹15 per m²?
   (a) 5,880   (b) 4,320
   (c) 4,200   (d) 4,290

9. If $p - 2q = 3$ and $pq = 5$, then what is the value of $(p^3 - 8q^3)$?
   (a) 27   (b) – 63
   (c) 72   (d) 117

10. ΔABC is incribed in a circle with center O, such that ∠ACB = 115°. O is joined to A. What is the measure of ∠OAB?
    (a) 35°   (b) 20°
    (c) 30°   (d) 25°

11. Samir and Puneet can complete the same work in 10 days and 15 days respectively. The work was assigned for ₹4,500. After working together for 3 days Samir and Puneet involved Ashok. The work was completed in total 5 days. What amount (in ₹) was paid to Ashok?
    (a) 1,500   (b) 800
    (c) 750   (d) 1,071

12. If $\sin\left(\dfrac{2A+B}{2}\right) = \cos\left(\dfrac{2A-B}{2}\right) = \dfrac{\sqrt{3}}{2}$, $0° < \dfrac{2A+B}{2} < 90°$ and $0° < \dfrac{2A+B}{2} < 90°$, then find the value of sin [3 (A – B)].
    (a) $\dfrac{1}{2}$ (b) $\dfrac{\sqrt{3}}{2}$
    (c) 1   (d) $\dfrac{1}{\sqrt{2}}$

13. The value of 25 ÷ 15 of 4 × [4 ÷ 5 × (9 – 7)] – (20 ÷ 5 of 9) is:
    (a) $\dfrac{2}{3}$ (b) $\dfrac{1}{3}$
    (c) $\dfrac{2}{9}$ (d) $\dfrac{4}{9}$

14. A boat goes 27 km upstream and 33 km downstream in 6 hours. In the same time it can go 36 km upstream and 22 km downstream. How much time will it take to go 36 km upstream and 44 km downstream?
    (a) 8 h 10 m   (b) 7 h 50 m
    (c) 8 h 30 m   (d) 8 h

15. A shopkeeper allows 16% discount on every item. Even after giving the discount, he makes a profit of 8%. If he gives 8% discount instead of 16% on an item marked for ₹1,800, then what will be his profit percent? (correct to 2 decimal places)
    (a) 19   (b) 18.31
    (c) 18.29   (d) 18

16. The given bar graph shows the imports and exports (in crore ₹) of steel for 5 years from 2014 to 2018.
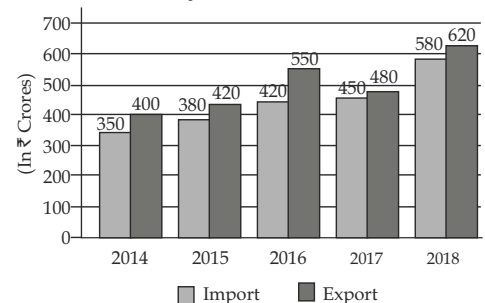
What is the ratio of average export to average import over the five years.

1. Radha purchased a Computer table for ₹ 10000 and a Centre table for ₹ 5000. She sold Computer table with 8% profit. With what profit percent should she sell the Centre table so as to gain 10% on the whole transaction?
   (a) 14% (b) 18%
   (c) 12% (d) 10%

2. $\dfrac{\cot^3\theta}{\cosec^2\theta}+\dfrac{\tan^3\theta}{\sec^2\theta} + 2\sin\theta\cos\theta = ?$
   (a) $\sin^2\theta\cos\theta$ (b) $\sin\theta\cos\theta$
   (c) $\cosec^2\theta\sec^2\theta$ (d) $\cosec\theta\sec\theta$

3. A heap of wheat is in the form of a cone whose base diameter is 8.4 m and height is 1.75 m. The heap is to be covered by canvass. What is the area (in m²) of the canvas required?
   $$\left(\text{Take } \pi = \dfrac{22}{7}\right)$$
   (a) 60.06 (b) 115.5
   (c) 60.6 (d) 115.05

