## SECTION – A
## (Multiple Choice Questions)

**Section – A consists of 20 questions of 1 mark each.**

1. If $p^2 = \frac{32}{50}$, then p is a/an

(A) whole number (B) integer

(C) rational number (D) irrational number

2. The distance of the point (– 6, 8) from $x$-axis is

(A) 6 units (B) – 6 units

(C) 8 units (D) 10 units

3. The number of quadratic polynomials having zeroes –5 and –3 is

(A) 1 (B) 2

(C) 3 (D) more than 3

4. The point of intersection of the line represented by $3x - y = 3$ and y-axis is given by

(A) (0, –3) (B) (0, 3)

(C) (2, 0) (D) (–2, 0)

5. The circumferences of two circles are in the ratio 4 : 5. What is the ratio of their radii ?

(A) 16 : 25 (B) 25 : 16

(C) $2 : \sqrt{5}$ (D) 4 : 5

6. If $\alpha$ and $\beta$ are the zeroes of the polynomial $x^2 - 1$, then the value of $(\alpha + \beta)$ is

(A) 2 (B) 1

(C) –1 (D) 0

7. $\frac{\cos^2\theta}{\sin^2\theta} - \frac{1}{\sin^2\theta}$, in simplified form, is :

(A) $\tan^2\theta$ (B) $\sec^2\theta$

(C) 1 (D) –1

8. If $\Delta PQR \sim \Delta ABC$; PQ = 6 cm, AB = 8 cm and the perimeter of $\Delta ABC$ is 36 cm, then the perimeter of $\Delta PQR$ is

(A) 20.25 cm (B) 27 cm

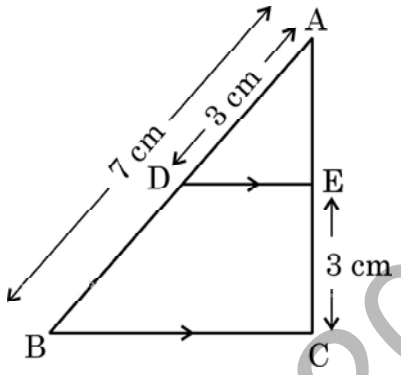
(C) 48 cm (D) 64 cm

9. If the quadratic equation $ax^2 + bx + c = 0$ has two real and equal roots, then 'c' is equal to

(A) $\frac{-b}{2a}$ (B) $\frac{b}{2a}$

(C) $\frac{-b^2}{4a}$ (D) $\frac{b^2}{4a}$

10. In the given figure, DE||BC. If AD = 3 cm, AB = 7 cm and EC = 3 cm, then the length of AE is




(A) 2 cm (B) 2.25 cm

(C) 3.5 cm (D) 4 cm

11. A bag contains 5 pink, 8 blue and 7 yellow balls. One ball is drawn at random from the bag. What is the probability of getting neither a blue nor a pink ball ?

(A) $\frac{1}{4}$ (B) $\frac{2}{5}$

(C) $\frac{7}{20}$ (D) $\frac{13}{20}$

12. The volume of a right circular cone whose area of the base is 156 $cm^2$ and the vertical height is 8 cm, is

(A) 2496 $cm^3$ (B) 1248 $cm^3$

(C) 1664 $cm^3$ (D) 416 $cm^3$

13. 3 chairs and 1 table cost ₹ 900; whereas 5 chairs and 3 tables cost ₹ 2,100. If the cost of 1 chair is ₹ $x$ and the cost of 1 table is ₹ y, then the situation can be represented algebraically as

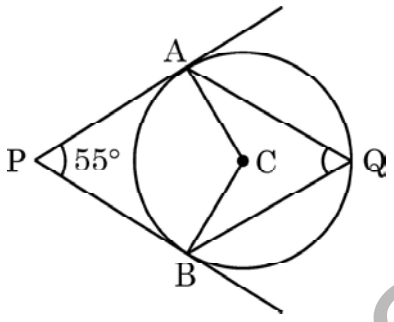
(A) $3x + y = 900,\ 3x + 5y = 2100$

(B) $x + 3y = 900,\ 3x + 5y = 2100$

(C) $3x + y = 900,\ 5x + 3y = 2100$

(D) $x + 3y = 900,\ 5x + 3y = 2100$

14. In the given figure, PA and PB are tangents from external point P to a circle with centre C and Q is any point on the circle. Then the measure of $\angle AQB$ is




