

# PRE-BOARD EXAMINATION

Class- X (2024-25)  
MATHEMATICS

MM: 80

TIME: 3hrs

## General Instructions:

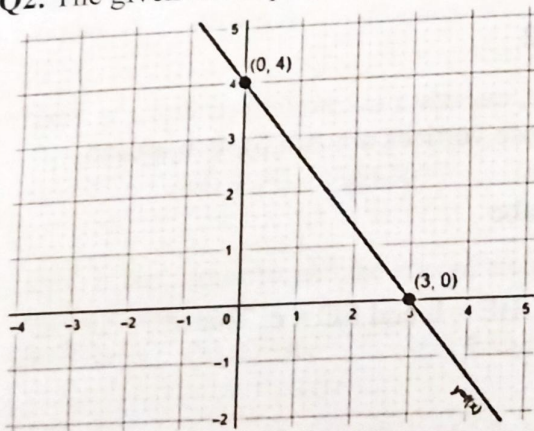
1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub- parts of the values of 1, 1 and 2 marks each respectively.

## Section A

Q1. If two positive integers  $a$  and  $b$  are written as  $a = x^3y^2$  and  $b = xy^3$ , where  $x, y$  are prime numbers, then the result obtained by dividing the product of the positive integers by the LCM  $(a, b)$  is

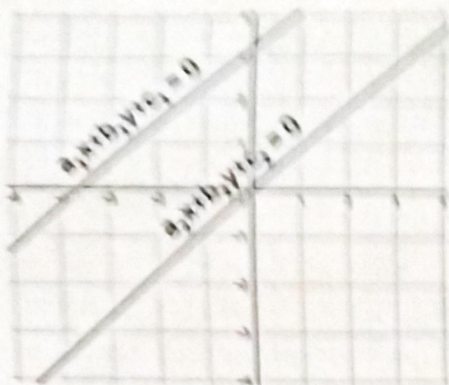
- (a)  $xy$       (b)  $xy^2$       (c)  $x^3y^3$       (d)  $x^2y^2$

Q2. The given linear polynomial  $y = f(x)$  has



- (a) 2 zeros      (b) 1 zero and the zero is '3'
- (c) 1 zero and the zero is '4'      (d) No zero

Q3. The lines representing the given pair of linear equations are non-intersecting. Which of the following statements is true?



- (a)  $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$  (b)  $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$  (c)  $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} = \frac{c_1}{c_2}$  (d)  $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

**Q4.** The nature of roots of the quadratic equation  $9x^2 - 6x - 2 = 0$  is:

- (a) No real roots (b) 2 equal real roots (c) 2 distinct real roots (d) More than 2 real roots

**Q5.** Two APs have the same common difference. The first term of one of these is  $-1$  and that of the other is  $-8$ . The difference between their 4th terms is

- (a) 1 (b)  $-7$  (c) 7 (d) 9

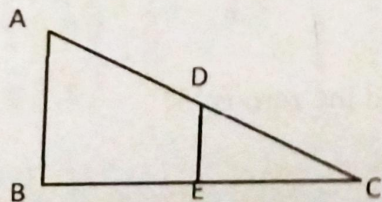
**Q6.** What is the ratio in which the line segment joining  $(2, -3)$  and  $(5, 6)$  is divided by x-axis?

- (a) 1:2 (b) 2:1 (c) 2:5 (d) 5:2

**Q7.** If origin is the centroid of a triangle whose vertices are  $A(a, b)$ ,  $B(b, c)$  and  $C(c, a)$ , then the value of  $a^3 + b^3 + c^3$  is

- (a)  $3ab$  (b)  $3bc$  (c)  $3ca$  (d)  $3abc$

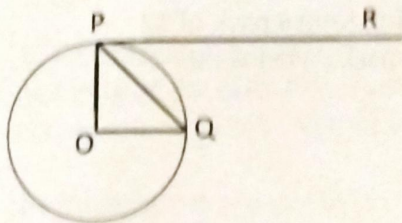
**Q8.** In  $\Delta ABC$ ,  $DE \parallel AB$ . If  $AB = a$ ,  $DE = x$ ,  $BE = b$  and  $EC = c$ . Then  $x$  expressed in terms of  $a$ ,  $b$  and  $c$  is:



- (a)  $\frac{ac}{b}$  (b)  $\frac{ac}{b+c}$  (c)  $\frac{ab}{c}$  (d)  $\frac{ab}{b+c}$

**Q9.** If  $O$  is centre of a circle and Chord  $PQ$  makes an angle  $50^\circ$  with the tangent

PR at the point of contact P, then the angle subtended by the chord at the centre is



- (a)  $130^\circ$     (b)  $100^\circ$     (c)  $50^\circ$     (d)  $30^\circ$

**Q10.** A quadrilateral PQRS is drawn to circumscribe a circle. If  $PQ = 12$  cm,  $QR = 15$  cm and  $RS = 14$  cm, then find the length of  $SP$  is