4. Chamanlal, Arshad and Jagjit Singh contested an election. All the votes polled were valid. Arshad got 35% of the total votes. For every 35 votes Chamanlal got 14 votes. The winner got 4950 more votes than the person who received the least number of votes. Find the total number of votes polled
   (a) 99000 (b) 13378
   (c) 38000 (d) 33000

5. A train leaves station A at 8 am and reaches station B at 12 noon. A car leaves station B at 8 : 30 am and reaches station A at the same time when the train reaches station B. At what time do they meet?
   (a) 10:22 am (b) 10:08 am
   (c) 9:38 am (d) 9:52 am

6. If $4x^4 - 37x^2 + 9 = 0$, $x > \sqrt{\dfrac{3}{2}}$, then what is the value of $8x^3 - \dfrac{27}{x^3}$?
   (a) – 215 (b) 35
   (c) – 35 (d) 215

7. A and B can complete a work in 15 days and 10 days respectively. They started doing the work together but after 4 days B had to leave. Then A working with a new worker C completed the remaining work in 3 days. If C works alone, in how many days he can do 40% of the same work?
   (a) 9 (b) 10
   (c) $8\dfrac{1}{2}$ (d) 8

8. Three shopkeepers A, B and C marked an identical article at ₹ 4820. A, B and C sold their article on successive discounts of 20% and 20%; 25% and 15%; 30% and 10% respectively. Which shopkeeper gives the maximum discount and bow much (in ₹)?
   (a) C, 1780 (b) C, 1783.40
   (c) A, 1735.20 (d) B, 1800

9. If $a - \dfrac{12}{a} = 1$, where a > 0 , then the value of $a^2 + \dfrac{16}{a^2}$ is:
   (a) 15 (b) 19
   (c) 17 (d) 11

10. AB is a diameter of a circle. C and D are points on the opposite sides of the diameter AB, such that $\angle ACD = 25°$. E is a point on the minor are BD. Find the measure of $\angle BED$ (in degrees).
    (a) 105 (b) 130
    (c) 115 (d) 125

11. If one of the angles of a triangle is 74°. then the angle between the bisectors of the other two interior angles is:
    (a) 53° (b) 127°
    (c) 16° (d) 106°

12. If $(16\sqrt{2}\,x^3 + 81\sqrt{3}y^3) \div (2\sqrt{2}\,x + 3\sqrt{3}\,y) = Ax^2 + By^2 + Cxy$, then find the value of $2A - 3B - 2\sqrt{6}\,C$.
    (a) 7 (b) 137
    (c) 25 (d) 79

13. If $2\sin(3x - 15)° = 1$, $0° < (3x - 15) < 90°$, then find the value of $\cos^2(2x + 15)° + \cot^2(x + 15)°$.

    (a) $\dfrac{7}{2}$ (b) $\dfrac{5}{2}$
    (c) 1 (d) $-\dfrac{7}{2}$

14. The following Pie chart represents the percentage-wise distribution of 300 students of class X in a school in six different sections A, B, C, D, E and F.
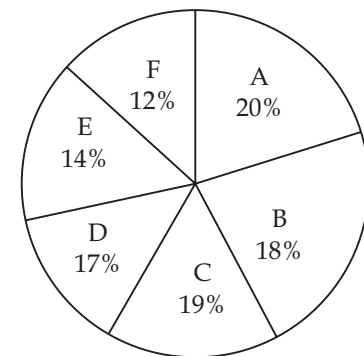

The table given below shows the number of boys of class X in six different sections A, B, C, D, E and F.

