

- (vii) In Section E, Questions no. 36 to 38 are case study based questions carrying 4 marks each. Internal choice is provided in 2 marks questions in case-study.
- (viii) There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 3 questions in Section E.
- (ix) Draw neat diagrams wherever required. Take $\pi = \frac{22}{7}$ wherever required, if not stated.
- (x) Use of calculators is **not** allowed.

SECTION A

This section comprises multiple choice questions (MCQs) of 1 mark each.

1. $\left(\frac{1 - \tan^2 30^\circ}{1 + \tan^2 30^\circ} \right)$ is equal to :

(a) $\sin 60^\circ$	(b) $\cos 60^\circ$
(c) $\tan 60^\circ$	(d) $\cos 30^\circ$

2. In ΔABC and ΔDEF , $\frac{AB}{DE} = \frac{BC}{FD}$. Which of the following makes the two triangles similar ?

(a) $\angle A = \angle D$	(b) $\angle B = \angle D$
(c) $\angle B = \angle E$	(d) $\angle A = \angle F$



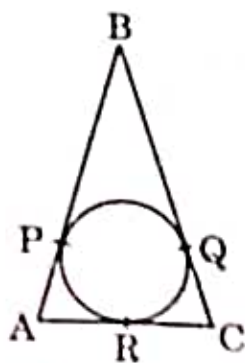
$$\sin \theta = \frac{p}{h} \quad \cos \theta = \frac{b}{h} \quad \tan \theta = \frac{p}{b}$$

3. The 13th term from the end of the A.P. : 20, 13, 6, -1,, -148 is :
- (a) 57 (b) -57
(c) 64 (d) -64

4. Two dice are rolled together. What is the probability of getting a sum greater than 10 ?

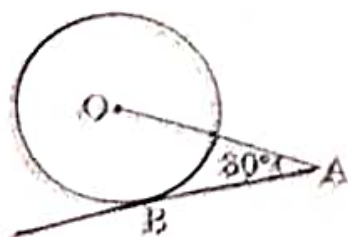
- (a) $\frac{1}{9}$ (b) $\frac{1}{6}$
(c) $\frac{1}{12}$ (d) $\frac{5}{18}$

5. In the given figure, $AB = BC = 10$ cm. If $AC = 7$ cm, then the length of BP is :



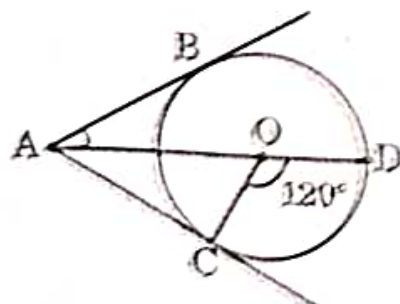
- (a) 3.5 cm (b) 7 cm
(c) 6.5 cm (d) 5 cm
6. Water in a river which is 3 m deep and 40 m wide is flowing at the rate of 2 km/h. How much water will fall into the sea in 2 minutes ?
- (a) 800 m³ (b) 4000 m³
(c) 8000 m³ (d) 2000 m³
7. If the mean and the median of a data are 12 and 15 respectively, then its mode is :
- (a) 13.5 (b) 21
(c) 6 (d) 14

In the given figure, AB is a tangent to the circle centered at O. If $OA = 6$ cm and $\angle OAB = 30^\circ$, then the radius of the circle is.