(A) 62½°

(B) 125°

(C) 55°

(D) 90°

15. A card is drawn at random from a well shuffled deck of 52 playing cards. The probability of getting a face card is

(A) $\frac{1}{2}$

(B) $\frac{3}{13}$

(C) $\frac{4}{13}$

(D) $\frac{1}{13}$

16. If $\theta$ is an acute angle of a right angled triangle, then which of the following equation is **not** true ?

(A) $\sin\theta \cot\theta = \cos\theta$

(B) $\cos\theta \tan\theta = \sin\theta$

(C) $\text{cosec}^2\theta - \cot^2\theta = 1$

(D) $\tan^2\theta - \sec^2\theta = 1$

17. If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and –3, then

(A) $a = -7, b = -1$

(B) $a = 5, b = -1$

(C) $a = 2, b = -6$

(D) $a = 0, b = -6$

18. 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

**Assertion – Reason Based Questions :** In question numbers **19** and **20**, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option out of the following :

(A) Both Assertion (A) and Reason (R) are true; and Reason (R) is the correct explanation of Assertion (A).

(B) Both Assertion (A) and Reason (R) are true; but Reason (R) is not the correct explanation of Assertion (A).

(C) Assertion (A) is true but Reason (R) is false.

(D) Assertion (A) is false but Reason (R) is true.

19. **Statement A (Assertion) :** If $5 + \sqrt{7}$ is a root of a quadratic equation with rational co-efficients, then its other root is $5 - \sqrt{7}$.

**Statement R (Reason) :** Surd roots of a quadratic equation with rational co-efficients occur in conjugate pairs.

20. **Statement A (Assertion) :** For $0 < \theta \leq 90°$, cosec $\theta$ – cot $\theta$ and cosec $\theta$ + cot $\theta$ are reciprocal of each other.

**Statement R (Reason) :** $\text{cosec}^2\theta - \cot^2\theta = 1$



## SECTION – B

Section – **B** consists of Very Short Answer (VSA) type of questions of **2** marks each.

21. (A) Show that $6^n$ can not end with digit 0 for any natural number 'n'.

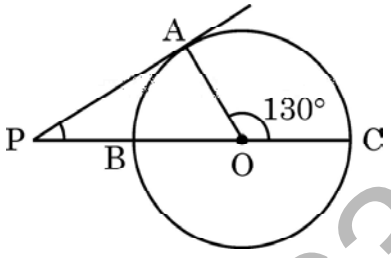
**OR**

(B) Find the HCF and LCM of 72 and 120.

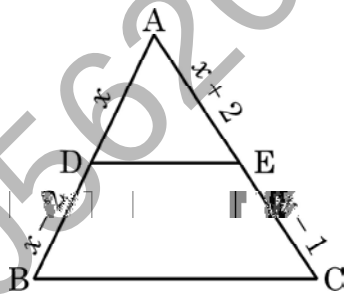
22. A line intersects y-axis and *x*-axis at point P and Q, respectively. If R(2, 5) is the mid-point of line segment PQ, then find the coordinates of P and Q.

23. Find the length of the shadow on the ground of a pole of height 18 m when angle of elevation $\theta$ of the sun is such that $\tan\theta = \frac{6}{7}$.

24. In the given figure, PA is a tangent to the circle drawn from the external point P and PBC is the secant to the circle with BC as diameter.
If $\angle AOC = 130°$, then find the measure of $\angle APB$, where O is the centre of the circle.

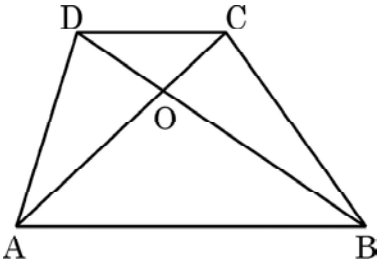



25. (A) In the given figure, ABC is a triangle in which DE||BC. If AD = $x$, DB = $x - 2$, AE = $x + 2$ and EC = $x - 1$, then find the value of $x$.