Section	A	B	C	D	E	F
No. of boys	36	26	34	28	x	20

If in section E, the ratio of the number of boys to the number of girls is 3 : 4, then the ratio of number of boys in section E to the number of girls in section C is :
(a) 18 : 23 (b) 23 : 18
(c) 23 : 24 (d) 24 : 23

15. The bar graph shows the number of students enrolled for a science course in institutes A and B during 5 years from 2014 to 2018.
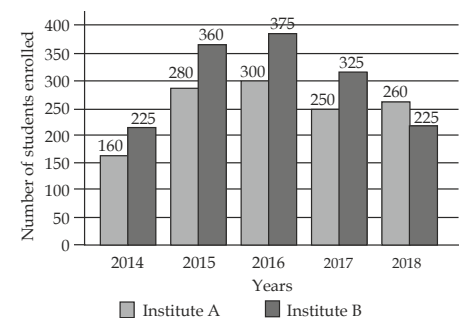
1. Ratio of the present age of a mother to that of the daughter is 7 : 1. After 5 years the ratio will become 4 : l. What is the difference (in years) in their present ages?
   (a) 30   (b) 31
   (c) 28   (d) 29

2. If $3\cos^2\theta - 4\sin\theta + 1 = 0$, $0° < \theta < 90°$, then $\tan\theta + \sec\theta = ?$
   (a) $2\sqrt{5}$ (b) $3\sqrt{3}$
   (c) $2\sqrt{3}$ (d) $\sqrt{5}$

3. What is the area (in cm^2) of a circle inscribed in a square of area 784 cm^2 ?
   $$\left(\text{Take } \pi = \frac{22}{7}\right)$$
   (a) 616   (b) 462
   (c) 660   (d) 924

4. In $\triangle ABC$, $\angle A = 90°$. $AD \perp BC$ at D. If AB = 12 cm and AC = 16 cm, then what is the length (in cm) of BD?
   (a) 6.4   (b) 7.2
   (c) 7.8   (d) 8.4

5. A train runs first 75 km at a certain uniform speed and next 90 km at an average speed of 10 km/h more than the normal speed. If it takes 3 hours to complete the journey, then how much time will the train take to cover 300 km with normal speed?
   (a) 5 hours
   (b) 5 hours 15 minutes
   (c) 6 hours
   (d) 5 hours 25 minutes

6. A can do a certain work in 15 days. B is 25% more efficient than A. Both worked together for 4 days. C alone completed the remaining work in 8 days. A, B and C together will complete the same work in ?
   (a) 5 days   (b) $4\frac{1}{2}$ days
   (c) $6\frac{1}{2}$ days   (d) 4 days

7. If $a^3 + b^3 = 405$ and $a + b = 9$, then the value of ab is
   (a) 10   (b) 15
   (c) 12   (d) 8

8. In a circle with center O and radius 5 cm. AB and CD are two parallel chords of lengths 6 cm and x cm.

respectively and the chords are on the opposite side of the centre O The distance between the chords is 7 cm. What is the value of x?
   (a) 9   (b) 8
   (c) 12   (d) 10

9. Study the following table and answer the question:

   Number of students enrolled for Vocational Courses (VC) in five institutes - A, B, C, D & E.

Institute \ Year	2013	2014	2015	2016	2017	2018
A	120	135	130	135	128	140
B	125	132	138	132	135	142
C	125	120	125	138	140	135
D	100	125	122	140	128	138
E	105	110	115	147	130	145

   The ratio of the total number of students enrolled for VC in institutes A, C and E in 2016 to the total number of students enrolled in institutes B and D in 2018, is
   (a) 8 : 7   (b) 3 : 2
   (c) 21 : 19   (d) 14 : 9

10. If, $\left(2x - \dfrac{3}{x}\right) = 2$ then what is the value of $\left(16x^4 + \dfrac{81}{x^4}\right)$?
    (a) 220   (b) 180
    (c) 184   (d) 328

11. In a circle with center O, AB is a diameter and CD is a chord such that $\angle ABC = 34°$ and CD = BD. What is the measure of $\angle DBC$?
    (a) 32°   (b) 30°
    (c) 24°   (d) 28°

12. Table shows the number of trees planted in 4 cities from 2016 to 2020.

Years	Chandigarh	Ahmadabad	Pune	Kolkata
2016	1800	2500	1800	2000
2017	2500	2300	1850	1800
2018	2300	2400	1840	1760
2019	2440	1950	1900	1600
2020	2250	2100	2000	1750

    From 2016 to 2020, how many more trees were planted in Ahmedabad as compared to trees planed in Pune?