- (a) 3 cm (b) $3\sqrt{3}$ cm
(c) 2 cm (d) $\sqrt{3}$ cm

In the given figure, AC and AB are tangents to a circle centered at O. If $\angle COD = 120^\circ$, then $\angle BAO$ is equal to:



- (a) 30° (b) 60°
(c) 45° (d) 90°

9. Which of the following numbers **cannot** be the probability of happening of an event?

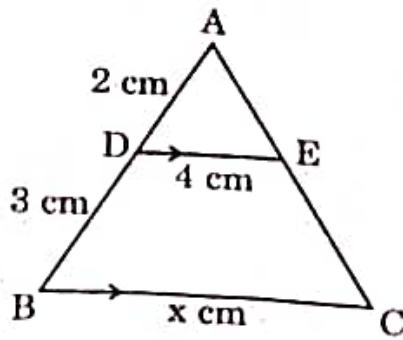
- (a) 0 (b) $\frac{1}{0.01}$
(c) 0.07 (d) $\frac{0.07}{3}$

10. If every term of the statistical data consisting of n terms is decreased by 2, then the mean of the data:

- (a) decreases by 2
(b) remains unchanged
(c) decreases by $2n$
(d) decreases by 1



12. In the given figure, $DE \parallel BC$. The value of x is :



- (a) 6 (b) 12.5
(c) 8 (d) 10
13. A quadratic equation whose roots are $(2 + \sqrt{3})$ and $(2 - \sqrt{3})$ is :
- (a) $x^2 - 4x + 1 = 0$ (b) $x^2 + 4x + 1 = 0$
(c) $4x^2 - 3 = 0$ (d) $x^2 - 1 = 0$
14. If $\tan \theta = \frac{5}{12}$, then the value of $\frac{\sin \theta + \cos \theta}{\sin \theta - \cos \theta}$ is :
- (a) $-\frac{17}{7}$ (b) $\frac{17}{7}$
(c) $\frac{17}{13}$ (d) $-\frac{7}{13}$
15. If end points of a diameter of a circle are $(-5, 4)$ and $(1, 0)$, then the radius of the circle is :
- (a) $2\sqrt{13}$ units (b) $\sqrt{13}$ units
(c) $4\sqrt{2}$ units (d) $2\sqrt{2}$ units
16. The number of polynomials having zeroes -1 and 2 is :
- (a) exactly 2 (b) only 1
(c) at most 2 (d) infinite

The pair of equations $ax + 2y = 9$ and $3x + by = 18$ represent parallel lines, where a, b are integers, if :

- (a) $a = b$ (b) $3a = 2b$
(c) $2a = 3b$ (d) $ab = 6$

18. The common difference of the A.P. whose n^{th} term is given by $a_n = 5n - 7$ is :
- (a) -7
 (b) 7
 (c) 5
 (d) -2

Questions number 19 and 20 are Assertion and Reason based questions carrying 1 mark each. Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

- (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
 (b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
 (c) Assertion (A) is true, but Reason (R) is false.
 (d) Assertion (A) is false, but Reason (R) is true.

19. Assertion (A) : The number 5^n cannot end with the digit 0, where n is a natural number.

Reason (R) : Prime factorisation of 5 has only two factors, 1 and 5.

20. Assertion (A) : If the points $A(4, 3)$ and $B(x, 5)$ lie on a circle with centre $O(2, 3)$, then the value of x is 2.

Reason (R) : Centre of a circle is the mid-point of each chord of the circle.

SECTION B

This section comprises very short answer (VSA) type questions of 2 marks each.

Using prime factorisation, find HCF and LCM of 96 and 120.

Find the ratio in which line $y = x$ divides the line segment joining the points $(6, -3)$ and $(1, 6)$.

- (a) If $a \cos \theta + b \sin \theta = m$ and $a \sin \theta - b \cos \theta = n$, then prove that $a^2 + b^2 = m^2 + n^2$.

OR

(b) Prove that :

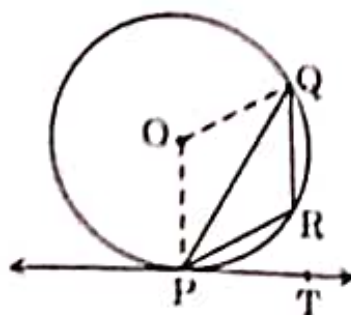
$$\sqrt{\frac{\sec A - 1}{\sec A + 1}} + \sqrt{\frac{\sec A + 1}{\sec A - 1}} = 2 \operatorname{cosec} A$$

24. (a) The line segment joining the points $A(4, -5)$ and $B(4, 5)$ is divided by the point P such that $AP : AB = 2 : 5$. Find the coordinates of P .

