

KENDRIYA VIDYALAYA SANGATHAN, ERNAKULAM REGION

PRE-BOARD EXAMINATION 2025-'26

MATHEMATICS [STANDARD] (041)

Class: X

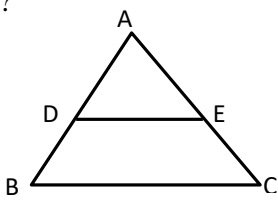
Duration: 3 hr.

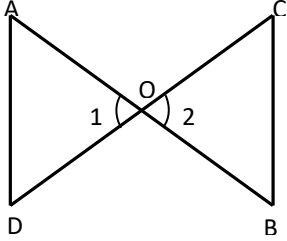
Max. Marks: 80

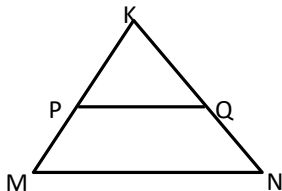
General instructions:

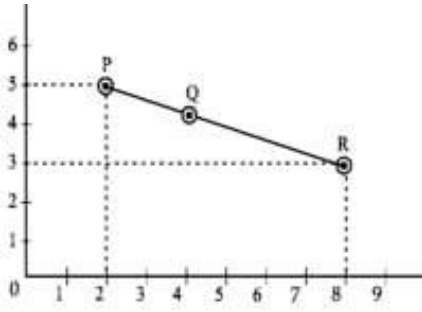


1. This Question Paper contains **38** questions.
2. This Question Paper has **5 Sections** – A, B, C, D and E.
3. Section A has **20 Multiple Choice type** questions of 1-mark each.
4. Section B has **5 Very Short Answer type** questions of 2-mark each.
5. Section C has **6 Short Answer type** questions of 3-mark each.
6. Section D has **4 Long Answer type** questions of 5-mark each.
7. Section E has **3 Case-based** questions of 4-mark each. An *internal choice* is provided in 2-mark questions in each case study.
8. An **internal choice** has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 3 questions in Section E.
9. Draw *neat diagrams* wherever required.
10. Take $\pi = \frac{22}{7}$ wherever required, if not stated.

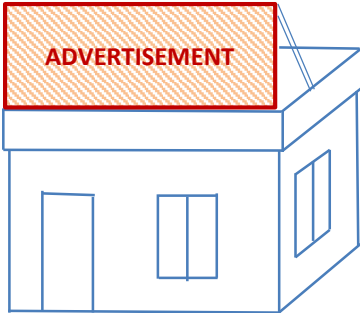

| Sl.No. | Section A | Mark |
|--------|---|----------|
| 1 | The sum of the exponents in the prime factorisation of 1764 is (a) 33 (b) 4 (c) 5 (d) 6 | 1 |
| 2 | If $\sin \theta + \cos \theta = p$ and $\sec \theta + \operatorname{cosec} \theta = q$, then $q(p^2 - 1) = \dots\dots$ (a) $2p$ (b) 2 (c) $\frac{2q}{p^2}$ (d) $\frac{q}{p^2}$ | 1 |
| 3 | The ratio of the HCF to LCM of 7, 21 and 28 is (a) 1:4 (b) 3:4 (c) 1:8 (d) 1:12 | 1 |
| 4 | If one zero of the polynomial $p(x) = (k^2 + 4)x^2 + 13x + 4k$ is the reciprocal of the other, then the value of k is (a) 2 (b) -2 (c) 1 (d) -1 | 1 |
| 5 | The roots of the quadratic equation $x^2 - 4px + 4p^2 - q^2 = 0$ are (a) $2p+q, 2p-q$ (b) $\frac{2p+q}{2}, \frac{2p-q}{2}$ (c) $\frac{p+q}{2}, \frac{p-q}{2}$ (d) $p+q, p-q$ | 1 |
| 6 | If the lines represented by the equations $3x - y - 5 = 0$ and $6x - 2y - p = 0$ are parallel then p is equal to (a) 5 (b) 6 (c) 10 (d) 4 | 1 |

