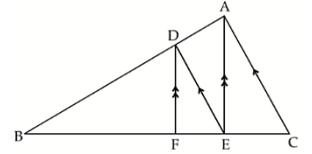


4. In the figure, $DE \parallel AC$ and $DF \parallel AE$. Which of these is equal to $\frac{BF}{FE}$?

- (A) $\frac{DF}{AE}$ (B) $\frac{BE}{EC}$
 (C) $\frac{BA}{AC}$ (D) $\frac{FE}{EC}$

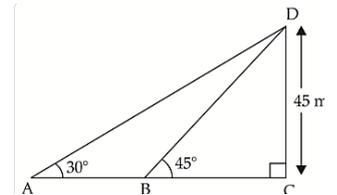


5. The area of the circle that can be inscribed in a square of 6 cm is

- (A) $36\pi \text{ cm}^2$ (B) $18\pi \text{ cm}^2$
 (C) $12\pi \text{ cm}^2$ (D) $9\pi \text{ cm}^2$

6. In the figure below, what is the length of AB?

- (A) $45\sqrt{3}$ m (B) $\frac{45}{\sqrt{3}}$ m
 (C) $45(\sqrt{3} - 1)$ m (D) $45(\sqrt{3} + 1)$ m



7. The probability that the drawn card from a pack of 52 cards is neither an ace nor a spade is

- (A) $\frac{9}{13}$ (B) $\frac{35}{52}$ (C) $\frac{10}{13}$ (D) $\frac{19}{26}$

8. Arti owns a manufacturing company. She hires 5 supervisors and 20 operators for a 6-month project. The table given below shows their salary breakup.

Position	Salary for the first two months	Salary for the remaining four months
Supervisor	Between ₹ 18,000 to ₹ 20,000	Between ₹ 22,000 to ₹ 25,000
Operator	Between ₹ 8,000 to ₹ 10,000	Between ₹ 13,000 to Rs 15,000

Arti agrees to pay the maximum decided amount as salary to the operators.

What would be the total amount (in Rs) that Arti will have to pay the operators for the first two months?

- (A) ₹ 10,000 (B) ₹ 200,000 (C) ₹ 300,000 (D) ₹ 500,000

9. The graph of a polynomial $p(x)$ cuts the X-axis at 3 points and touches it at 2 other points.

The number of zeroes of $p(x)$ is

- (A) 1 (B) 2 (C) 3 (D) 5

10. If the discriminant of the equation $6x^2 - bx + 2 = 0$ is 1, then value of b is:

- (A) 7 (B) -7 (C) ± 7 (D) none of these

11. If 7 times the 7th term of an A.P. is equal to 11 times its 11th term, then its 18th term will be

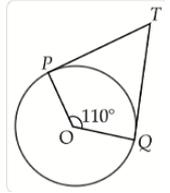
- (A) 7 (B) 11 (C) 18 (D) 0

12. In what ratio, does the point (-4,6) divide the line segment joining the points A(-6,10) and B(3,-8)?

- (A) 2:7 (B) 7:2 (C) 1:2 (D) 2:1

13. In the figure, if TP and TQ are the two tangents to a circle with centre O such that $\angle POQ = 110^\circ$, the $\angle PTQ$ is equal to:

(A) 60° (B) 70° (C) 80° (D) 90°



14. $\sec \theta$ when expressed in terms of $\cot \theta$, is equal to:

(A) $\frac{1+\cos^2\theta}{\cot\theta}$ (B) $\sqrt{1+\cot^2\theta}$ (C) $\frac{\sqrt{1+\cot^2\theta}}{\cot\theta}$ (D) $\frac{\sqrt{1-\cot^2\theta}}{\cot\theta}$

15. If $\tan(5x + 30^\circ) = 1$, then x is

(A) 15° (B) 5° (C) 3° (D) None of these

16. If $k + 2$, $4k - 6$ and $3k - 2$ are three consecutive terms of A.P. then the value of k is:

(A) 3 (B) -3 (C) 4 (D) -4

17. If the sum of the first n terms of an A.P. be $3n^2 + n$ and its common difference is 6, then its first term is

(A) 2 (B) 3 (C) 1 (D) 4

18. Look at the numbers shown below:

(i) -0.5 (ii) 0.00001 (iii) $\frac{1}{2}$ (iv) 1 (v) 1.00001 (vi) 99%

Which of the above numbers represent probabilities of events?

(A) only (i) and (iii) (B) only (i), (ii), (iii) and (iv)
(C) only (ii), (iii), (iv) and (v) (D) only (ii), (iii), (iv) and (vi)

19. Assertion (A): if the height of the cone is 10 cm and the radius of the base is 7 cm, then the volume of the cone is 513.3 cm^3 .

