

General Instructions:

Read the following instructions carefully and follow them.

1. This question paper contains 38 questions.
2. This question paper is divided into 5 sections A, B, C, D and E.
3. In Section A, Questions 1 – 18 are multiple choice questions (MCQs) and question number 19 and 20 are Assertion – Reason based questions of 1 mark each.
4. In Section B, Questions 21 – 25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Questions 26 – 31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Questions 32 – 35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Question number 36 – 38 are case study based questions, carrying 4 marks each with sub parts of the values 1, 1 and 2 marks each respectively.
8. All questions are compulsory. However, an internal choice in 2 questions of Section B, 2 questions of Section C and 2 questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat and clean figures wherever required.
10. Take $\pi = \frac{22}{7}$, wherever required if not stated.
11. Use of calculators is not allowed.

Section – A

Section A consists of 20 questions of 1 mark each.

1. If the zeroes of a quadratic polynomial are 1, 1; then the polynomial can be:
 - a. $x^2 + x + 1$

b. $x^2 - 2x + 1$

c. $x^2 + 3x + 2$

d. $x^2 + 2x + 2$

2. Which of the following experiments have equally likely outcomes?

a. A driver attempts to start a car. The car starts or does not start.

b. A baby is born, it is a boy or a girl.

c. A player attempts to shoot a basketball. He shoots or misses the shot.

d. A chef attempts to prepare a dish. It turns to be tasty or does not taste good.

3. A three digit number is chosen. The probability that all three digits are same is:

a. $\frac{1}{100}$

b. $\frac{99}{100}$

c. $\frac{11}{900}$

d. 0

4. For what value of k , the following pair of linear equations $2x + 3y + 5 = 0$ and $kx + 4y = 10$ has a unique solution?

a. $k = \frac{8}{3}$

b. $k \neq \frac{8}{3}$

c. $k = 3$

d. $k \neq 3$

5. Which of the following equations has no real roots?

a. $x^2 - 4x + 4 = 0$

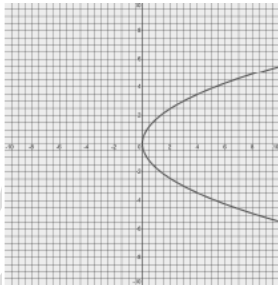
b. $x^2 - 4x = 0$

c. $3x^2 - 1 = 0$

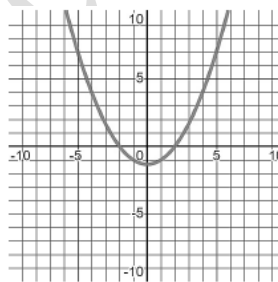
d. $x^2 + 1 = 0$

6. Which of the following is not the graph of a quadratic polynomial?

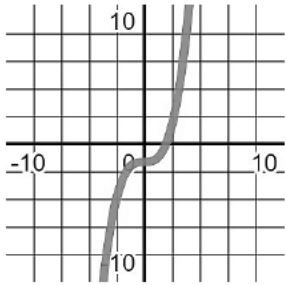
a.



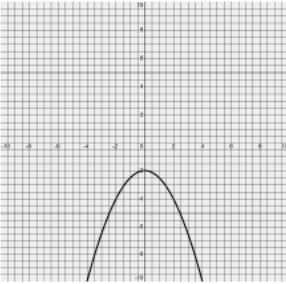
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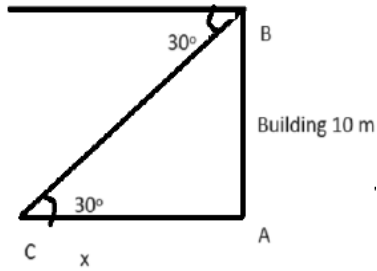
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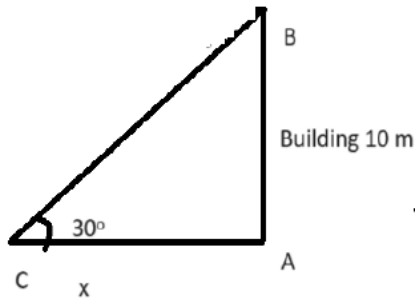
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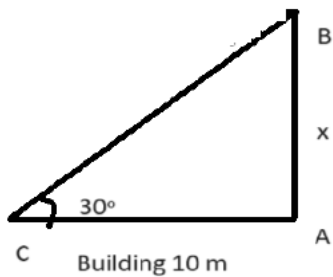
7. If $p - 1, p + 3, 3p - 1$ are in A.P, then p is equal to:
 a. 4 b. -4 c. 2 d. -2
8. The perimeter of a triangle with vertices $(0, 4), (0, 0)$ and $(3, 0)$ is:
 a. 5 b. 12 c. 11 d. $7 + \sqrt{5}$
9. If $(1, 1), (-1, -1)$ are two vertices of an equilateral triangle, then the third vertex is:
 a. $(-\sqrt{3}, -\sqrt{3})$
 b. $(0, 0)$
 c. $(-1, 0)$
 d. $(0, 1)$
10. If $\cos A = \frac{3}{5}$, then $\sec A - \tan A$ is equal to:
 a. 3 b. $\frac{11}{12}$ c. $\frac{1}{3}$ d. $\frac{12}{11}$
11. $8 \cot^2 A - 8 \operatorname{cosec}^2 A =$
 a. 1 b. 8 c. -1 d. -8
12. Which of the following figure is correct for the question: From the top of a building of height 10 m, the angle of depression of an object on the ground is 30° . If the distance of the object from the building is x , then the value of x is:
 a.