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| 7 | <p>In the given figure, $DE \parallel BC$, $AE = a$ unit, $EC = b$ unit, $DE = x$ unit, $BC = y$ unit, which of the following is true?</p>  <p>(a) $x = \frac{a+b}{ay}$ (b) $y = \frac{ax}{a+b}$ (c) $x = \frac{ay}{a+b}$ (d) $\frac{x}{y} = \frac{a}{b}$</p> | 1 |
| 8 | <p>The points A (3, 1), B (5, 1), C (a, b), D (4, 3) are the vertices of a parallelogram ABCD. The values of a and b are respectively</p> <p>(a) $a = 6, b = 3$ (b) $a = 2, b = 1$ (c) $a = 4, b = 2$ (d) $a = 3, b = 6$</p> | 1 |
| 9 | <p>At one end A of diameter AB of a circle of radius 5 cm, a tangent XAY is drawn. The length of the chord CD parallel to XY and at a distance 8 cm from A is</p> <p>(a) 4 cm (b) 5 cm (c) 6 cm (d) 8 cm</p> | 1 |
| 10 | <p>If the distance between the points (2, -2) and (-1, x) is 5, one of the values of x is</p> <p>(a) -2 (b) 2 (c) -1 (d) 1</p> | 1 |
| 11 | <p>The radius of two concentric circles are 4 cm and 5 cm, then the length of each chord of one circle which is tangent to the other circle is</p> <p>(a) 5 cm (b) 6 cm (c) 9 cm (d) 1 cm</p> | 1 |
| 12 | <p>The area of the square that can be inscribed in a circle of radius 8 cm is</p> <p>(a) 256 cm^2 (b) 128 cm^2 (c) $64\sqrt{2} \text{ cm}^2$ (d) 64 cm^2</p> | 1 |
| 13 | <p>If a large circular pizza is divided into 5 equal sectors, then the central angle of each sector will be</p> <p>(a) 60° (b) 90° (c) 45° (d) 72°</p> | 1 |
| 14 | <p>If $\tan 3\theta = \sqrt{3}$, then $\frac{\theta}{2}$ is</p> <p>(a) 60° (b) 20° (c) 30° (d) 10°</p> | 1 |
| 15 | <p>If an arc subtends at an angle 90° at the centre of a circle, then the ratio of its length to the circumference of the circle is</p> <p>(a) 2:3 (b) 4:1 (c) 1:4 (d) 1:3</p> | 1 |
| 16 | <p>On a throw of a die if getting 6 is considered success, then probability of losing the game is</p> <p>(a) 0 (b) 1 (c) $\frac{1}{6}$ (d) $\frac{5}{6}$</p> | 1 |
| 17 | <p>The probability that a non-leap year selected at random will contain 53 Sundays is</p> <p>(a) $\frac{1}{7}$ (b) $\frac{2}{7}$ (c) $\frac{3}{7}$ (d) $\frac{5}{7}$</p> | 1 |