- (a) 15 cm    (b) 14 cm    (c) 12 cm    (d) 11 cm

**Q11.** Given that  $\sin \theta = \frac{a}{b}$ , then  $\cos \theta$  is.

- (a)  $\frac{b}{\sqrt{b^2-a^2}}$     (b)  $\frac{b}{a}$     (c)  $\frac{\sqrt{b^2-a^2}}{b}$     (d)  $\frac{a}{\sqrt{b^2-a^2}}$

**Q12.**  $(\sec A + \tan A)(1 - \sin A)$  equals:

- (a)  $\sec A$     (b)  $\sin A$     (c)  $\operatorname{cosec} A$     (d)  $\cos A$

**Q13.** If a pole 6 m high casts a shadow  $2\sqrt{3}$  m long on the ground, then the Sun's elevation is

- (a)  $60^\circ$     (b)  $45^\circ$     (c)  $30^\circ$     (d)  $90^\circ$

**Q14.** If the perimeter and the area of a circle are numerically equal, then the radius of the circle is

- (a) 2 units    (b)  $\pi$  units    (c) 4 units    (d) 7 units

**Q15.** There is a square board of side '2a' units circumscribing a red circle. Jayadev is asked to keep a dot on the above said board. The probability that he keeps the dot on the shaded region is.



- (a)  $\frac{\pi}{4}$  (b)  $\frac{4-\pi}{4}$  (c)  $\frac{\pi-4}{4}$  (d)  $\frac{4}{\pi}$

**Q16.** 2 cards of hearts and 4 cards of spades are missing from a pack of 52 cards. A card is drawn at random from the remaining pack. What is the probability of getting a black card?

- (a)  $\frac{22}{52}$  (b)  $\frac{22}{46}$  (c)  $\frac{24}{52}$  (d)  $\frac{24}{46}$

**Q17.** The upper limit of the modal class of the given distribution is:

Height (in cm)	Below 140	Below 145	Below 150	Below 155	Below 160	Below 165
Number of girls	4	11	29	40	46	51

- (a) 165 (b) 160 (c) 155 (d) 150

**Q18.** If from a point A which is at a distance of 13 cm from the centre O of a circle of radius 5 cm, the pair of tangent AB and AC to the circle are drawn, then the area of quadrilateral ABOC is

- (a) 60 cm<sup>2</sup> (b) 120 cm<sup>2</sup> (c) 50 cm<sup>2</sup> (d) 80 cm<sup>2</sup>

**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

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion  
(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.

**Q19. Assertion:** Total Surface area of the top is the sum of the curved surface area of the hemisphere and the curved surface area of the cone.

**Reason :** Top is obtained by joining the plane surfaces of the hemisphere and cone together.

**Q20. Assertion:** , -5, -5/2, 0, 5/2.... is in Arithmetic Progression.

**Reason :** The terms of an Arithmetic Progression cannot have both positive and negative rational numbers.

**Section B**

**Q21.** The H.C.F of 85 and 238 is expressible in the form  $85m - 238$ . Find the value of  $m$ .

**Q22.** (A) Jayanti throws a pair of dice and records the product of the numbers appearing on the dice. Pihu throws 1 dice and records the squares of the number that appears on it. Who has the better chance of getting the number 36? Justify.

OR

(B) An integer is chosen between 70 and 100, Find the probability that it is (a) prime number (b) divisible by 7

**Q23.** If  $\tan(A + B) = \sqrt{3}$  and  $\tan(A - B) = \frac{1}{\sqrt{3}}$ ;  $0^\circ < A + B < 90^\circ$ ;  $A > B$ , find  $A$  and  $B$ .

**Q24.** Find the coordinates of the point  $P$  which divides the join of  $A(-2,5)$  and  $B(3,-5)$  in the ratio 2:3.

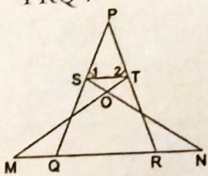
**Q25.** (A) Find the zeroes of the following polynomial:  $5\sqrt{5}x^2 + 30x + 8\sqrt{5}$ .

OR

(B) If the sum and product of the roots of the equation  $kx^2 + 6x + 4k = 0$  are equal. Find  $k$

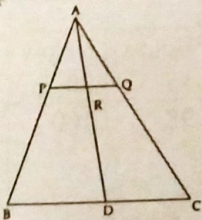
**Section C**

**Q26.** In given figure  $\angle 1 = \angle 2$  and  $\triangle NSQ \cong \triangle MTR$ , then prove that  $\triangle PTS \sim \triangle PRQ$ .



OR

In  $\triangle ABC$ ,  $P$  and  $Q$  are points on  $AB$  and  $AC$  respectively such that  $PQ$  is parallel to  $BC$ . Prove that the median  $AD$  drawn from  $A$  on  $BC$  bisects  $PQ$ .



**Q27.** If  $(1, p/3)$  is the mid-point of the line segment joining the points  $(2, 0)$  and

(0, 2/3), then show that the line  $5x + 3y + 2 = 0$  passes through the point  $(-1, 3p)$ .

