# KENDRIYA VIDYALAYA SANGATHAN, ERNAKULAM REGION

## PREBOARD EXAM- MATHEMATICS BASIC

**General instructions:**

(1)This question paper contains 38 questions. All questions are compulsory.

(2)This question paper is divided in to five sections- A,B,C,D and E.

(3)In Section A, Questions no.1 to 18 are multiple choice questions(MCQs) and questions no.19 and 20 are Assertion-Reason based questions of 1 mark each.

(4)In Section B, Questions no.21 to 25 are very short answer (VSA) type questions, carrying 2 marks each.

(5)In Section C, Questions no.26 to 31 are short answer (SA) type questions, carrying 3 marks each.

(6)In Section D, Questions no.32 to 35 are long answer (LA) type questions, carrying 5 marks each.

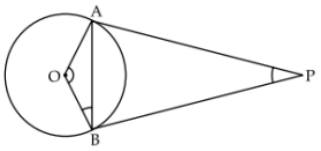
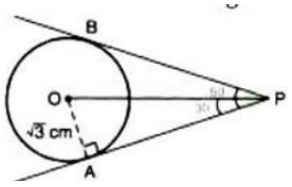
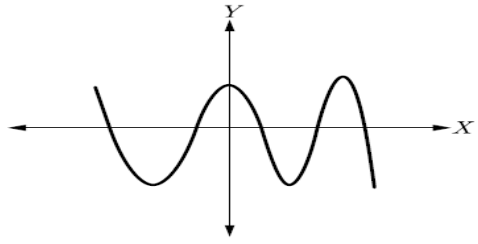
(7) In Section E, Questions no.36 to 38 are case study based questions, carrying 4 marks each. Internal choice is provided in 2 marks questions in each case study.

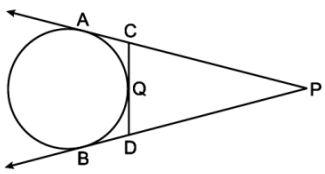
(8)There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 3 questions in Section E.

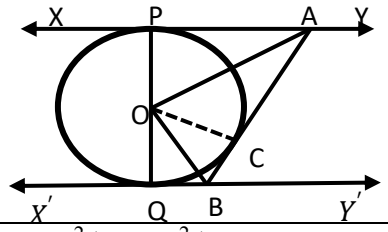
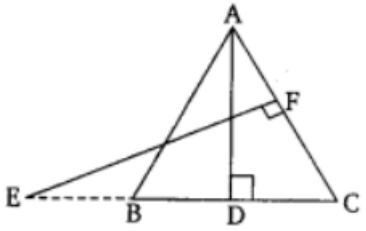
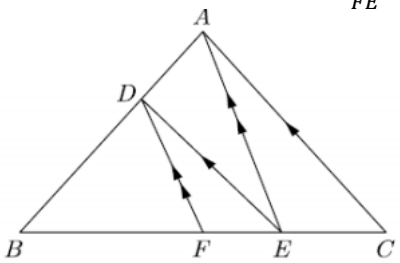
(9)Draw neat diagrams wherever required. Take $\pi = \frac{22}{7}$ wherever required, if not stated.

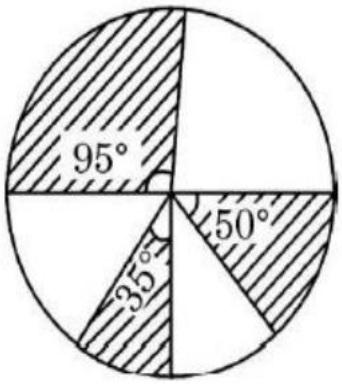
(10)Use of calculators is not allowed.

