D A V PUBLIC SCHOOL , SECTOR 8-C , CHANDIGARH
PRE-BOARD II, CLASS : X [MATHEMATICS] 2023-24

Time: 3 Hours **M.M. 80**

General Instructions:

1. This Question Paper has 5 Sections A-E.
2. Section **A** has 20 MCQs carrying 1 mark each
3. Section **B** has 5 questions carrying 02 marks each.
4. Section **C** has 6 questions carrying 03 marks each.
5. Section **D** has 4 questions carrying 05 marks each.
6. Section **E** has 3 case based integrated units of assessment (04 marks each)
7. All Questions are compulsory.
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. If two positive integers m and n are written as $m = a^5b$ and $n = a^2b^3$; a and b are prime numbers, then HCF (m, n) is:
(a) a^5b^3 (b) a^2b (c) ab^3 (d) a^5b

2. If $\tan(3x + 30^0) = 1$ then the value of x will be:
(a) 5^0 (b) 15^0 (c) 20^0 (d) 45^0

3. If a card is selected from a deck of 52 cards, then the probability of its being a red face card is
(a) $\frac{4}{26}$ (b) $\frac{2}{26}$ (c) $\frac{3}{26}$ (d) $\frac{3}{52}$

4. Each root of $x^2 - bx + c = 0$ is decreased by 2. The resulting equation is $x^2 - 2x + 1 = 0$, then
(a) $b = 6, c = 9$ (b) $b = 3, c = 5$ (c) $b = 2, c = +1$ (d) $b = -4, c = 3$

5. If $A\left(\frac{m}{3}, 5\right)$ is the mid-point of the line segment joining the points Q(– 6, 7) and R(– 2, 3), then the value of m is
(a) – 12 (b) – 4 (c) 12 (d) – 6

6. Which term of an AP, 21, 42, 63, 84, ... is 210?
(a) 9th (b) 10th (c) 11th (d) 12th

7. The quadratic polynomial, the sum of whose zeroes is – 5 and their product is 6, is
(a) $x^2 + 5x + 6$ (b) $x^2 - 5x + 6$ (c) $x^2 - 5x - 6$ (d) $- x^2 + 5x + 6$

8. Which of the following cannot be the probability of an event?
(a) $\frac{4}{26}$ (b) 57.06% (c) 0.005 (d) $\frac{7}{6}$

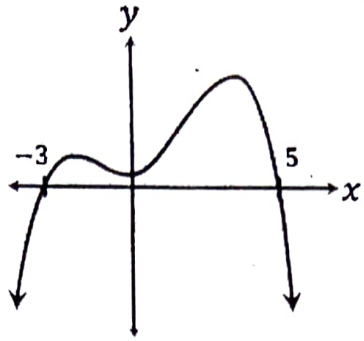
9. Volumes of two spheres are in the ratio 64 : 27. The ratio of their surface areas is
(a) 3 : 4 (b) 4 : 3 (c) 9 : 16 (d) 16 : 9

10. If the angle of depression of an object from a 75 m high tower is 30^0, then the distance of the object from the tower is

(a) $25\sqrt{3}$ m (b) $50\sqrt{3}$ m (c) $75\sqrt{3}$ m (d) 150 m

11. Graph of a polynomial $p(x)$ is given in the figure. The number of zeroes of $p(x)$ is :

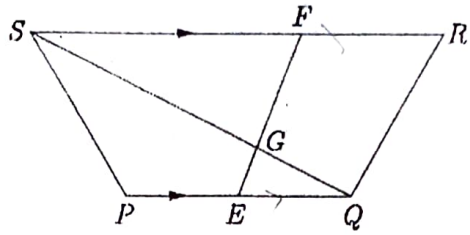
(a) – 3 and 5 (b) 2 (c) 3 (d) 4



12. In the figure, PQRS is a trapezium in which PQ || RS. On PQ and RS, there are points E and F respectively such that EF intersects SQ at *G*. Which one is true with respect to the figure?