   (a) 2000   (b) 1860
   (c) 2340   (d) 1850

13. The average of 22 numbers is 37.5. The average of first 12 numbers is 40.6 and that of the last 12 numbers is 35.4. If 11th and 12th numbers are excluded, then what is the average of the remaining numbers'?
    (a) 37.8   (b) 37.4
    (c) 36.4   (d) 36.9

14. If $\dfrac{\cosec\theta + \cot\theta}{\cosec\theta - \cot\theta} = 7$, then the value of $\dfrac{4\sin^2\theta - 1}{4\sin^2\theta + 5}$ is ;
    (a) $-\dfrac{1}{3}$ (b) $\dfrac{1}{9}$
    (c) $-\dfrac{1}{9}$ (d) $\dfrac{1}{3}$

15. $x + y + z = 2$ and $xy + yz + zx = -11$, then the value of $x^3 + y^3 + z^3 - 3xyz$ is:
    (a) 71   (b) 74
    (c) 69   (d) 78

16. $1 + 2\tan^2\theta + 2\sin\theta \sec^2\theta$, $0° < \theta < 90°$, is equal to :
    (a) $\dfrac{1 - \sin\theta}{1 + \sin\theta}$ (b) $\dfrac{1 + \cos\theta}{1 - \cos\theta}$
    (c) $\dfrac{1 + \sin\theta}{1 - \sin\theta}$ (d) $\dfrac{1 - \cos\theta}{1 + \cos\theta}$

17. The income of A is 30% less than the income of B and the income of B is 137.5% more than that of C. If the income of A is ₹28500 less than that of B, then the income (in ₹) of C is:
    (a) 40,000   (b) 50,000
    (c) 36,000   (d) 48,000

18. The selling price of an article marked for ₹10,000 after giving three discounts. 20%, 10% and k% is ₹6,120. What will be selling price (in ₹) of the same article if a single discount of $(k + 20)$% is allowed?
    (a) 6,500   (b) 8,000
    (c) 8,500   (d) 6,800

19. Study the following table and answer the question:

    Number of students enrolled for Vocational Courses (VC) in five institutes – A, B, C, D & E.

1. A train is to cover 370 km at a uniform speed. After running 100 km, the train could run at a speed 5 km/h less than its normal speed due to some technical fault. The train got delayed by 36 minutes. What is the normal speed of the train, in km/h?
   (a) 40   (b) 45
   (c) 50   (d) 48

2. If $3 \tan \theta = 2\sqrt{3} \sin \theta$, $0° < \theta < 90°$, then find the value of $2\sin^2 2\theta - 3\cos^2 3\theta$.
   (a) $\dfrac{3}{2}$ (b) $\dfrac{1}{2}$
   (c) $-\dfrac{3}{2}$ (d) 1

3. A shopkeeper marks his goods 30% higher than the cost price and allows a discount of 10% on the marked price. In order to earn 6.5% more profit, what discount percent should he allow on the marked price?
   (a) 5   (b) 4
   (c) 6   (d) 5.5

4. A circle touches all the four sides of a quadrilateral ABCD whose sides are AB = 8.4 cm, BC = 9.8 cm and CD = 5.6 cm. The length of side AD, in cm, is:
   (a) 4.9   (b) 3.8
   (c) 4.2   (d) 2.8