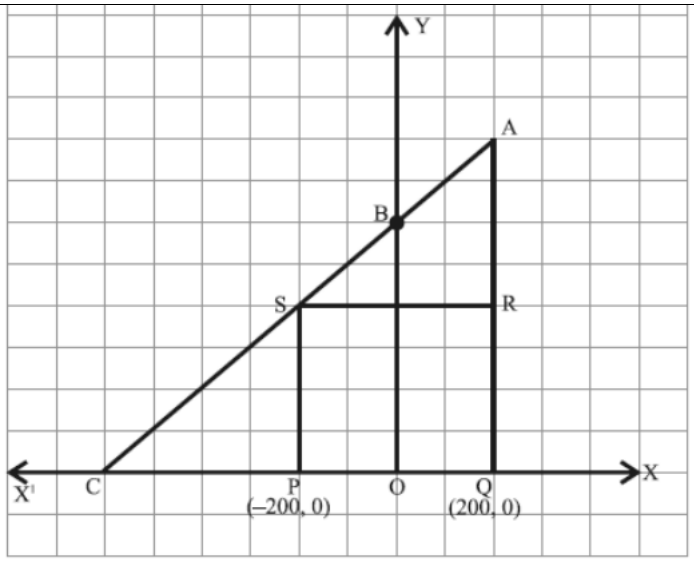
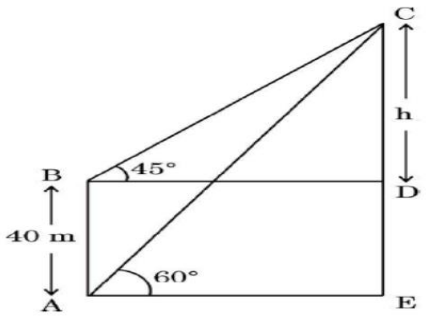
| | **SECTION-A(20 × 1 = 20)** | Marks |
|---|---|---|
| 1 | HCF of two numbers is 27 and their LCM is 162. If one of the numbers is 54 then the other number is<br>(a)36 (b) 35 (c)9 (d)81 | 1 |
| 2 | The value of k for which graph of the system of equations 5x+7y=3and 15x+21y=k coincide is<br>(a)9 (b) 5 (c) 7 (d) 18 | 1 |
| 3 | The coordinates of the vertex A of a rectangle ABCD whose three vertices are given as $B(0, 0)$, $C(3, 0)$ & $D(0, 4)$ are<br>(a) (4, 0) (b) (0, 3) (c) (3, 4) (d) (4, 3) | 1 |
| 4 | Volume of two spheres are in the ratio 64:27. The ratio of their surface areas is<br>a) 3:4 (b)4:3 (c)9:16 (d)16:9 | 1 |
| 5 | The quadratic equation $2x^2 - \sqrt{5}x + 1 =$ has<br>(a)Two distinct real roots (b) two equal real roots<br>(c)no real roots (d) more than 2 real roots | 1 |
| 6 | The midpoint of the line segment joining the points $P(-4, 5)$and $Q(4, 6)$ lies on<br>(a) x-axis (b) y-axis<br>(c) origin (d) neither x-axis nor y-axis | 1 |
| 7 | If k, (2k-1) and (2k+1) are the three successive terms of an AP, then the value of k is<br>(a)1 (b)2 (c)3 (d)4 | 1 |

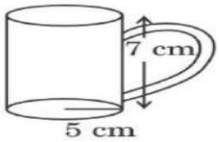
| | | |
|---|---|---|
| 8 | Curved surface area of a cylinder of height 5 cm is 94.2 $cm^2$. Radius of the cylinder is (take $\pi$ = 3.14)<br>(a) 2 cm (b) 3 cm (c) 2.9 cm (d) 6 cm | 1 |
| 9 | If sin$\theta$ = x and sec$\theta = y$, then tan$\theta$ is equal to<br>(a )xy (b) x/y (c) y/x (d)1/xy | 1 |
| 10 | In $\Delta ABC$ and $\Delta DEF$, $\angle B = \angle E$, $\angle F = \angle C$ $and$ $AB = 3DE$. Then the two triangles are<br>(a) Congruent but not similar (c) similar but not congruent<br>(b) Neither congruent nor similar (d) congruent as well as similar | 1 |
| 11 | If the centre of a circle is (3, 5) and end points of a diameter are (4, 7) $and$ (2,$y$) then the value of y is<br>(a) 3 (b) -3 (c) 7 ( d) 4 | 1 |
| 12 | The area of the circle that can be inscribed in a square of side 6 cm is<br>(a) 36$\pi$ $cm^2$ (b) 18$\pi$ $cm^2$ (c) 12$\pi$ $cm^2$ (d) 9$\pi$ $cm^2$ | 1 |
| 13 | Two tangents are drawn from an external point P such that < $OBA$ = $10^0$ . Then < $BPA$ is<br>(a)$10^0$ (b)$20^0$ (c)$30^0$ (d)$40^0$:<br> | 1 |
| 14 | Two tangents making an angle of $60^0$ between them are drawn to a circle of radius $\sqrt{3}$ $cm$ then the length of each tangent is<br>(a) $\sqrt{3}$ $cm$ (b) 3 $cm$<br>(c) $3\sqrt{3}$ $cm$ (d)9 $cm$<br> | 1 |
| 15 | The graph of y = p(x) where p(x) is a polynomial in variable x, is as follows:<br>The number of zeros of p(x) is<br><br>(a)0 (b)1/6 (c)5 (d)6 | 1 |
| 16 | The distance of the point ( -6, 8) from the origin is<br>(a)6 (b)-6 (c)8 (d)10 | 1 |
| 17 | Two identical solid cubes of side ‘a’ are joined end to end. The total surface area of the resulting cuboid is<br>(a) 6$a^2$ ( b) 10$a^2$ ( c) 5$a^2$ (d) 4$a^2$ | 1 |