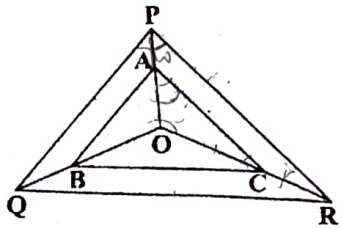
(a) EQ × GQ = GS × FS (b) SF × GE = QE × GS

(c) EQ × GS = GQ × FS (d) EQ × GS = GQ × FS



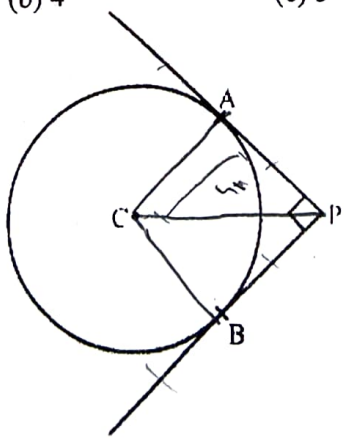
13. In the given fig., A, B and C are points on OP, OQ and OR respectively such that AB || PQ and AC || PR. If PA = 3 cm, AO = 4 cm. then OC : OR equals:

(a) 4 : 7 (b) 7 : 4 (c) 3 : 7 (d) 7 : 3



14. PA and PB are two tangents drawn from an external point P to a circle with centre C and radius 4 cm. If PA ⊥ PB, then the length of each tangent (in cm) is

(a) 3 (b) 4 (c) 5 (d) 6



15. If in Δ ABC and Δ PQR, we have $\frac{AB}{QR} = \frac{BC}{PR} = \frac{CA}{PQ}$ then:

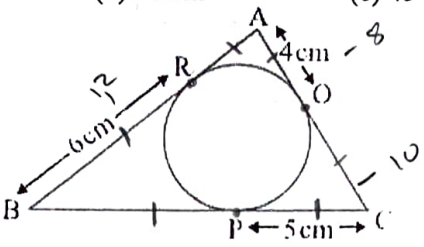
(a) ΔPQR ~ ΔCAB (b) ΔPQR ~ ΔABC (c) ΔCBA ~ ΔPQR (d) ΔBCA ~ΔPQR

16. For what value of k, do the equations $3x - y + 8 = 0$ and $6x - ky = -16$ represent coincident lines?

(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) 2 (d) – 2

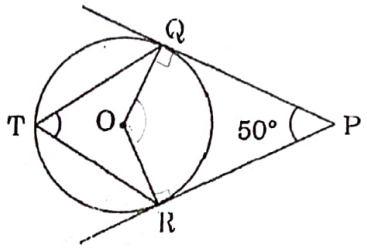
17. In the given fig., the perimeter of ΔABC is :

(a) 15 cm (b) 30 cm (c) 45 cm (d) 60 cm



18. From a point P, two tangents PQ and PR are drawn to a circle with centre at O. T is a point on the major arc QR of the circle. If ∠QPR = 50^0, then ∠QTR equals :

(a) 50^0 (b) 130^0 (c) 65^0 (d) 90^0



DIRECTION: In the question number 19 and 20, a statement of **assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option.

19. ***Statement A (Assertion):*** A tangent to a circle is perpendicular to the radius through the point of contact.

Statement R (Reason): The lengths of tangents drawn from an external point to a circle are equal.

(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.

Statement A (Assertion): The system of linear equations $3x + 5y - 4 = 0$ and $15x + 25y - 25 = 0$ is inconsistent

Statement R (Reason): The pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ is inconsistent if $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

(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)

SECTION – B

Section B consists of 5 questions of 2 marks each

21. Find a point P on x -axis equidistant from the points A (–1, 0) and B (5, 0).

OR

Find the co-ordinate of the point dividing the line segment joining the points A (1, 3) and B (4, 6) in the ratio 2 : 1.