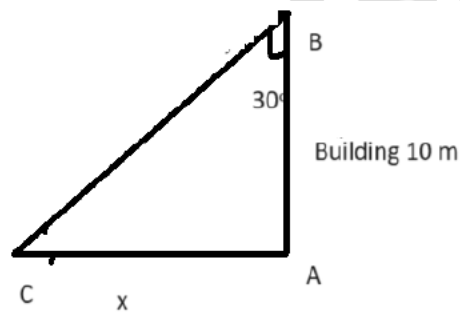
b.



c.



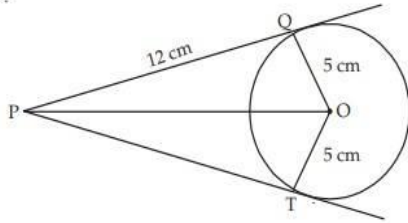
d.



13. A kite is flying at a height of 80 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 30° , then the length of the string is:

- a. 160 m b. 40 m c. 100 m d. 115 m

14. If PQ and PT are tangents from an external point P to a circle with centre O and radius 5 cm. If $PQ = 12$ cm, then the perimeter of the quadrilateral PQOT is:



- a. 24 cm b. 34 cm c. 17 cm d. 20 cm

15. Area of a sector of a circle with central angle θ and radius r is:

- a. $\frac{\theta}{180^\circ} \times 2\pi r$ b. $\frac{\theta}{360^\circ} \times 2\pi r$ c. $\frac{\theta}{720^\circ} \times 2\pi r^2$ d. $\frac{\theta}{180^\circ} \times \pi r^2$

16. The radius (in cm) of the largest right circular cone that can be cut out from a cube of edge 4.2 cm is:

- a. 8.4 b. 4.2 c. $(4.2)^2$ d. 2.1

17. In $\triangle ABC$, D and E are points on the sides AB and AC respectively such that $DE \parallel BC$ and $AD : DB = 3 : 1$. If $EA = 6.6$ cm, then $AC =$

- a. 6.6 cm b. 2.2 cm c. 3.3 cm d. 8.8 cm

18. Mode and mean of a data are 24 and 30. Median of the data is:

- a. 14 b. 20 c. 28 d. 26

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

Choose the correct option:

- 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 and 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): $P(-2, 5)$ and $Q(2, -1)$ are two points on the coordinate plane. The midpoint $(0, 2)$ is the only point equidistant from P and Q.

Reason (R): There are many points (x, y) where $(x + 2)^2 + (y - 5)^2 = (x - 2)^2 + (y + 1)^2$ are equidistant from P and Q.

20. Assertion (A): A number q is factorised as $3^2 \times 7^2 \times b$, where b is a prime number and other than 3 and 7. q is definitely an odd number.

Reason (R): $3^2 \times 7^2$ is an odd number.

Section – B

Section B consists of 5 questions of 2 marks each.

21. A juice seller had three types of juice. 403 litres of 1st kind, 434 litres of 2nd kind and 465 litres of 3rd kind. Find the least possible number of containers of equal size in which different types of juice can be filled without mixing.

OR

Check whether the statement below is true or false:

The square root of every composite number is rational.

Justify your answer by proving rationality or irrationality as applicable.

22. Find the sum of the even numbers from 0 to 50.

OR

If the n^{th} term of an A.P. is given by $a_n = 5 - 6n$, then find the sum of its first 20 terms.