**OR**

(B) Diagonals AC and BD of trapezium ABCD with AB||DC intersect each other at point O. Show that $\frac{OA}{OC} = \frac{OB}{OD}$.



## SECTION – C

Section – **C** consists of Short Answer (SA) type of questions of **3** marks each.

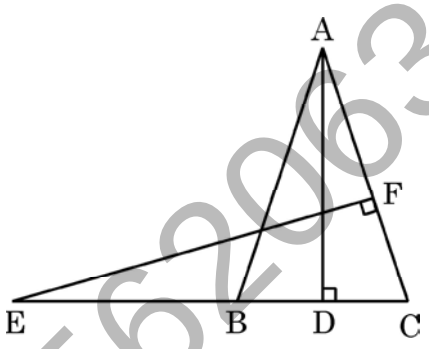
26. Find the ratio in which the line segment joining the points A(6, 3) and B(–2, –5) is divided by $x$-axis.

27. (A) Find the HCF and LCM of 26, 65 and 117, using prime factorisation.

**OR**

(B) Prove that $\sqrt{2}$ is an irrational number.

28. In the given figure, E is a point on the side CB produced of an isosceles triangle ABC with AB = AC. If AD ⊥ BC and EF ⊥ AC, then prove that ΔABD ~ ΔECF.




29. (A) The sum of two numbers is 15. If the sum of their reciprocals is $\frac{3}{10}$, find the two numbers.

**OR**

(B) If α and β are roots of the quadratic equation $x^2 - 7x + 10 = 0$, find the quadratic equation whose roots are $\alpha^2$ and $\beta^2$.

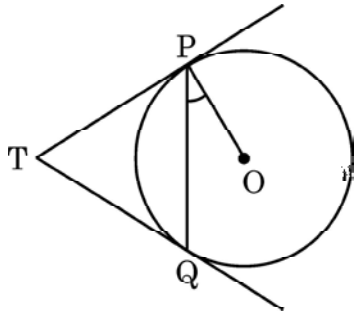
30. Prove that $\frac{1 + \sec A}{\sec A} = \frac{\sin^2 A}{1 - \cos A}$.

31. In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find the area of the sector formed by the arc. Also, find the length of the arc.

## SECTION – D

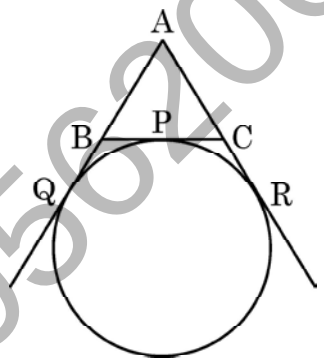
Section – D consists of Long Answer (LA) type questions of **5** marks each.

32. (A) Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2\ \angle OPQ$.




**OR**

(B) A circle touches the side BC of a $\Delta ABC$ at a point P and touches AB and AC when produced at Q and R respectively. Show that $AQ = \frac{1}{2}$ (Perimeter of $\Delta ABC$).




33. A solid is in the shape of a right-circular cone surmounted on a hemisphere, the radius of each of them being 7 cm and the height of the cone is equal to its diameter. Find the volume of the solid.

34. (A) The ratio of the $11^{th}$ term to the $18^{th}$ term of an A.P. is 2 : 3. Find the ratio of the $5^{th}$ term to the $21^{st}$ term. Also, find the ratio of the sum of first 5 terms to the sum of first 21 terms.

**OR**

(B) If the sum of first 6 terms of an A.P. is 36 and that of the first 16 terms is 256, find the sum of first 10 terms.