OR

- (b) Point $P(x, y)$ is equidistant from points $A(5, 1)$ and $B(1, 5)$. Prove that $x = y$.

25. In the given figure, PQ is a chord of the circle centered at O . PT is a tangent to the circle at P . If $\angle QPT = 55^\circ$, then find $\angle PRQ$.



SECTION C

This section comprises short answer (SA) type questions of 3 marks each.

26. Find the mean of the following distribution :

Classes	0 - 15	15 - 30	30 - 45	45 - 60	60 - 75	75 - 90
Frequency	17	20	18	21	15	9

27. A 2-digit number is seven times the sum of its digits. The number formed by reversing the digits is 18 less than the given number. Find the given number.

28. Prove that :

$$\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \csc \theta$$

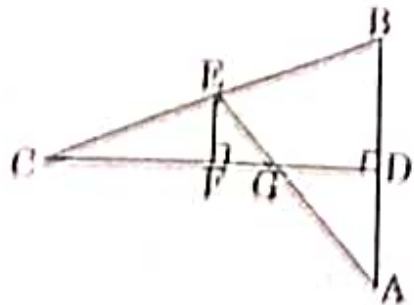
29. (a) Prove that $\sqrt{3}$ is an irrational number.

OR

(b) The traffic lights at three different road crossings change after every 48 seconds, 72 seconds and 108 seconds respectively. If they change simultaneously at 7 a.m., at what time will they change together next?

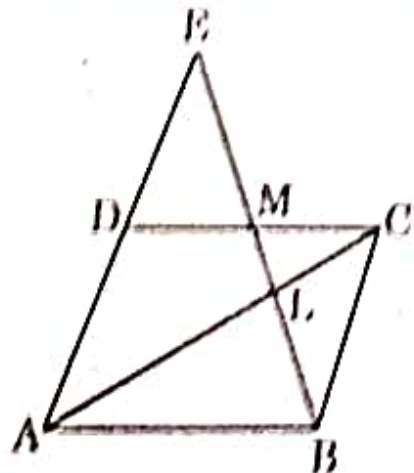
30. In an A.P., the sum of the first n terms is given by $S_n = 6n - n^2$. Find its 80th term.

1. (a) In the given figure, CD is the perpendicular bisector of AB. EF is perpendicular to CD. AE intersects CD at G. Prove that $\frac{CF}{CD} = \frac{FG}{DG}$.



OR

(b) In the given figure, ABCD is a parallelogram. BE bisects CD at M and intersects AC at L. Prove that $EL = 2BL$.