**Q28.** If  $\alpha, \beta$  are zeroes of quadratic polynomial  $5x^2 + 5x + 1$ , find the value of  
 (i)  $\alpha^2 + \beta^2$  (ii)  $\alpha^{-1} + \beta^{-1}$

**Q29.** (A) If  $\sin\theta + \cos\theta = \sqrt{2}$ , then evaluate :  $\tan\theta + \cot\theta$ .  
 OR

(B) Prove that  $\frac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \operatorname{cosec} A + \cot A$ .

**Q30.** (A) Sides of a right triangular field are 25m, 24m and 7m. At the three corners of the field, a cow, a buffalo and a horse are tied separately with ropes of 3.5 m each to graze in the field. Find the area of the field that cannot be grazed by these animals.

OR

(B) AB is a chord of a circle centred at O such that  $\angle AOB = 60^\circ$ . If  $OA = 14$  cm then find the area of the minor segment. (take  $\sqrt{3} = 1.73$ )

**Q31.** Prove that  $5 + \sqrt{7}$  is irrational.

### Section D

**Q32.** (A) The median of the following data is 525. Find the values of x and y, if the total frequency is 100.

Class interval	0 - 100	100- 200	200- 300	300- 400	400- 500	500- 600	600- 700	700- 800	800- 900	900- 1000
Frequency	2	5	x	12	17	20	y	9	7	4

OR

(B) A life insurance agent found the following data for distribution of ages of 100 policy holders. Calculate the median age, if policies are given only to persons having age 18 years onwards but less than 60 year.

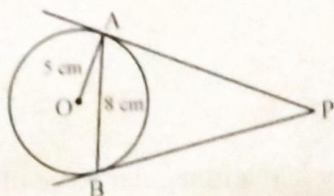
Age (in years)	Below 20	Below 25	Below 30	Below 35	Below 40	Below 45	Below 50	Below 55	Below 60
Number of policy holders	2	6	24	45	78	89	92	98	100

**Q33. (A)** An aeroplane flying horizontally at a height of 2500 m above the ground is observed at an elevation of  $60^\circ$  and after 15 s, the elevation is observed to be  $30^\circ$ . Find the speed (in km/h) of the aeroplane.

OR

**(B)** As observed from the top of a 75 m high lighthouse from the sea level, the angles of depression of two ships are  $30^\circ$  and  $45^\circ$ . If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships (Use  $\sqrt{3} = 1.732$ )

**Q34.** Prove that the lengths of tangents drawn from an external point to a circle are equal.



In the given figure, AB is a chord of length 8 cm of a circle of radius 5 cm. The tangents to the circle at A and B intersect at P. Find the length of AP.

**Q35. (A)** The age of the father is twice the sum of the ages of his 2 children. After 20 years, his age will be equal to the sum of the ages of his children. Find the age of the father.

Or

**(B)** Sita Devi wants to make a rectangular pond on the road side for the purpose of providing drinking water for street animals. The area of the pond will be decreased by 3 square feet if its length is decreased by 2 ft. and breadth is increased by 1 ft. Its area will be increased by 4 square feet if the length is increased by 1 ft. and breadth remains same. Find the dimensions of the pond.

### Section E

**Q36.** Shrey wants to buy a car and plans to take a loan from the bank. He pays his total of Rs 11,80,000 by paying every month starting with the first instalments of Rs 10000. If he increases the instalment by Rs 1000 every month answer the following:

(i) Determine the AP.

(ii) what is the amount paid by Shrey in 30<sup>th</sup> instalment?

(iii) Determine the amount paid by Shrey in 35 instalments.

OR

Determine the amount paid in 40 instalments.

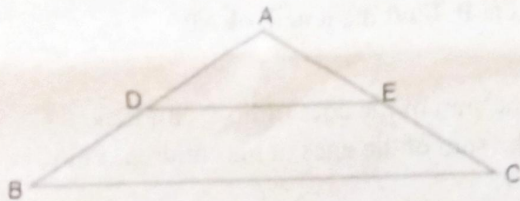
**Q37.** A metal Smith wants to make a vessel in the form of a hemispherical bowl mounted by a hollow cylinder. The diameter of the hemispherical part is 42 cm and the total height of the vessel is 63 cm. Based on above information answer the following:

- (i) find the height of the cylinder.
- (ii) find the inside surface area of the vessel.
- (iii) find the volume of the cylindrical part.

OR

Find the volume of the hemispherical part.

**Q38.** Read the following and answer: A farmer had a triangular piece of land. He put a fence, parallel to one of the sides of the field as shown in the figure.



- (i) If  $AD = 50\text{cm}$  and  $DB = 70\text{cm}$  then find  $AE/EC$ .
- (ii) If the point D is 20m away from A, where as AB and AC are 80m and 100m resp. then find the value of AE.
- (iii) show that  $\triangle ABC \sim \triangle ADE$

OR

If  $AD = x + 1$ ,  $DB = 3x - 1$ ,  $AE = x + 3$ ,  $EC = 3x + 4$ , then find the value of x.