Reason (R): According to assertion, if $\sqrt{149} = 12.2$, then curved surface area of a cone is 268.4 cm^2 .

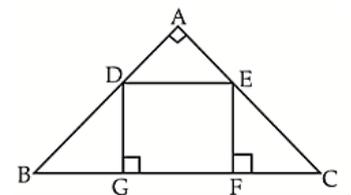
20. Assertion (A): If the sum of first n terms of an AP is given by $S_n = 6n + 7n^2$, then its n th term is $7n^2 - 8n + 1$.

Reason (R): n th term can be obtained using formula $a_n = S_n - S_{n-1}$.

SECTION-B

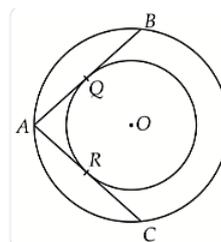
21. Given that $\sqrt{2}$ is an irrational, prove that $(5+3\sqrt{2})$ is an irrational number.

22. If $\tan \theta = \frac{1}{\sqrt{5}}$, (A) Evaluate: $\frac{\operatorname{cosec}^2\theta - \sec^2\theta}{\operatorname{cosec}^2\theta + \sec^2\theta}$ OR (B) verify the identity: $\sin^2\theta + \cos^2\theta = 1$.

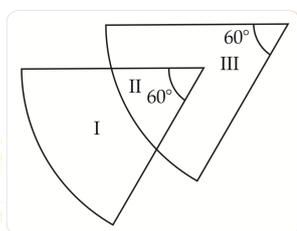


23. In the given figure, DEFG is a square and $\angle BAC = 90^\circ$. Show that $FG^2 = BG \times FC$.

24. In Fig, there are two concentric circle with centre O. If ARC and AQB are tangent to the smaller circle from the point P lying on the larger circle, find the length of AC, if $AQ = 5\text{cm}$.



25. Show below are two overlapping sectors of a circle. The radii of the sectors are 6 cm and 8 cm. The figure is divided into three regions – I, II and III. (Note: The figure is not to scale) Find the difference in the areas of regions I and III. Show your work.



SECTION-C

26. If a circle touches the side BC of a triangle ABC at P and extended sides AB and AC at Q and R, respectively. Prove that $AQ = \frac{1}{2}(BC + CA + AB)$.

27. If $\tan(A + B) = 1$ and $\tan(A - B) = \frac{1}{\sqrt{3}}$, $0^\circ < A + B < 90^\circ$, $A > B$, then find the value of A and B.

28. The frequency distribution of daily rainfall in a town during a certain period is shown below.

Rainfall (in mm)	Number of days
0-20	10
20-40	x
40-60	12
60-80	8

Unfortunately, due to manual errors, the information on the 20-40 mm range got deleted from the data. If the mean daily rainfall for the period was 32 mm, find the number of days when the rainfall ranged between 20-40 mm. Show your work.

29. If one root of the quadratic equation $x^2 + 12x - k = 0$ is thrice the other root, then find the value of k.

30. A fraction becomes $\frac{2}{3}$ when 3 is added from the numerator and it becomes $\frac{1}{2}$ when 1 is subtracted from the denominator. Find the fraction.

OR

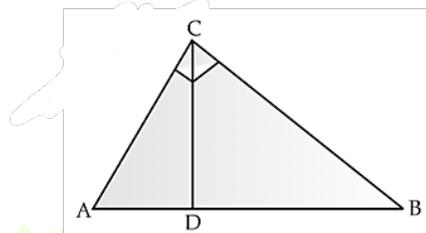
The present age of father is three years more than three times the age of his son. Three years later hence the father's age will be 10 years more than twice the age of the son. Determine the present ages.

31. Find the mean of the following data using assumed mean method.

Class	0-5	5-10	10-15	15-20	20-25
Frequency	8	7	10	13	12

SECTION-D

32. In the given figure $\angle ACB = 90^\circ$ and $CD \perp AB$, prove that $CD^2 = BD \times AD$.



33. A right cylindrical container of radius 6 cm and height 15 cm is full of ice-cream, which has to be distributed to 10 children in equal cones having hemispherical shape on the top. If the height of the conical portion is four times its base radius, find the radius of the ice-cream cone.

OR

A vessel in the form of a hollow hemisphere mounted by a hollow cylinder. The diameter of hemisphere is 12 cm and the total height of vessel is 10 cm. Find the inner surface area of the vessel.