22. In ΔACB, $\angle C = 90^0$, AB = 29 units, BC = 21 units and $\angle ABC = \theta$. Determine the value of $\cos^2\theta - \sin^2\theta$

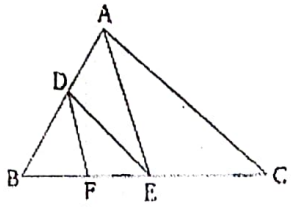
23. Find the LCM of 92 and 510, using prime factorisation.

24. Solve the following pair of linear equations : $x - y = 3$; $\frac{x}{3} + \frac{y}{2} = 6$

OR

The difference between two numbers is 26 and one number is three times the other. Find them.

25. In the given fig., DE || AC and DF || AE. Prove that $\frac{BF}{FE} = \frac{BE}{EC}$



SECTION – C

Section C consists of 6 questions of 3 marks each.

26. Prove that $\sqrt{\frac{\text{cosec}A - \cot A}{\text{cosec}A + \cot A}} = \frac{1 - \cos A}{\sin A}$.

OR

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

27. Find the coordinates of the points of trisection of the line segment joining (4, –1) and (–2, –3).

28. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

29. If α and β are zeroes of the quadratic polynomial $2x^2 - 5x + 1$, then find a quadratic polynomial whose zeroes are $\alpha + 1$ and $\beta + 1$.

30. Given that $\sqrt{2}$ is irrational, prove that $5 + 3\sqrt{2}$ is an irrational number.

31. AD and PM are medians of triangles ABC and PQR, respectively where $\Delta ABC \sim \Delta PQR$, prove that $\frac{AB}{PQ} = \frac{AD}{PM}$.

OR

A girl of height 90 cm is walking away from the base of a lamp-post at a speed of 1.2 m/s. If the lamp is 3.6 m above the ground, find the length of her shadow after 4 seconds.

SECTION – D

Section C consists of 4 questions of 5 marks each.

32. The denominator of a fraction exceeds its numerator by 3. If one is added to both numerator and denominator, the difference between the new and the original fraction is $\frac{1}{24}$. Find the original fraction.

OR

A piece of cloth costs ₹35. If the piece was 4 meters longer and each meter costs ₹1 less, the cost would remain unchanged. How long is the piece?

33. A solid wooden toy is in the shape of a right circular cone mounted on a hemisphere of same radius. If the radius of the hemisphere is 4·2 cm and the total height of the toy is 10·2 cm, find the volume of the wooden toy. Also, find the total surface area of the toy.

34. If the total frequency is 100 and median is 30, find the missing frequencies.

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
No. of students	10	x	25	30	y	10

35. A pole 5 m high is fixed on the top of a tower. The angle of elevation of the top of the pole observed from a point A on the ground is 60^0 and the angle of depression of the point A from the top of the tower is 45^0. Find the height of the tower.

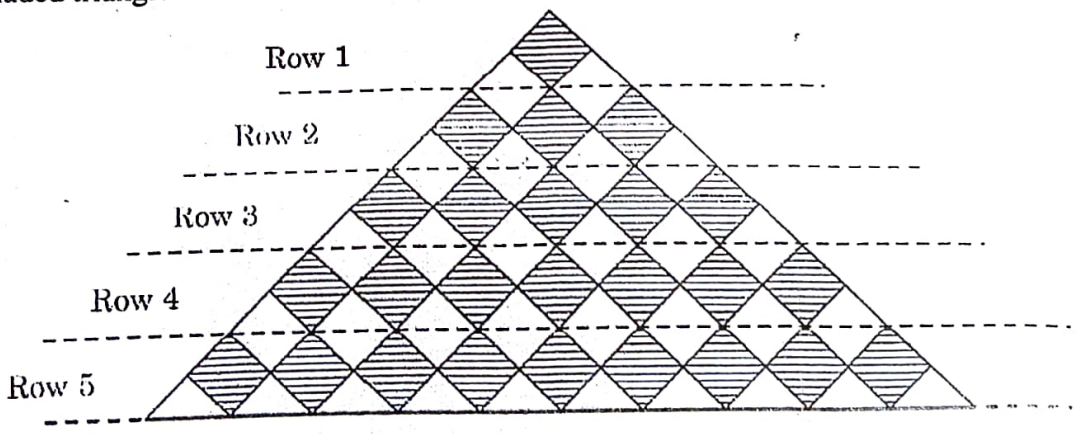
Or

From the top of a building AB, 60 m high, the angle of depression of the top and bottom of a vertical lamp post CD are observed to be 30^0 and 60^0 respectively. Find (a) the horizontal distance between AB and CD; (b) the height of the lamp post CD.