23. Three cubes each of side 4 cm are joined end to end. Find the surface area of the resulting cuboid.

24. Find the values of k for which the roots of the equation $2x^2 - kx + k = 0$ are equal.

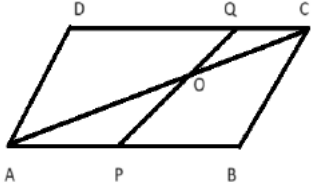
25. Wasim made a model of Pac – Man, after playing the famous video game of the same name. The area of the model is $120\pi \text{ cm}^2$. Pac – Man's mouth forms an angle of 60° at the centre of the circle. A picture of the model is shown. Wasim wants to decorate the model by attaching a coloured ribbon to the entire boundary of the shape. What is the minimum length of the ribbon required in terms of π ? Show your work.



Section – C

Section C consists of 6 questions of 3 marks each.

26. Find the zeroes of the quadratic polynomial $6x^2 - 3 - 7x$ and verify the relationship between the zeroes and the coefficients of the polynomial.
27. Prove that: $(1 + \cot A - \operatorname{cosec} A)(1 + \tan A + \sec A) = 2$
28. ABCD is a parallelogram. Point P divides AB in the ratio 2 : 3 and point Q divides DC in the ratio 4 : 1. Prove that OC is half of OA.



OR

In $\triangle ABC$, $AB = AC$ and D is a point on AC , such that $BC^2 = AC \times CD$.
Prove that $BD = BC$.

29. Given that $\sqrt{3}$ is an irrational number. Prove that $5 + 2\sqrt{3}$ is an irrational number.
30. Anny is playing a game and has two identical six sided dice. The faces of the dice have 3 even numbers and 3 odd numbers. She has to roll the two dice simultaneously and has two options to choose from before rolling the dice. She wins a prize if:
Option 1: The sum of the two numbers appearing on the top of the two dice is odd.
Option 2: The product of the two numbers appearing on the top of the two dice is odd.
Which option should Anny choose so that her chances of winning a prize is higher? Show your work.
31. The sum of the numerator and denominator of a fraction is 4 more than twice the numerator. If the numerator and denominator are increased by 3, they are in the same ratio 2 : 3. Find the fraction.

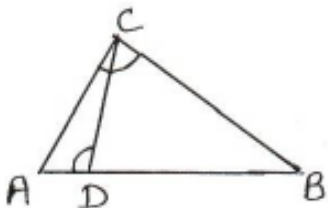
OR

The present age of a father is 3 years more than three times the age of his son. Three years later, the father's age will be 10 years more than twice the age of the son. Determine their present ages.

Section – D

Section D consists of 4 questions of 5 marks each.

32. In the given figure, $\angle ADC = \angle BCA$. Prove that $\triangle ACB \sim \triangle ABC$. Hence, find BD if $AC = 8$ cm and $AD = 3$ cm.



33. The angles of depression of the top and bottom of a building 50 metres high as observed from the top of a tower are 30° and 60° respectively. Find the height of the tower and also the horizontal distance between the building and the tower. (Use $\sqrt{3} = 1.732$)

OR

The angle of elevation of an aeroplane from a point on the ground is 60° . After a flight of 30 seconds, the angle of elevation changes to 30° . If the plane is flying at a constant height of $3600\sqrt{3}$ m, find the speed in km/hr of the plane.

34. The following distribution gives the daily income of 35 workers of a factory:

Daily income	Less than 120	Less than 140	Less than 160	Less than 180	Less than 200
Number of workers	5	16	24	31	35

Find the mode and median for the above distribution.

OR

If the mean of the following frequency distribution is 54, find the value of p . Hence, find the median of the distribution.

Class	Frequency
0 – 20	7
20 – 40	p
40 – 60	10
60 – 80	9
80 – 100	13

35. Prove that the lengths of the tangents drawn from an external point of a circle are equal.

Hence prove the following: A circle touches all the four sides of a quadrilateral ABCD, then $AB + CD = AD + BC$.

Section – E

Section E consists of 3 case study based questions of 4 marks each.

36. An interior designer, Sana, hired two painters, Manan and Bhima to make paintings for her buildings. Both painters were asked to make 50 different paintings each. The prices quoted by both the painters are given below:

Manan asked for ₹ 6000 for the first painting, and an increment of ₹ 200 for each following painting.

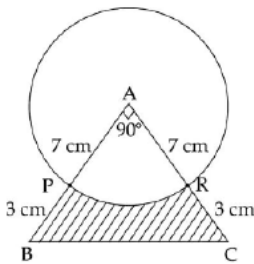
Bhima asked for ₹ 4000 for the first painting, and an increment of ₹ 400 for each following painting.

- (i) How much money did Manan get for his 25th painting? Show your work.
- (ii) How much money did Bhima get in all? Show your work.
- (iii) If both Manan and Bhima make paintings at the same price, find the first painting for which Bhima will get more money than Manan. Show your steps.

