

General Instructions:

1. This question paper has 5 sections A, B, C, D and E.
2. Section A has 20 Multiple Choice Questions (MCQs) carrying 1 mark each.
3. Section B has 5 Short Answer type questions carrying 2 marks each.
4. Section C has 6 Short Answer type questions carrying 3 marks each.
5. Section D has 4 Long Answer type questions carrying 5 marks each.
6. In Section E, question number 36 to 38 are case study based questions, carrying 4 marks each. Internal choice is provided in 2 marks questions in each case study.
7. All questions are compulsory. However, an internal choice in 2 questions of 2 marks, 2 questions of 3 marks and 2 questions of 5 marks has been provided in the 2 marks questions of Section E.
8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$, wherever required if not stated.

Section – A

Section A consists of 20 questions of 1 mark each.

1. 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. $\frac{\theta}{180^\circ} \times \pi r^2$
2. 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
3. Mode and mean of a data are 24 and 30. Median of the data is:
a. 14 b. 20 c. 28 d. 26
4. 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.
5. A three digit number is chosen. The probability that all three digits are same is:

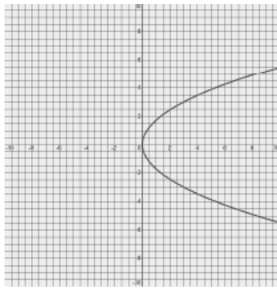
- a. $\frac{1}{100}$ b. $\frac{99}{100}$ c. $\frac{11}{900}$ d. 0

6. 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:

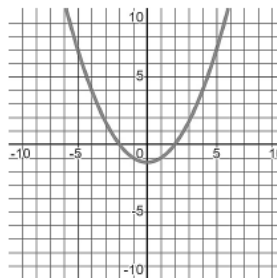
- a. 160 m b. 40 m c. 100 m d. 115 m

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

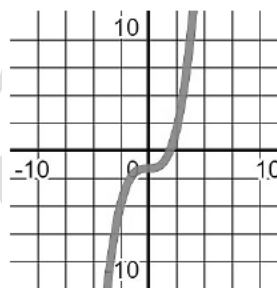
a.



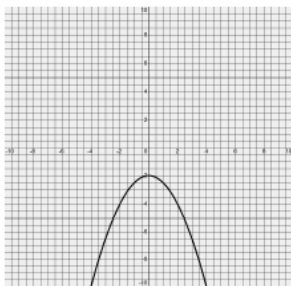
b.



c.



d.

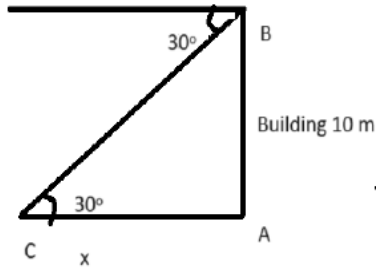


8. For what value of k , the following pair of linear equations $2x + 3y + 5 = 0$ and $kx + 4y = 10$ has a unique solution?
- a. $k = \frac{8}{3}$ b. $k \neq \frac{8}{3}$ c. $k = 3$ d. $k \neq 3$
9. Which of the following equations has no real roots?
- a. $x^2 - 4x + 4 = 0$
 b. $x^2 - 4x = 0$
 c. $3x^2 - 1 = 0$
 d. $x^2 + 1 = 0$
10. In an A.P., if $a = 3.5, d = 0, n = 101$, then a_n will be:
- a. 0 b. 3.5 c. 103.5 d. 104.5
11. In ΔABC , 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
12. 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. $x^2 + 2x + 2$
13. If $P(1, 2), Q(4, 6), R(5, 7), S(m, n)$ are the vertices of a parallelogram PQRS, then:
- a. $m = 2, n = 4$
 b. $m = 3, n = 4$
 c. $m = 2, n = 3$
 d. $m = 3, n = 5$
14. $\sin 2A = 2 \sin A$ is true, when $A =$
- a. 0° b. 30° c. 45° d. 60°
15. $8 \cot^2 A - 8 \operatorname{cosec}^2 A =$
- a. 1 b. 8 c. -1 d. -8
16. Which term of the A.P.: $20, 19\frac{1}{4}, 18\frac{1}{2}, 17\frac{3}{4}, \dots$ is the first negative term?