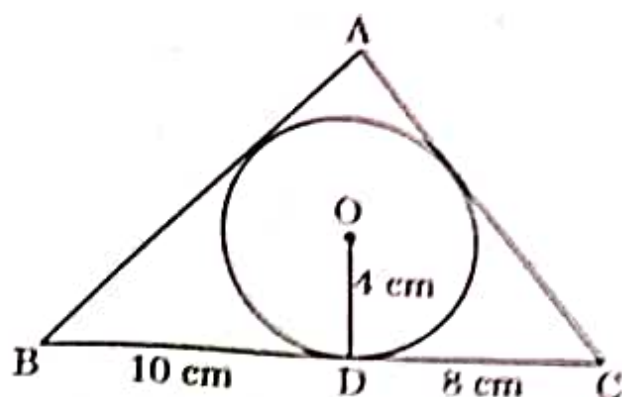




SECTION D

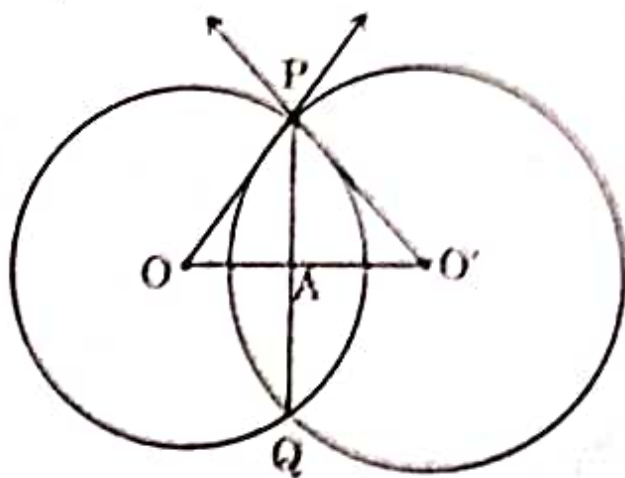
This section comprises long answer (LA) type questions of 5 marks each.

32. (a) A triangle ABC is drawn to circumscribe a circle of radius 4 cm such that the segments BD and DC are of lengths 10 cm and 8 cm respectively. Find the lengths of the sides AB and AC, if it is given that area $\Delta ABC = 90 \text{ cm}^2$.



OR

- (b) Two circles with centres O and O' of radii 6 cm and 8 cm, respectively intersect at two points P and Q such that OP and O'P are tangents to the two circles. Find the length of the common chord PQ.



83

33. A horse is tied to a peg at one corner of a square shaped grass field of side 15 m by means of a 5 m long rope. Find the area of that part of the field in which the horse can graze. Also, find the increase in grazing area if length of rope is increased to 10 m. (Use $\pi = 3.14$)

34

The angle of elevation of the top of a vertical tower from a point P on the ground is 60° . From another point Q, 10 m vertically above the first point P, its angle of elevation is 30° . Find :

- (a) The height of the tower.
- (b) The distance of the point P from the foot of the tower.
- (c) The distance of the point P from the top of the tower.

35

(a) A train travels at a certain average speed for a distance of 54 km and then travels a distance of 63 km at an average speed of 6 km/h more than the first speed. If it takes 3 hours to complete the journey, what was its first average speed ?

OR

(b) Two pipes together can fill a tank in $\frac{15}{8}$ hours. The pipe with larger diameter takes 2 hours less than the pipe with smaller diameter to fill the tank separately. Find the time in which each pipe can fill the tank separately.

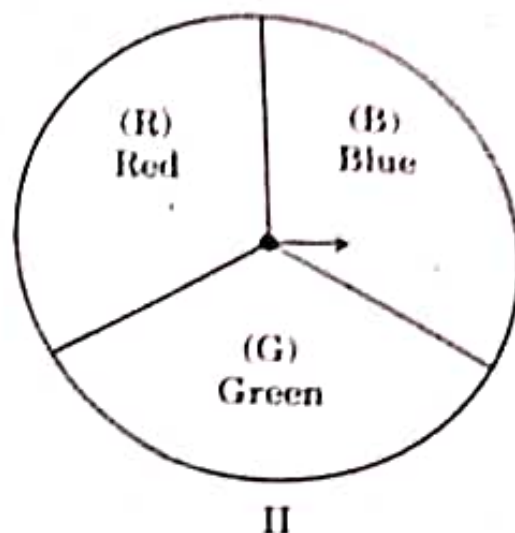
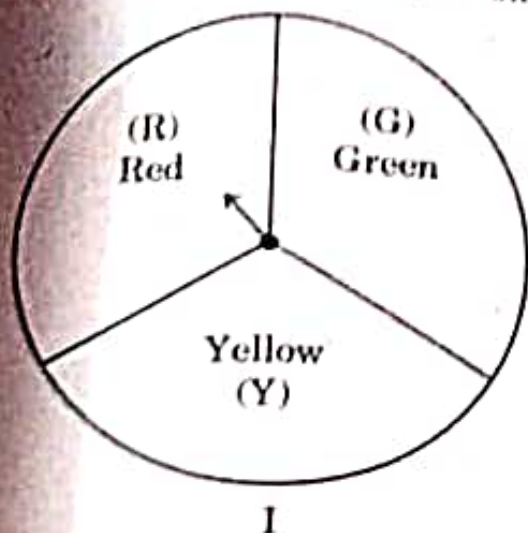


SECTION II

This section comprises 3 case study based questions of 4 marks each.