SECTION – E

Case Study based questions

36. A fashion designer is designing a fabric pattern. In each row, there are some shaded squares and unshaded triangles.



Based on the above, answer the following questions :

(i) Identify A.P. for the number of squares in each row. 1

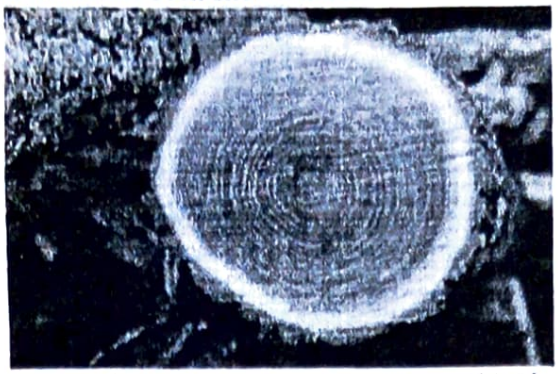
(ii) Identify A.P. for the number of triangles in each row. 1

(iii) (a) If each shaded square is of side 2 cm, then find the shaded area when 5 rows have been designed. 2

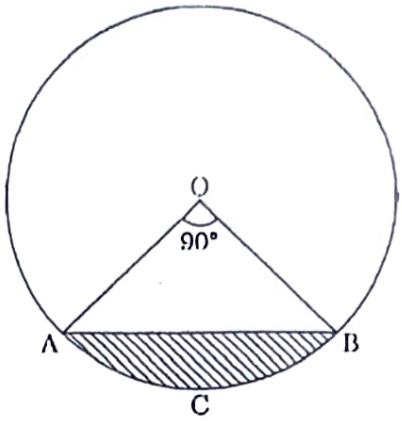
OR

(iii) (b) With respect to triangles; find S_{10}. 2

37. **Age of a tree :** The most accurate way to determine the age of a tree is to count the annual rings of wood growth. One such trunk has been shown here.



To make an identification mark, the forest department has painted segment ACBA. (See diagram) If chord AB makes an angle 90° at the centre and radius of the trunk is 21 cm, then find the :



(i) length of chord AB. 1

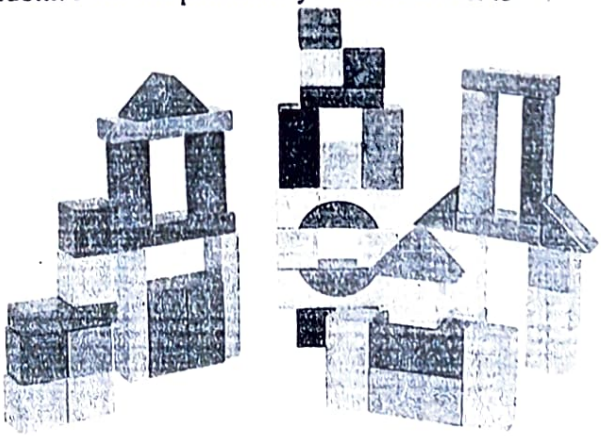
(ii) area of OAB. 1

(iii) (a) area of segment ACBA. 2

OR

(iii) (b) perimeter of sector OACBO. 2

38. Prateek goes to a toy shop to purchase a building block kit for his son. He found that the kit contains 120 blocks, of which 40 are red, 25 are blue, 30 are green and the rest are yellow. His son picks up a block at random. Find the probability that the block is



(i) of red colour. 1

(ii) of yellow colour. 1

(iii) either of green colour or blue colour. 2

OR

(iv) of all colour except red colour. 2

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