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SECTION - A

This section consists of 20 multiple choice questions of 1 mark each.

1. The system of equations $x + 5 = 0$ and $2x - 1 = 0$, has 1
 (A) No solution (B) Unique solution
 (C) Two solutions (D) Infinite solutions

2. In a right triangle ABC, right-angled at A, if $\sin B = \frac{1}{4}$, then the value of $\sec B$ is 1
 (A) 4 (B) $\frac{\sqrt{15}}{4}$
 (C) $\sqrt{15}$ (D) $\frac{4}{\sqrt{15}}$

3. $\sqrt{0.4}$ is a/an 1
 (A) natural number (B) integer
 (C) rational number (D) irrational number

4. Which of the following cannot be the unit digit of 8^n , where n is a natural number? 1
 (A) 4 (B) 2
 (C) 0 (D) 6

5. Which of the following quadratic equations has real and distinct roots? 1
 (A) $x^2 + 2x = 0$ ✓ (B) $x^2 + x + 1 = 0$ ✗
 (C) $(x - 1)^2 = 1 - 2x$ ✗ (D) $2x^2 + x + 1 = 0$ ✗

6. If the zeroes of the polynomial $ax^2 + bx + \frac{2a}{b}$ are reciprocal of each other, then the value of b is 1
 (A) 2 (B) $\frac{1}{2}$
 (C) -2 (D) $-\frac{1}{2}$



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37. The Statue of Unity situated in Gujarat is the world's largest Statue which stands over a 58 m high base. As part of the project, a student constructed an inclinometer and wishes to find the height of Statue of Unity using it.

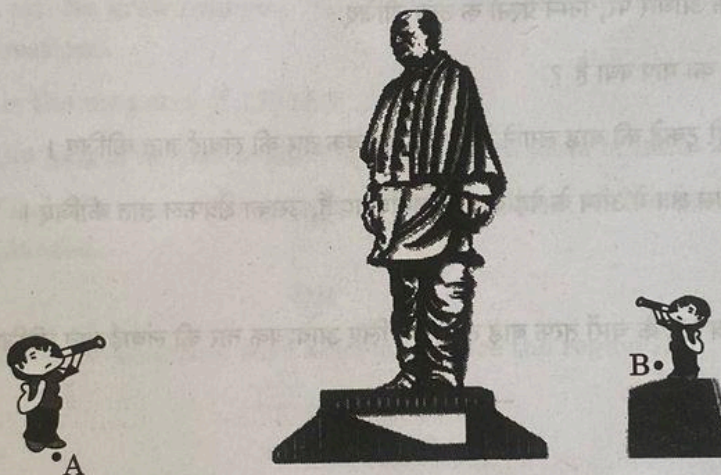
He noted following observations from two places :

Situation – I :

The angle of elevation of the top of Statue from Place A which is $80\sqrt{3}$ m away from the base of the Statue is found to be 60° .

Situation – II :

The angle of elevation of the top of Statue from a Place B which is 40 m above the ground is found to be 30° and entire height of the Statue including the base is found to be 240 m.



Based on given information, answer the following questions :

- | | | |
|-----------|---|---|
| (i) | Represent the Situation – I with the help of a diagram. | 1 |
| (ii) | Represent the Situation – II with the help of a diagram. | 1 |
| (iii) (a) | Calculate the height of Statue excluding the base and also find the height including the base with the help of Situation – I. | 2 |

OR

- | | | |
|-----------|---|---|
| (iii) (b) | Find the horizontal distance of point B (Situation – II) from the Statue and the value of $\tan \alpha$, where α is the angle of elevation of top of base of the Statue from point B. | 2 |
|-----------|---|---|



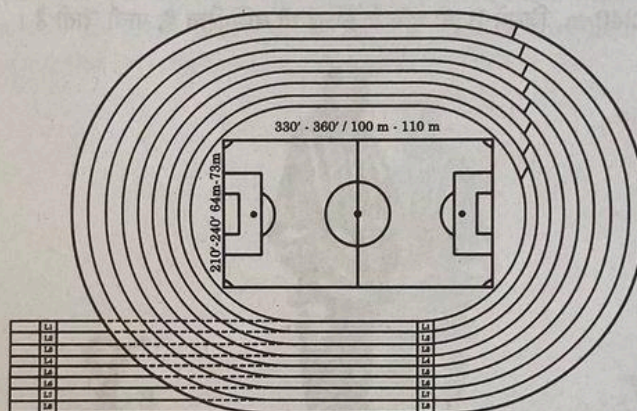
35. From one face of a solid cube of side 14 cm, the largest possible cone is carved out. Find the volume and surface area of the remaining solid.
 (Use $\pi = \frac{22}{7}$, $\sqrt{5} = 2.2$)

5

SECTION - E

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

36. In order to organise, Annual Sports Day, a school prepared an eight lane running track with an integrated football field inside the track area as shown below :



The length of innermost lane of the track is 400 m and each subsequent lane is 7.6 m longer than the preceding lane.