5. $\triangle ABC \sim \triangle DEF$ and the area of $\triangle ABC$ is 13.5 cm^2 and the area of $\triangle DEF$ is 24 cm^2. If BC = 3.15 cm, then the length (in cm) of EF is:
   (a) 4.2   (b) 3.9
   (c) 4.8   (d) 5.1

6. A trader bought 640 kg of rice. He sold a part of rice at 20% profit and the rest at 5% loss. He earned a profit of 15% in the entire transaction. What is the quantity (in kg) of rice that lie sold at 5% loss?
   (a) 154   (b) 132
   (c) 256   (d) 128

7. Bar graph shows the number of students enrolled for a vocational course in institutes A and B during 5 years from 2014 to 2018.
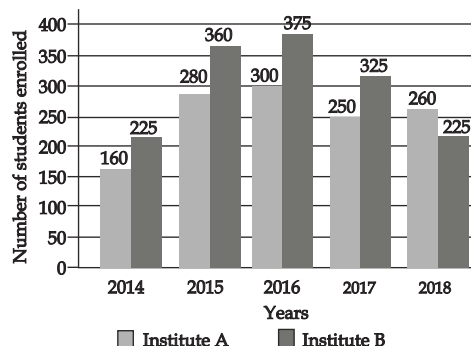
In which year the number of students enrolled in institute A is $x\%$ less, where $25 < x < 30$, than the number of students enrolled in institute B in the same year?
   (a) 2014   (b) 2017
   (c) 2015   (d) 2016

8. The area of a circular park is 12474 m^2. There is 3.5 m wide path around the park. What is the area (in m^2) of the path? $\left(\text{Take } \pi = \dfrac{22}{7} \right)$
   (a) 1435.5   (b) 1440.5
   (c) 1424.5   (d) 1380.5

9. If $x^4 + \dfrac{1}{x^4}$ 727, x > 1, then what is the value of $\left(x - \dfrac{1}{x} \right)$?
   (a) – 6   (b) 5
   (c) – 5   (d) 6

10. In $\triangle ABC$, $\angle C$= 90° and Q is the midpoint of BC. If AB = 10 cm and AC = $2\sqrt{10}$ cm, then the length of AQ is:
    (a) $5\sqrt{2}$ cm   (b) $\sqrt{55}$ cm
    (c) $3\sqrt{5}$ cm   (d) $5\sqrt{3}$ cm

11. If $x - \dfrac{1}{x}$ = 1, then what is the value of $x^8 + \dfrac{1}{x^8}$?
    (a) 3   (b) 47
    (c) 119   (d) – 1

12. The following table shows day-wise number of seats occupied of different classes in a train. Numbers in bracket represent the total seats available in a particular class.

Day	2nd Class Non-AC (900)	1st Class Non-AC (500)	ACIII Tier (500)	ACII Tier (250)	AC1st Class (150)
Monday	850	460	480	240	145
Tuesday	840	400	450	230	120
Wednesday	830	390	480	220	130
Thursday	790	480	490	250	125
Friday	840	470	500	210	130

How many seats remained vacant taking all the days together in non-AC classes?
   (a) 715   (b) 650
   (c) 600   (d) 585

13. The value of $90 \div 20$ of $6 \times [11 \div 4$ of $\{3 \times 2 - (3 - 8)\}] \div (9 \div 3 \times 2)$ is;
    (a) $\dfrac{9}{8}$ (b) $\dfrac{1}{36}$
    (c) $\dfrac{1}{32}$ (d) $\dfrac{3}{8}$

14. The radii of two concentric circles are 12 cm and 13 cm. AB is a diameter of the bigger circle. BD is a tangent to a smaller circle touching it at D. Find the length (in cm) of AD? (correct to one decimal place)
    (a) 24.5   (b) 17.6
    (c) 23.5   (d) 25.5

15. The data given in the table shows the number of boys and girls enrolled in three different streams in a school over 5 years.