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| 18 | The mode and mean are 7 and 8, respectively. Then the median is (a) $\frac{1}{3}$ (b) $\frac{13}{3}$ (c) $\frac{23}{3}$ (d) 33 | 1 |
| | Question no. 19 and 20 contain a statement of Assertion (A) followed by a statement of Reason (R) . Select the correct answer out of the following choices. (a) Both (A) and (R) are true and (R) is the correct explanation of (A). (b) Both (A) and (R) are true but (R) is not the correct explanation of (A). (c) (A) is true but (R) is false. (d) (A) is false but (R) is true. | |
| 19 | Assertion (A): The number 5^n cannot end with the digit zero, where n is a natural number. Reason (R): A number ends with digit zero, if its prime factorization contains both 2 and 5. | 1 |
| 20 | Assertion (A): If $x = 2 \sin^2 \theta$ and $y = 2 \cos^2 \theta + 1$, then the value of $x + y = 3$. Reason (R): For any value of θ , $\sin^2 \theta + \cos^2 \theta = 1$ | 1 |
| | Section B | |
| 21 | Determine the A.P. whose 3 rd term is 16 and the 7 th term exceeds the 5 th term by 12. OR Find the number of natural numbers between 101 and 999 which are divisible by both 2 and 5. | 2 |
| 22 | In the given figure, $\frac{OA}{OC} = \frac{OD}{OB}$. Prove that $\angle A = \angle C$ and $\angle B = \angle D$.  | 2 |
| 23 | XY and MN are tangents drawn at the end points of the diameter DE of the circle with centre O. Prove that $XY \parallel MN$. | 2 |
| 24 | In a right-angled triangle ABC, $\tan B = \frac{12}{5}$. Find $\sin B$ and $\sec B$. | 2 |
| 25 | Find the area of quadrant of a circle whose circumference is 22 cm. OR A pendulum swings through an angle of 30° and describes an arc 8.8 cm in length. Find the length of the pendulum. | 2 |
| | Section C | |
| 26 | Prove that $\sqrt{3}$ is irrational. | 3 |
| 27 | Find the zeros of the polynomial $x^2 + \frac{1}{6}x - 2$ and verify the relation between the coefficient and the zeros of the polynomial. | 3 |

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| 28 | One year ago a man was 8-times as old as his son. Now his present age is equal to the square of his son's age. Find their present ages? | 3 |
| 29 | Prove that <i>the length of the tangents drawn from an external point to a circle are equal.</i> | 3 |
| 30 | Prove that $\frac{\sin \theta - 2 \sin^3 \theta}{2 \cos^3 \theta - \cos \theta} = \tan \theta$ OR Prove that $(\sin \theta + \operatorname{cosec} \theta)^2 + (\cos \theta + \sec \theta)^2 = 7 + \tan^2 \theta + \cot^2 \theta$ | 3 |
| 31 | Three different coins are tossed together. Find the probability of getting: (a) Exactly two heads (b) At least two tails (c) Exactly one head. OR Cards marked with numbers 3, 4, 5, 50 are placed in a bag and mixed thoroughly. One card is drawn at random from the bag. Find the probability that the number on the card drawn is: (a) Divisible by 7 (b) A perfect square (c) A multiple of 6. | 3 |
| Section D | | |
| 32 | Solve graphically the pair of linear equation $2x + y = 6$ and $2x - y + 2 = 0$. (a) Shade the region bounded by these lines and the x-axis. (b) Find the coordinates of the vertices of the triangular region formed by these lines and the x-axis. | 5 |
| 33 | (a) State and prove the Basic Proportionality theorem. (b) In the given figure, $PQ \parallel MN$. If $\frac{KP}{PM} = \frac{4}{13}$ and $KN = 20.4$ cm, then find KQ.  | 5 |
| 34 | A gulab jamun when ready for serving, the sugar syrup is about 30% of the total volume. Find approximately, how much syrup would be found in 45 gulab jamuns shaped like a cylinder with two hemispherical ends, if the complete length of each of the gulab jamun is 5 cm and its diameter is 2.8 cm. OR A solid is composed of a cylinder with hemispherical ends. If the whole length of the solid is 108 cm and the diameter of the hemispherical ends is 36 cm, find the cost of polishing the surface of the solid at the rate of 7 paise per sq.cm. | 5 |