Case Study - 1

38. A middle school decided to run the following spinner game as a fund-raiser on Christmas Carnival.



Making Purple : Spin each spinner once. Blue and red make purple. So, if one spinner shows Red (R) and another Blue (B), then you 'win'. One such outcome is written as 'RB'.

Based on the above, answer the following questions :

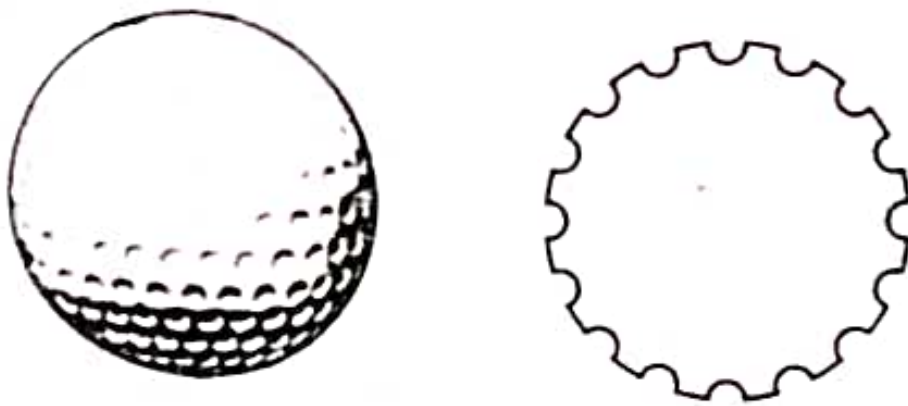
- (i) List all possible outcomes of the game.
- (ii) Find the probability of 'Making Purple'.
- (iii) (a) For each win, a participant gets ₹ 10, but if he/she loses, he/she has to pay ₹ 5 to the school.
If 99 participants played, calculate how much fund could the school have collected.

OR

- (iii) (b) If the same amount of ₹ 5 has been decided for winning or losing the game, then how much fund had been collected by school ? (Number of participants = 99)

Case Study - 2

37. A golf ball is spherical with about 300 – 500 dimples that help increase its velocity while in play. Golf balls are traditionally white but available in colours also. In the given figure, a golf ball has diameter 4.2 cm and the surface has 315 dimples (hemi-spherical) of radius 2 mm.



Based on the above, answer the following questions :

- | | | |
|-------|--|---|
| (i) | Find the surface area of one such dimple. | 1 |
| (ii) | Find the volume of the material dug out to make one dimple. | 1 |
| (iii) | (a) Find the total surface area exposed to the surroundings. | 2 |

OR

- | | | |
|-------|---------------------------------------|---|
| (iii) | (b) Find the volume of the golf ball. | 2 |
|-------|---------------------------------------|---|

Case Study - 8

In a pool at an aquarium, a dolphin jumps out of the water travelling at 20 cm per second. Its height above water level after t seconds is given by $h = 20t - 10t^2$



$20t = 20 \times 2 = 40$
 $20t^2 = 20 \times 4 = 80$
 $20t - 10t^2 = 40 - 80 = -40$
 $20t - 10t^2 = -40$
 $20t - 10t^2 = -40$
 $20t - 10t^2 = -40$

Based on the above, answer the following questions :

- Find zeroes of polynomial $p(t) = 20t - 10t^2$.
- Which of the following types of graph represents $p(t)$?