| Years	Arts		Science		Commerce	
	Boys	Girls	Boys	Girls	Boys	Girls
2012	48	36	40	35	35	45
2014	42	43	42	32	32	42
2016	45	42	38	30	36	38
2018	39	46	41	23	28	34
2020	36	43	39	30	39	41

The number of boys in Science stream in the years 2012 and 2016 taken together is what percent of the number of girls for all the years in the Commerce stream?
   (a) 45.5   (b) 39
   (c) 35   (d) 32.5

16. The average of eleven numbers is 56. The average of first three numbers is 52 and that of next five

1. The following pie charts represent the distribution of candidates who were enrolled for a competitive examination and the candidates (om of those enrolled) who passed the exam from five different institutes P, Q, R, S and T.

   Total number of candidates enrolled in five different institutes = 7500
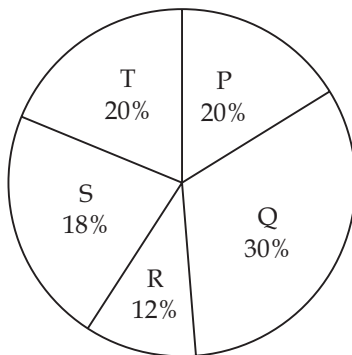
   Total number of candidates passed the examination from five institutes = 4000
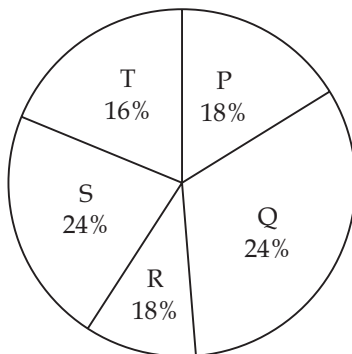
   What is the ratio of the total number of candidates enrolled in institutes Q, R and S together, to the number of candidates passed from the institutes Q, R and S together?
   (a) 15 : 71   (b) 75 : 44
   (c) 71 : 15   (d) 44 : 75

2. Radha saves 25% of her income. If her expenditure increases by 20% and her income increases by 29%. then her savings increase by :
   (a) 56%   (b) 70%
   (c) 52%   (d) 65%

3. Surbhi sold an article for ₹176 after giving 12% discount on its marked price. Had she not given any discount she would have earned a profit of 25%. What is the cost price (in₹) of the article?
   (a) 160   (b) 165
   (c) 150   (d) 145

4. In ∆ABC, D and E are the points on sides AB and AC, respectively such that ∠ADE = ∠B . If AD = 7 cm, BD = 5 cm and BC = 9 cm, then DE (in cm) is equal to:
   (a) 5.25   (b) 10
   (c) 7   (d) 6.75

5. The value of
   $$\frac{2\sin^2 30°\tan 60°-3\cos^2 60°\sec^2 30°}{4\cot^2 45°-\sec^2 60°+\sin^2 60°+\cos^2 90°}$$
   (a) $\frac{1}{3}(\sqrt{3}-2)$ (b) $\frac{2(\sqrt{3}+2)}{3}$
   (c) $\frac{2(\sqrt{3}-2)}{3}$ (d) $\frac{1}{3}(\sqrt{3}+2)$

6. If a five digit number 247xy is divisible by 3, 7 and 11, then what is the value of (2y – 8x)?
   (a) 9   (b) 17
   (c) 6   (d) 11

7. The ratio of two numbers A and B is 5 : 8. If 5 is added to each of A and B. then the ratio of A and B becomes 2 : 3. The sum of A and B is:
   (a) 65   (b) 91
   (c) 78   (d) 42