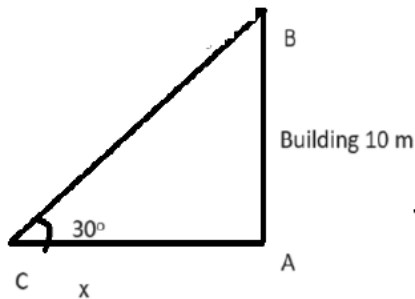
- a. 27th b. 28th c. 26th d. 25th

17. Which of the following figure is correct for the question: From the top of a building of height 10 m, the angle of elevation of an object on the ground is 30° . If the distance of the object from the building is x , then find x .

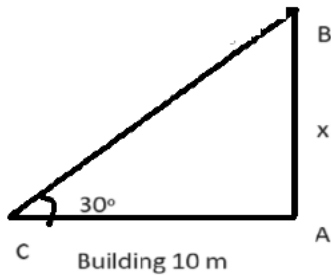
a.



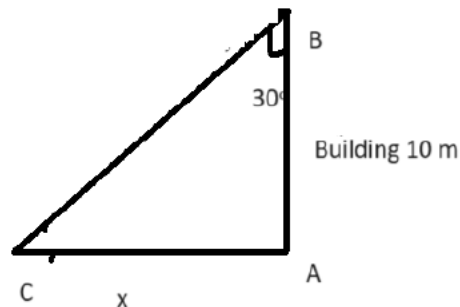
b.



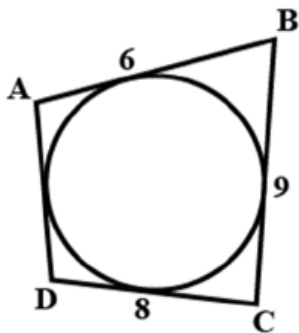
c.



d.



18. A circle touches all the four sides of a quadrilateral ABCD. If $AB = 6$ cm, $BC = 9$ cm and $CD = 8$ cm, then the length of the side AD is:



- a. 9 cm b. 3 cm c. 7 cm d. 5 cm

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.

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

19. $P(-2, 5)$ and $Q(2, -1)$ are two points on the coordinate plane.

Assertion (A): The midpoint $(0, 2)$ is the only point equidistant from P and Q.

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

20. 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.

Assertion (A): 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. 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.



22. Find two consecutive positive integers, sum of whose squares is 365.
 23. Find the sum of odd numbers between 0 and 50.

OR

If the sum of first n terms of an A.P. is $4n - n^2$, find its n^{th} term.

24. Three cubes each of side 4 cm are joined end to end. Find the surface area of the resulting cuboid.
 25. An army contingent of 1000 members is to march behind an army band of 56 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march?

OR

Check whether the statement given is true or false:

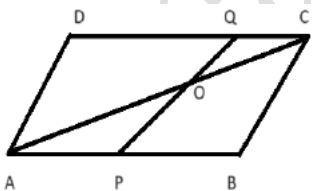
The square root of every composite number is rational.

Justify your answer by proving the rationality or irrationality as applicable.

Section – C

Section C consists of 6 questions of 3 marks each.

26. 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 $BD = BC$.

27. Given that $\sqrt{3}$ is an irrational number. Prove that $5 + 2\sqrt{3}$ is an irrational number.
 28. Find the zeroes of the quadratic polynomial $6x^2 - 3 - 7x$ and verify the relationship between the zeroes and the coefficients of the polynomial.

29. (6, 0) and (0, 2) are two points of intersection of two lines represented by a pair of linear equations.
- How many points of intersection does the pair of linear equations have in total? Justify your answer.
 - Find the equation that represents one of the lines of the above pair. Show your work.
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. Prove that: $(1 + \cot A - \operatorname{cosec} A)(1 + \tan A + \sec A) = 2$

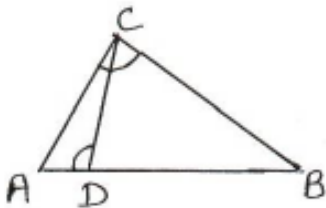
OR

Prove that: $\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \tan \theta + \cot \theta$

Section – D

Section D consists of 4 questions of 5 marks each.