Based on given information, answer the following questions, using concept of Arithmetic Progression.

- (i) What is the length of the 6th lane ? 1
 (ii) How long is the 8th lane than that of 4th lane ? 1
 (iii) (a) While practicing for a race, a student took one round each in first six lanes. Find the total distance covered by the student. 2

OR

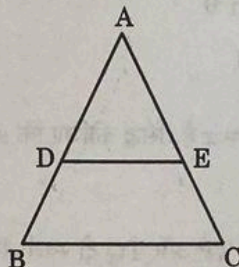
- (iii) (b) A student took one round each in lane 4 to lane 8. Find the total distance covered by the student. 2



SECTION - B

This section has 5 very short answer type questions of 2 marks each.

21. In the adjoining figure, $\frac{AD}{BD} = \frac{AE}{EC}$ and $\angle BDE = \angle CED$, prove that $\triangle ABC$ is an isosceles triangle. 2



22. A bag contains cards which are numbered from 5 to 100 such that each card bears a different number. A card is drawn at random. Find the probability that number on the card is 2

- (i) a perfect square
- (ii) a 2-digit number

23. (a) Solve the following pair of equations algebraically : 2

$$101x + 102y = 304$$

$$102x + 101y = 305$$

OR

- (b) In a pair of supplementary angles, the greater angle exceeds the smaller by 50° . Express the given situation as a system of linear equations in two variables and hence obtain the measure of each angle. 2

24. (a) If $a \sec \theta + b \tan \theta = m$ and $b \sec \theta + a \tan \theta = n$, prove that $a^2 + n^2 = b^2 + m^2$ 2

OR

- (b) Use the identity : $\sin^2 A + \cos^2 A = 1$ to prove that $\tan^2 A + 1 = \sec^2 A$. Hence, find the value of $\tan A$, when $\sec A = \frac{5}{3}$, where A is an acute angle. 2

25. Prove that abscissa of a point P which is equidistant from points with coordinates $A(7, 1)$ and $B(3, 5)$ is 2 more than its ordinate. 2



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30. Check whether the following system of equations is consistent or not.
If consistent, solve graphically
 $x - 2y + 4 = 0$, $2x - y - 4 = 0$

3

31. If the points $A(6, 1)$, $B(p, 2)$, $C(9, 4)$ and $D(7, q)$ are the vertices of a parallelogram ABCD, then find the values of p and q . Hence, check whether ABCD is a rectangle or not.

3

SECTION - D

This section has 4 long answer questions of 5 marks each.

32. Following data shows the number of family members living in different bungalows of a locality :

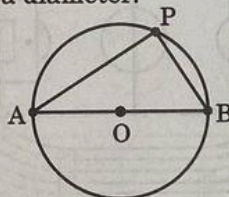
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Number of Members	0 - 2	2 - 4	4 - 6	6 - 8	8 - 10	Total
Number of Bungalows	10	p	60	q	5	120

If the median number of members is found to be 5, find the values of p and q .

33. (a) There is a circular park of diameter 65 m as shown in the following figure, where AB is a diameter.

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An entry gate is to be constructed at a point P on the boundary of the park such that distance of P from A is 35 m more than the distance of P from B. Find distance of point P from A and B respectively.

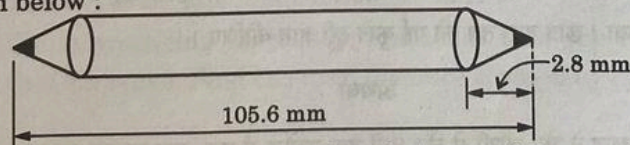
OR

- (b) Find the smallest value of p for which the quadratic equation $x^2 - 2(p + 1)x + p^2 = 0$ has real roots. Hence, find the roots of the equation so obtained.

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34. On the day of her examination, Riya sharpened her pencil from both ends as shown below :

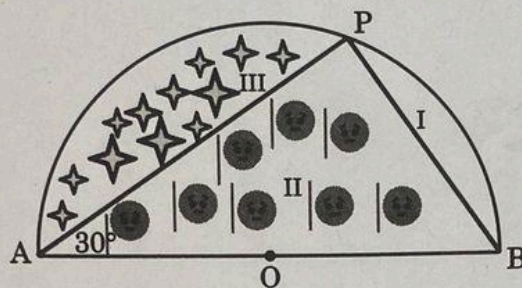
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The diameter of the cylindrical and conical part of the pencil is 4.2 mm. If the height of each conical part is 2.8 mm and length of entire pencil is 105.6 mm, find the total surface area of the pencil.