8. If length of a rectangle is increased to its three times and breadth is decreased to its half, then the ratio of the area of given rectangle to the area of new rectangle is:
   (a) 1 : 3   (b) 3 : 2
   (c) 3 : 1   (d) 2 : 3
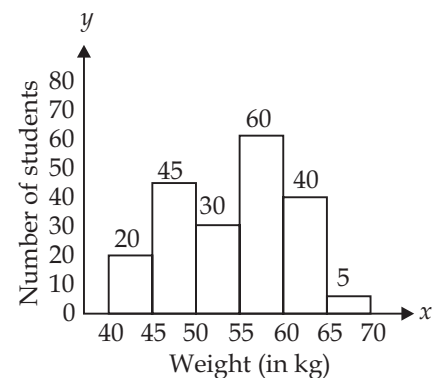
9. The value of 3 ÷ 18 of 3 × 6 – 22 x 6 ÷ 18 – 3 ÷ 2 + 10 – 3 ÷ 9 of 3 × 9 is:
   (a) $\frac{1}{3}$ (b) $-\frac{1}{3}$
   (c) $-\frac{1}{2}$ (d) $\frac{1}{2}$

10. If $x - y = 11$ and $\frac{1}{x} - \frac{1}{y} = \frac{11}{24}$, then what is the value of $x^3 - y^3 + x^2y^2$?
    (a) 1115   (b) 1331
    (c) 1105   (d) 1307

11. Find the value of
    $$\frac{8\sin 30°\sin^2 60°-4\sin 90°-\sec^2 45°}{\tan^2 45°-\cot^2 30°}$$
    (a) $\frac{5}{2}$ (b) $-\frac{1}{2}$
    (c) $\frac{3}{4}$ (d) $\frac{3}{2}$

12. The histogram shows the weights of students of class X in a school.

    Let x be the number of students whose weight is less than 50 kg and y be the number of the students whose weight is greater than or equal to 60 kg. What is the value of $x : y$?
    (a) 13 : 11   (b) 11 : 13
    (c) 9 : 13   (d) 13 : 9

13. In a triangle ABC, AB : AC = 5 : 2, BC = 9 cm. BA is produced to D, and the bisector of the Angle CAD meets BC produced at E. What is the length (in cm) of CE?
    (a) 9   (b) 6
    (c) 10   (d) 3

14. If 2 cos² θ = 3sinθ, 0° < θ < 90°, then the value of (sec² θ – tan²θ + cos²θ) is:
    (a) $\frac{7}{4}$ (b) $\frac{9}{4}$
    (c) $\frac{5}{4}$ (d) $\frac{3}{4}$

15. Number of male and female members in different organizations A, B, C, D and E are given in the bar graph.

1. If $x + y = 4$ and $\dfrac{1}{x} + \dfrac{1}{y} = \dfrac{16}{15}$, then what is the value of $(x^3 + y^3)$?
   (a) 18   (b) 19
   (c) 21   (d) 16

2. If the 5-digit number 676xy is divisible by 3, 7 and 11, then what is the value of $(3x - 5y)$?
   (a) 9   (b) 11
   (c) 10   (d) 7

3. $\triangle ABC \sim \triangle PQR$. The area of $\triangle ABC$ and $\triangle PQR$ are 64 cm² and 81 cm², respectively and AD and PT are the medians of $\triangle ABC$ and $\triangle PQR$, respectively. If PT = 10.8 cm, then AD = ?
   (a) 9 cm   (b) 12 cm
   (c) 8.4 cm   (d) 9.6 cm

4. Some fruits are bought at 15 for ₹ 140 and equal number of fruits at 10 for ₹132. If all the fruits are sold at ₹132 per dozen, then what is the profit percent in the entire transaction?
   (a) $4\dfrac{1}{2}$ (b) $2\dfrac{1}{4}$
   (c) $3\dfrac{1}{8}$ (d) 3

5. Study the following table and answer the question:

   Number of cars sold by dealers A, B, C, D and E during first six months of 2018.