32. Prove that the radius of a circle is perpendicular to the tangent at the point of contact. Hence, prove the following: The tangents at the end points of a chord of a circle make equal angles with chord.
33. 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.



34. The angle of elevation of the top Q of a vertical tower PQ from a point X on the ground is 60° . At a point Y, 40 m vertically above X, the angle of elevation is 45° . Find the height of the tower PQ. (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 $3600\sqrt{3} \text{ m}$, find the speed in km/hr of the plane.

35. 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 of the above distribution.

OR

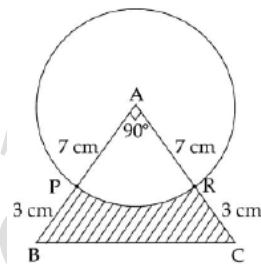
If the median of the following frequency distribution is 32.5, find the values of f_1 and f_2 .

C.I.	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	Total
Frequency	f_1	5	9	12	f_2	3	2	40

Section – E

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

36. 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.

- Find the area of the sector APR.
- Find the cost of silver plating.
- Find the area which is silver plated.

OR

Find the perimeter of PRCB.

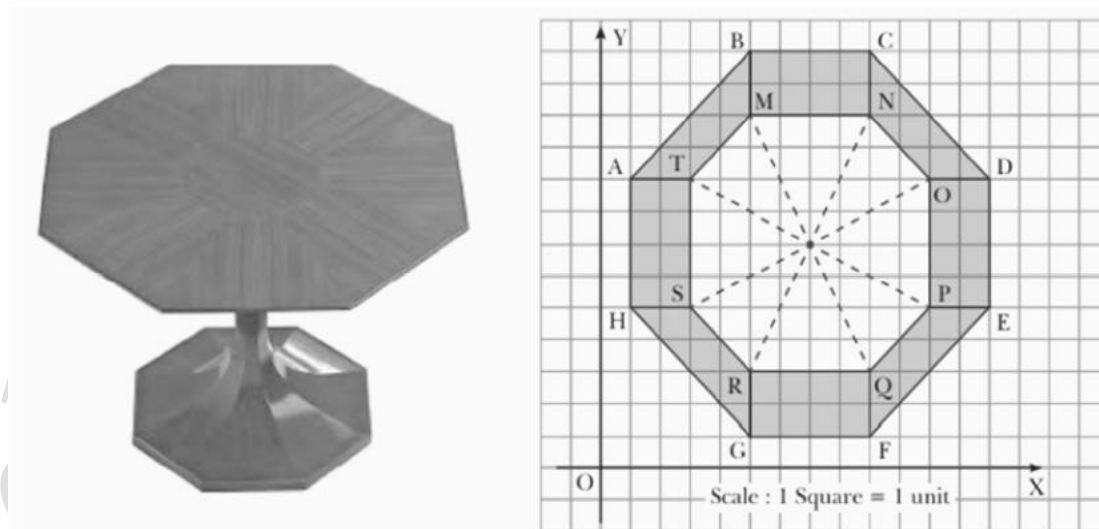
37. An interior designer, Sana, hired two painters, Manan and Bhima to make paintings for her buildings. Both painters were asked to make 50 different paintings each. The prices quoted by both the painters are given below:
 Manan asked for ₹ 6000 for the first painting, and an increment of ₹ 200 for each following painting.
 Bhima asked for ₹ 4000 for the first painting, and an increment of ₹ 400 for each following painting.

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

38. Tables are arranged in a party. The top of a table is shown in the figure given below.



Answer the following questions:

- If a vase is placed exactly at the midpoint of the line segment joining H and E, find the coordinates of the position of the vase using midpoint formula.
- Find the distance between A and C.
- If R divides the line joining G and M in the ratio $k : 1$, find the value of k using Section formula.

OR

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

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