38. Anurag purchased a farmhouse which is in the form of a semicircle of diameter 70 m. He divides it into three parts by taking a point P on the semicircle in such a way that $\angle PAB = 30^\circ$ as shown in the following figure, where O is the centre of semicircle.



In part I, he planted saplings of Mango tree, in part II, he grew tomatoes and in part III, he grew oranges. Based on given information, answer the following questions.

- | | |
|--|---|
| (i) What is the measure of $\angle POA$? | 1 |
| (ii) Find the length of wire needed to fence entire piece of land. | 1 |
| (iii) (a) Find the area of region in which saplings of Mango tree are planted. | 2 |

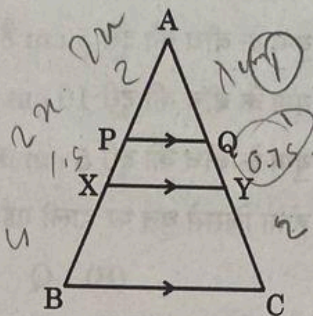
OR

- | | |
|---|---|
| (iii) (b) Find the length of wire needed to fence the region III. | 2 |
|---|---|

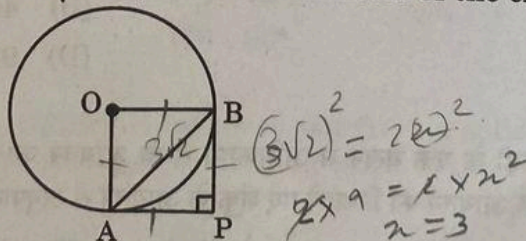


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7. The distance of point $(a, -b)$ from x -axis is
 (A) a (B) $-a$
 (C) b (D) $-b$
8. In the adjoining figure, $PQ \parallel XY \parallel BC$, $AP = 2$ cm, $PX = 1.5$ cm and $BX = 4$ cm. If $QY = 0.75$ cm, then $AQ + CY =$



- (A) 6 cm (B) 4.5 cm
 (C) 3 cm (D) 5.25 cm
9. Given $\triangle ABC \sim \triangle PQR$, $\angle A = 30^\circ$ and $\angle Q = 90^\circ$. The value of $(\angle R + \angle B)$ is
 (A) 90° (B) 120°
 (C) 150° (D) 180°
10. Two coins are tossed simultaneously. The probability of getting at least one head is
 (A) $\frac{1}{4}$ (B) $\frac{1}{2}$
 (C) $\frac{3}{4}$ (D) 1
11. In the adjoining figure, PA and PB are tangents to a circle with centre O such that $\angle P = 90^\circ$. If $AB = 3\sqrt{2}$ cm, then the diameter of the circle is



- (A) $3\sqrt{2}$ cm (B) $6\sqrt{2}$ cm
 (C) 3 cm (D) 6 cm



SECTION - C

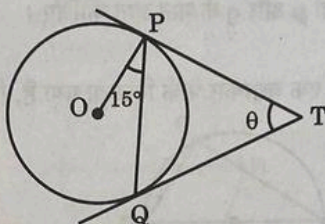
This section has 6 short answer type questions of 3 marks each.

26. (a) Prove that : $\frac{\cos \theta - 2 \cos^3 \theta}{\sin \theta - 2 \sin^3 \theta} + \cot \theta = 0$. 3

OR

- (b) Given that $\sin \theta + \cos \theta = x$, prove that $\sin^4 \theta + \cos^4 \theta = \frac{2 - (x^2 - 1)^2}{2}$. 3

27. In the adjoining figure, TP and TQ are tangents drawn to a circle with centre O. If $\angle OPQ = 15^\circ$ and $\angle PTQ = \theta$, then find the value of $\sin 2\theta$. 3



28. (a) Prove that $\sqrt{5}$ is an irrational number. 3

OR

- (b) Let p, q and r be three distinct prime numbers. 3

Check whether $p \cdot q \cdot r + q$ is a composite number or not.

Further, give an example for 3 distinct primes p, q, r such that

(i) $p \cdot q \cdot r + 1$ is a composite number.

(ii) $p \cdot q \cdot r + 1$ is a prime number.