OR

Sana's friend, Aarti hired Manan and Bhima to make paintings for her at the same rates as for Sana. Aarti had both painters make the same number of paintings and paid them the exact same amount in total. How many paintings did Aarti get each painter to make? Show your work.

37. To honour teachers on teachers' day, mementos are purchased. A memento is made as shown in the figure. Its base PBCR is silver plated from the front side at the rate of ₹ 500.



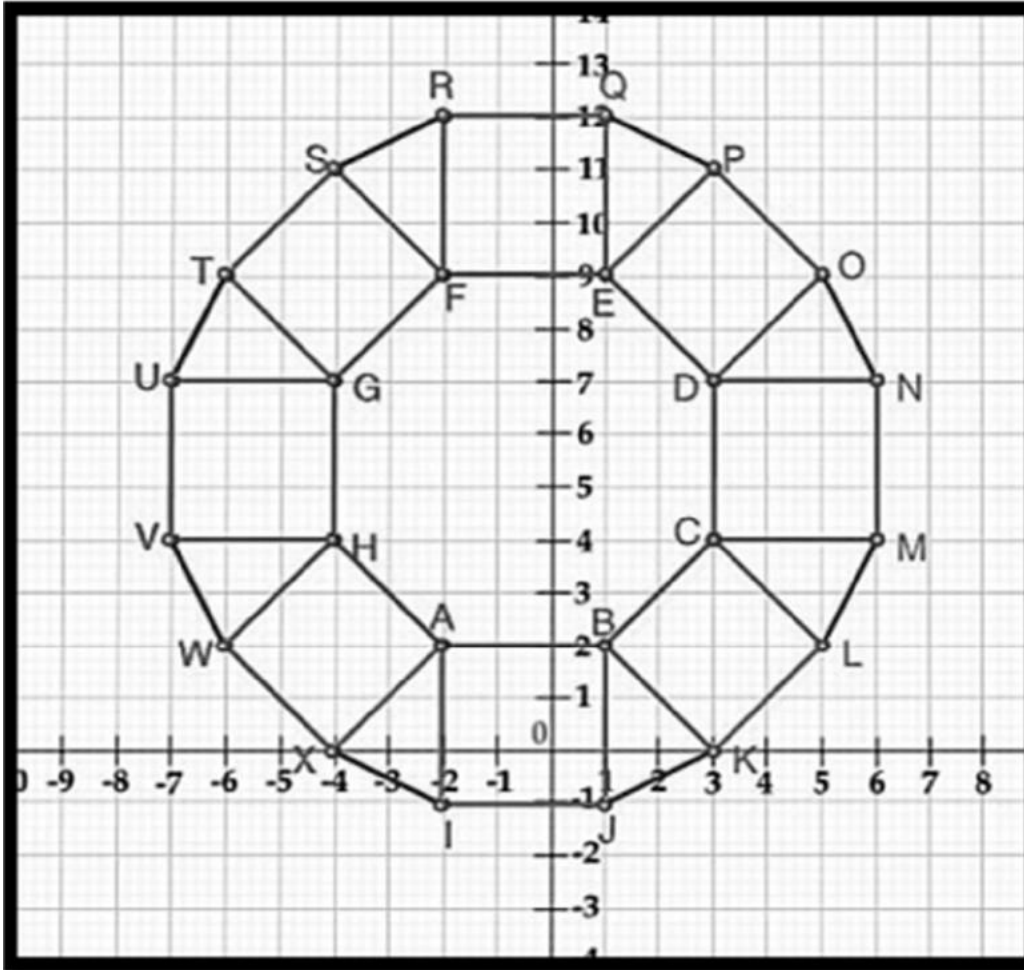
Answer the questions based on the above information.

- (i) Find the area of the sector APR.
- (ii) Find the cost of silver plating.
- (iii) Find the area which is silver plated.

OR

Find the perimeter of PRCB.

38. A tiling or tessellation of a flat surface is the covering of a plane using one or more geometric shapes, called tiles, with no overlaps and no gaps. You may find tessellation patterns on floors, walls, paintings etc. Shown below is a tiled floor in the archeological Museum of Seville, made using squares, triangles and hexagons.



Answer the following questions:

- (i) What is the length of the line segment joining points C and F?
- (ii) Find the midpoint of the line segment joining the points A and F using midpoint formula.
- (iii) If F divides the line joining A and R in the ratio $k : 1$, find the value of k using Section formula.

OR

If a point (x, y) is equidistant from F and C, find a relation in terms of x and y .