34. $p(x) = ax^2 - 8x + 3$, where a is a non-zero real number. One zero of $p(x)$ is 3 times the other zero.
- (i) find the value of a . Show your work.
 - (ii) What is the shape of the graph of $p(x)$? Give a reason for your answer.
35. Two different dice are thrown together. Find the probability that the numbers obtained have
- (i) Even sum, and
 - (ii) Even product

SECTION-E

36. Read the following text and answer the following questions:

Aayush starts walking from his house to office. Instead of going to the office directly, he goes to a bank first, from there to his daughter's school and then reaches the office. (Assume that all distances covered are in straight lines). If the house is situated at (2,4), bank at (5,8), school at (13,14) and office at (13,26) and co-ordinates are in km.

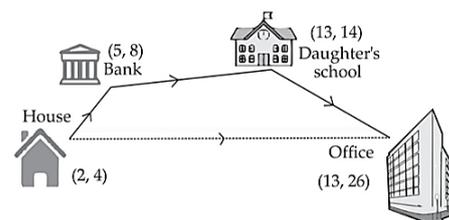
(i) What is the distance between house and bank?

OR

What is the distance between the bank and daughter's school?

(ii) What is the distance daughter's school and office?

(iii) What is the extra distance travelled by Aayush?

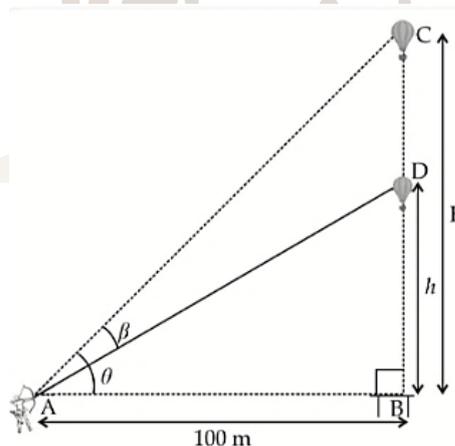


37. Read the following text and answer the following questions

At an archery academy, Guru Drona had floated a gift box with two ballons at a height of H metres from the table. As part of his practice, Arjuna was given the task to bring the gift box to the table paced below. Arjuna was standing on the ground at a horizontal distance of 100 metres from the table at point B. He aimed at the ballons with an elevation angle of θ and shot the arrow to burst one of the ballons.

When Arjuna burst the first ballon, the box came down to the height of h metres from the table. He now reduced his angle of elevation by β and shot his arrow at the second ballon.

The second ballon burst and the gift box landed safely on the table. Assume that Arjuna's arrows travel in straight lines and did not curve down. (Note : The figure is not to scale) use $\sqrt{3} = 1.73, \sqrt{2} = 1.41$)



(i) if $\theta = 45^\circ$ and $\beta = 15^\circ$, what is the difference between the box's initial height and its height after the first shot?

(ii) for Ashwatthama, Guru Drona raised the gift box further higher such that the angles θ and β were 60° and 30° respectively. What is the value of the ratio $\frac{H}{h}$ now?

OR

When the initial angle of elevation, θ was 45° , Arjuna felt uncomfortable as it straight his neck. From his original spot, approximately how much he retreat away

for the balloons, so that the new angle of elevation, θ become 30° ?

(iii) if $\theta=45^\circ$ and $\beta = 15^\circ$, what is the distance that the arrow has to travel to burst the second balloon?

38. Read the following text and answer following questions from:

SCALE FACTOR

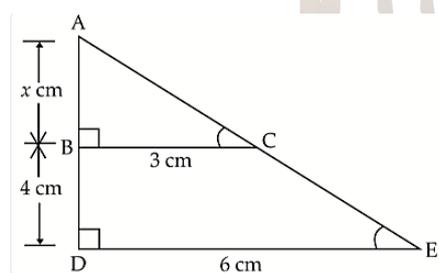


A scale drawing of an object is the same shape as the object but a different size. The scale of a drawing is a comparison of the length used on a drawing to the length it represents. The scale is written as a ratio. The ratio of two corresponding sides in similar figures is called the scale factor.

Scale factor = length in image / corresponding length in object if one shape can become another using resizing, then the shapes are similar. Hence, two shapes are similar when one can become the other after a resize, flip, slide or turn. In the photograph below showing the side view of a train engine. Scale factor is 1:200

This means that a length of 1 cm on the photograph above corresponds to a length of 200 cm or 2 m, of the actual engine. The scale can also be written as the ratio of two lengths.

(i) If the length of the model is 11 cm, then find the overall length of the engine in the photograph above, including the couplings (mechanism used to connect)



(ii) What will affect the similarity of any two polygons.

OR

What is the actual width of the door if the width of the door in photograph is 0.35 cm?

(iii) Find the length of AB in the given figure. Also find the area of $\triangle ADE$.