Dealer	Month					
	January	February	March	April	May	June
A	620	640	628	635	430	625
B	600	642	635	580	450	620
C	640	635	640	540	625	740
D	520	645	722	740	600	780
E	548	638	720	740	650	800

   The ratio of the total number of cars sold by dealer B in January, April and June to the total number of cars sold by dealers A and D in March is
   (a) 8 : 9   (b) 7 : 5
   (c) 10 : 9   (d) 4 : 3

6. If $x + \dfrac{1}{x} = 4$, then the value of $x^5 + \dfrac{1}{x^5}$ is:
   (a) 776   (b) 736
   (c) 724   (d) 684

7. The average of 28 numbers is 77. The average of first 14 numbers is 74 and the average of last 15 numbers is 84. If the 14th number is excluded, then what is the average of remaining numbers? (correct to one decimal places)
   (a) 74.7   (b) 77
   (c) 73.1   (d) 76.9

8. The value of $20 \div 5$ of $8 \times [9 \div 6 \times (6 - 3)] - (10 \div 2$ of $20)$ is:
   (a) 6   (b) 2
   (c) 1   (d) 0

9. To do a certain work. A and B work on alternate days with B beginning the work on the first day. A alone can complete the same work in 24 days. If the work gets completed in $11\dfrac{1}{3}$ days, then B alone can complete $\dfrac{7}{9}$ th part of the original work in:
   (a) 4 days   (b) 6 days
   (c) $5\dfrac{1}{2}$ days   (d) $4\dfrac{1}{2}$ days

10. If $8(x + y)^3 - 27(x - y)^3 = (5y - x)(Ax^2 + By^2 + Cxy)$, then what is the value of $(A - B - C)$?
    (a) 16   (b) – 26
    (c) 34   (d) – 16

11. Length of each side of a rhombus is 13 cm and one of the diagonal is 24 cm. What is the area (in cm²) of the rhombus?
    (a) 60   (b) 120
    (c) 300   (d) 240

12. If $\dfrac{\cos^2\theta}{\cot^2\theta + \sin^2\theta - 1} = 3, 0° < \theta < 90°$, then the value of $(\tan \theta + \csc \theta)$ is:
    (a) $2\sqrt{3}$ (b) $\dfrac{4\sqrt{3}}{3}$
    (c) $3\sqrt{3}$ (d) $\dfrac{5\sqrt{3}}{3}$

13. Let $DABC \sim DPQR$ and $\dfrac{ar(\triangle ABC)}{ar(\triangle PQR)} = \dfrac{144}{49}$. If AB = 12 cm. BC = 7 cm and AC = 9 cm, then PR (in cm) is equal to:
    (a) 12   (b) $\dfrac{49}{12}$
    (c) $\dfrac{108}{7}$ (d) $\dfrac{21}{4}$

14. Study the following table and answer the question:

    Number of cars sold by dealers A, B, C, D & E during first six months of 2018.

Dealer	Month					
	January	February	March	April	May	June
A	620	640	628	635	430	625
B	600	642	635	580	450	620
C	640	635	640	540	625	740
D	520	645	722	740	600	780
E	548	638	720	740	650	800

    In July 2018, if the sales of cars by the dealer D increases by the same percentage as in June 2018 over its previous month, then what is the number of cars sold by D in July 2018?
    (a) 1020   (b) 975
    (c) 959   (d) 1014

15. A shopkeeper earns a profit of 21% after selling a book at 21% discount on the printed price. The ratio of the cost price and selling price of the book is
    (a) 100 : 79   (b) 79 : 100
    (c) 100 : 121   (d) 121 : 100

16. Study the table and answer the question.

    In the table, production and sale (in 1000 tonnes) of a certain product of a company over 5 years is given.

Year	Production (in 1000 tonnes)	Sale (in 1000 tonnes)
2015	1250	1000
2016	1400	1290
2017	1450	1100
2018	1500	1450
2019	1600	1390

    In which year(s) sale is more than 90% of the production?
    (a) 2015, 2017, 2019
    (b) 2016, 2018
    (c) 2016, 2017
    (d) 2017, 2018