29. Find the zeroes of the polynomial $q(x) = 8x^2 - 2x - 3$. Hence, find a polynomial whose zeroes are 2 less than the zeroes of $q(x)$. 3



12. If $x = \cos 30^\circ - \sin 30^\circ$ and $y = \tan 60^\circ - \cot 60^\circ$, then

- (A) $x = y$ (B) $x > y$
(C) $x < y$ (D) $x > 1, y < 1$

13. For a circle with centre O and radius 5 cm, which of the following statements is true?

P : Distance between every pair of parallel tangents is 5 cm. ~~X~~

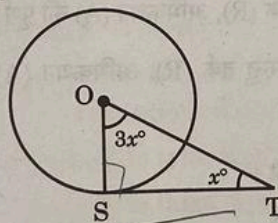
Q : Distance between every pair of parallel tangents is 10 cm. ~~X~~

R : Distance between every pair of parallel tangents must be between 5 cm and 10 cm. ~~X~~

S : There does not exist a point outside the circle from where length of tangent is 5 cm. ~~X~~

- (A) P (B) Q
(C) R (D) S

14. In the adjoining figure, TS is a tangent to a circle with centre O. The value of $2x^\circ$ is



- (A) 22.5
(C) 67.5

- (B) 45
(D) 90

15. A peacock sitting on the top of a tree of height 10 m observes a snake moving on the ground. If the snake is $10\sqrt{3}$ m away from the base of the tree, then angle of depression of the snake from the eye of the peacock is

- (A) 30°
(C) 60°

- (B) 45°
(D) 90°

16. If a cone of greatest possible volume is hollowed out from a solid wooden cylinder, then the ratio of the volume of remaining wood to the volume of cone hollowed out is

- (A) 1 : 1
(C) 2 : 1

- (B) 1 : 3
(D) 3 : 1



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17. If the mode of some observations is 10 and sum of mean and median is 25, then the mean and median respectively are 1
- (A) 12 and 13 (B) 13 and 12
(C) 10 and 15 (D) 15 and 10

18. If the maximum number of students has obtained 52 marks out of 80, then 1
- (A) 52 is the mean of the data. (B) 52 is the median of the data.
(C) 52 is the mode of the data. (D) 52 is the range of the data.

Directions : In Question Numbers 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**.

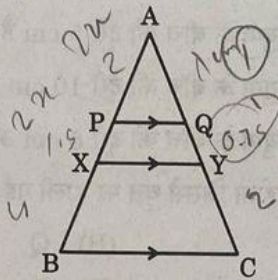
Choose the correct option from the following :

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is 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. **Assertion (A) :** For two prime numbers x and y ($x < y$), $HCF(x, y) = x$ and $LCM(x, y) = y$. 1
- Reason (R) :** $HCF(x, y) \leq LCM(x, y)$, where x, y are any two natural numbers.
20. In an experiment of throwing a die, 1
- Assertion (A) :** Event E_1 : getting a number less than 3 and Event E_2 : getting a number greater than 3 are complementary events.
- Reason (R) :** If two events E and F are complementary events, then $P(E) + P(F) = 1$.



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7. The distance of point $(a, -b)$ from x -axis is 1
- (A) a (B) $-a$
- (C) b (D) $-b$

8. In the adjoining figure, $PQ \parallel XY \parallel BC$, $AP = 2$ cm, $PX = 1.5$ cm and $BX = 4$ cm. If $QY = 0.75$ cm, then $AQ + CY =$ 1

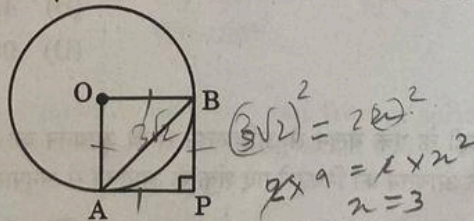


- (A) 6 cm (B) 4.5 cm
- (C) 3 cm (D) 5.25 cm
9. Given $\triangle ABC \sim \triangle PQR$, $\angle A = 30^\circ$ and $\angle Q = 90^\circ$. The value of $(\angle R + \angle B)$ is 1
- (A) 90° (B) 120°
- (C) 150° (D) 180°

10. Two coins are tossed simultaneously. The probability of getting atleast one head is 1

- (A) $\frac{1}{4}$ (B) $\frac{1}{2}$
- (C) $\frac{3}{4}$ (D) 1

11. In the adjoining figure, PA and PB are tangents to a circle with centre O such that $\angle P = 90^\circ$. If $AB = 3\sqrt{2}$ cm, then the diameter of the circle is 1



- (A) $3\sqrt{2}$ cm (B) $6\sqrt{2}$ cm
- (C) 3 cm (D) 6 cm