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|---|--|---|---------|---------|----------|---------|----------|-----------|---|---|----|---|----|----------------|--------|---------|---------|---------|---------|---------|-----------|---|---|----|----|---|---|---|
| 35 | <p>If the mean of the following distribution is 54. Find the value of P.</p> <table><tr><td>Class interval</td><td>0 – 20</td><td>20 – 40</td><td>40 – 60</td><td>60 – 80</td><td>80 – 100</td></tr><tr><td>Frequency</td><td>7</td><td>P</td><td>10</td><td>9</td><td>13</td></tr></table> <p style="text-align: center;">OR</p> <p>If the median of the distribution given below is 28.5. Find the values of x and y if the total frequency is 60.</p> <table><tr><td>Class interval</td><td>0 – 10</td><td>10 – 20</td><td>20 – 30</td><td>30 – 40</td><td>40 – 50</td><td>50 – 60</td></tr><tr><td>Frequency</td><td>5</td><td>x</td><td>20</td><td>15</td><td>y</td><td>5</td></tr></table> | Class interval | 0 – 20 | 20 – 40 | 40 – 60 | 60 – 80 | 80 – 100 | Frequency | 7 | P | 10 | 9 | 13 | Class interval | 0 – 10 | 10 – 20 | 20 – 30 | 30 – 40 | 40 – 50 | 50 – 60 | Frequency | 5 | x | 20 | 15 | y | 5 | 5 |
| Class interval | 0 – 20 | 20 – 40 | 40 – 60 | 60 – 80 | 80 – 100 | | | | | | | | | | | | | | | | | | | | | | | |
| Frequency | 7 | P | 10 | 9 | 13 | | | | | | | | | | | | | | | | | | | | | | | |
| Class interval | 0 – 10 | 10 – 20 | 20 – 30 | 30 – 40 | 40 – 50 | 50 – 60 | | | | | | | | | | | | | | | | | | | | | | |
| Frequency | 5 | x | 20 | 15 | y | 5 | | | | | | | | | | | | | | | | | | | | | | |
| <p style="text-align: center;">Section E</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 36 | <p>Three friends Anil, Rajesh and Ravi of Class X decided to visit an Amusement Park during vacation. They were excited to take water sliding in three different slides. The position of the three friends shown by P, Q and R in the three different slides is given below. Consider 0 as the origin, answer the following questions.</p> <div></div> <p>(a) Find the coordinates of the point Q which divides the line segment PR in the ratio 1:2 internally.</p> <p style="text-align: center;">OR</p> <p>Find the coordinates of point on x-axis which is at equal distance from P and Q.</p> <p>(b) Find coordinates of mid-point of P and R.</p> <p>(c) If the origin shifts by 2 units towards right and 1 unit towards north, then find the coordinates of the point R.</p> | <p style="text-align: right;">2</p> <p style="text-align: right;">1</p> <p style="text-align: right;">1</p> | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 37 | <p>Games are essential part of human life offering numerous benefits for individuals of all age groups. Treasure Hunt is an exciting and adventurous game where participants follow a series of clues/numbers/maps to discover hidden treasures. Players engage in a thrilling quest, solving puzzles and riddles to unveil the location of the coveted prize. While playing a Treasure Hunt game, some clues (numbers) are hidden in various spots collectively forming an A.P. If</p> |  | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| | <p>the number on the n^{th} spot is $20 + 4n$, then answer the following questions to help the players in spotting the clues.</p> <p>(a) Which number is on the first spot?</p> <p>(b) Which spot is numbered as 112?</p> <p>(c) What is the sum of all the numbers on the first 10 spots?</p> <p>OR</p> <p>Which number is on the $(n - 2)^{\text{th}}$ spot?</p> | <p>1</p> <p>1</p> <p>2</p> |
| 38 | <p>Rani bought a building for her business and decided to rent out rooftop space for advertisements to earn extra income.</p> <p>From a point P on the ground level, the angle of elevation of the roof of the building is 30° and the angle of elevation of the top of the signboard is 45°. The point P is at a distance of 24 m from the base of the building.</p> <div></div> <p>On the basis of the above information, answer the following questions.</p> <p>(a) Find the height of the building (<i>without the signboard</i>).</p> <p>OR</p> <p>Find the height of the building (<i>with the signboard</i>).</p> <p>(b) Find the height of the signboard.</p> <p>(c) Find the distance of the point P from the top of the signboard.</p> | <p>2</p> <p>1</p> <p>1</p> |