35. 250 apples of a box were weighed and the distribution of masses of the apples is given in the following table :

| **Mass (in grams)** | 80 – 100 | 100 – 120 | 120 – 140 | 140 – 160 | 160 – 180 |
|---|---|---|---|---|---|
| **Number of apples** | 20 | 60 | 70 | $x$ | 60 |

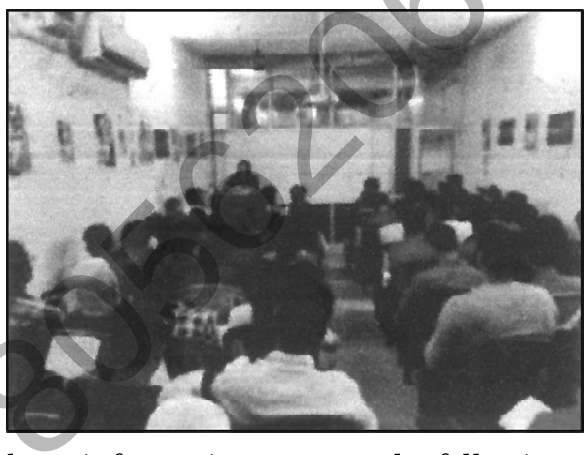
(i) Find the value of $x$ and the mean mass of the apples. **3**

(ii) Find the modal mass of the apples. **2**

## SECTION – E

**3** Case Study Based Questions. Each question is of **4** marks.

36. A coaching institute of Mathematics conducts classes in two batches I and II and fees for rich and poor children are different. In batch I, there are 20 poor and 5 rich children, whereas in batch II, there are 5 poor and 25 rich children. The total monthly collection of fees from batch I is ₹ 9000 and from batch II is ₹ 26,000. Assume that each poor child pays ₹ $x$ per month and each rich child pays ₹ y per month.



Based on the above information, answer the following questions :

(i) Represent the information given above in terms of $x$ and y. **1**

(ii) Find the monthly fee paid by a poor child. **2**

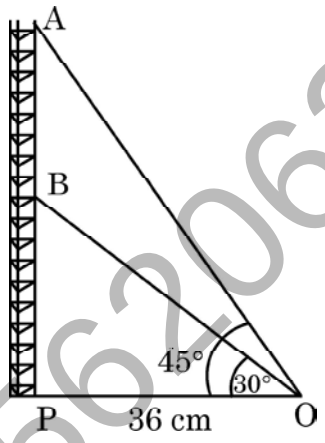
**OR**

Find the difference in the monthly fee paid by a poor child and a rich child.

(iii) If there are 10 poor and 20 rich children in batch II, what is the total monthly collection of fees from batch II ? **1**

37. Radio towers are used for transmitting a range of communication services including radio and television. The tower will either act as an antenna itself or support one or more antennas on its structure. On a similar concept, a radio station tower was built in two Sections A and B. Tower is supported by wires from a point O.

Distance between the base of the tower and point O is 36 cm. From point O, the angle of elevation of the top of the Section B is 30° and the angle of elevation of the top of Section A is 45°.






Based on the above information, answer the following questions :

(i) Find the length of the wire from the point O to the top of Section B. **1**

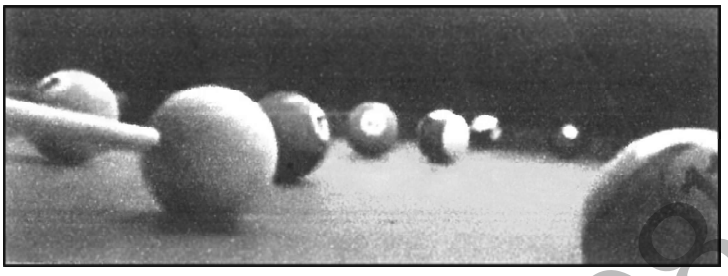
(ii) Find the distance AB. **2**

**OR**

Find the area of $\Delta OPB$.

(iii) Find the height of the Section A from the base of the tower. **1**

38. "Eight Ball" is a game played on a pool table with 15 balls numbered 1 to 15 and a "cue ball" that is solid and white. Of the 15 numbered balls, eight are solid (non-white) coloured and numbered 1 to 8 and seven are striped balls numbered 9 to 15.



The 15 numbered pool balls (no cue ball) are placed in a large bowl and mixed, then one ball is drawn out at random.

Based on the above information, answer the following questions :

(i) What is the probability that the drawn ball bears number 8 ?

(ii) What is the probability that the drawn ball bears an even number ?

**OR**

What is the probability that the drawn ball bears a number, which is a multiple of 3 ?

(iii) What is the probability that the drawn ball is a solid coloured and bears an even number ?