| | | |
|---|---|---|
| 18 | If in triangles ABC and DEF, $\frac{AB}{DE}=\frac{BC}{FD}$ then they will be similar when<br>a) $\angle B = \angle E$ (b) $\angle A = \angle D$ (c) $\angle B = \angle D$ (d) $\angle A = \angle B$ | 1 |
| | Questions number **19** and **20** are Assertion and Reason based questions carrying 1 mark each. Two statements are given, one labelled as Assertion(A) and the other is labelled as Reason(R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.<br>(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).<br>(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).<br>(c) Assertion (A) is true but Reason (R) is false.<br>(d) Assertion (A) is false but Reason (R) is true. | 1 |
| 19 | Assertion (A): If $nth$ term of an AP is $7-4n$, then its common difference is -4.<br>Reason(R) : Common difference of an AP is $d = a_{n+1} - a_n$ | 1 |
| 20 | Assertion : (A): ABCD is a trapezium with $DC \parallel AB$. E and F are points on AD and BC respectively such that $EF \parallel AB$. Then $\frac{AE}{ED}=\frac{BF}{FC}$<br>Reason : Any line parallel to parallel sides of a trapezium divides the non-parallel sides proportionally. | 1 |
| | **SECTION-B(5× 2 = 10)** | |
| 21 | In a school, there are two sections of class X. There are 40 students in the first section and 48 students in the second section. Determine the minimum number of books required for their class library so that they can be distributed equally among students of both sections. | 2 |
| 22 | Evaluate: $\frac{cos45^0}{tan30^0+sin60^0}$<br>**OR**<br>If cos(A-B) = $\frac{\sqrt{3}}{2}$, sin(A+B) =1, then find the value of A and B. | 2 |
| 23 | In figure PA and PB are tangents to the circle drawn from an external point P. CD is the third tangent touching the circle at Q. PA = 15 cm, find the perimeter of ΔPCD.<br><br><br>**OR**<br>Two concentric circles are of radii 15 cm and 9 cm. Find the length of the chord of the larger circle which touches the smaller circle. | 2 |
| 24 | Find the value of k, if the quadratic equation has two equal roots:<br>$2x^2 + k x + 3 = 0$ | 2 |
| 25 | If one root of the quadratic equation $x^2 + 12x - k = 0$ is thrice the other root, then find the value of k. | 2 |

| | | |
|---|---|---|
| | **SECTION-C(6× 3 = 18)** | |
| 26 | Given that √3 is an irrational, prove that 5 + 2√3 is an irrational number. | 3 |
| 27 | In the given figure, $XY$ and $X'Y'$ are two parallel tangents to a circle with centre O and another tangent AB with point of contact C, is intersecting $XY$ at A and $X'Y'$ at B. Prove that $\angle AOB = 90^0$.<br> | 3 |
| 28 | $(\sin A + \text{cosec } A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$ | 3 |
| 29 | In the given figure, $AB = AC$. E is a point on CB produced. If AD is perpendicular to BC and EF perpendicular to AC prove that $\Delta\, ABD \sim \Delta\, CEF$.<br><br>**OR**<br>In the given figure, $DE \parallel AC$ and $DF \parallel AE$. Prove that $\frac{BF}{FE} = \frac{BE}{EC}$.<br> | 3 |
| 30 | A man starts his job with a certain monthly salary and earns a fixed increment every year. If his salary was Rs 15,000 after 4 years of service and Rs 18000 after 10 years of service, what was his starting salary and what was the annual increment? | 3 |
| 31 | Find the zeros of the quadratic polynomial $2x^2 - x - 6$ and verify the relationship between zeros and coefficient. | 3 |
| | **SECTION-D (4× 5 = 20)** | |
| 32 | Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides at distinct points, then the other two sides are divided in the same ratio.<br>Use the above theorem to find EC ,in triangle ABC where DE\|\|BC, $\frac{AD}{DB} = \frac{3}{2}$ and AE=2.7 | 5 |

| | | |
|---|---|---|
| 33 | An aeroplane when flying at a height of 4000m from the ground passes vertically above another aeroplane at an instant when the angles of the elevation of the two planes from the same point on the ground are $60^0$ and $45^0$ respectively. Find the vertical distance between the aeroplanes at that instant.($\sqrt{3}$=1.732)<br>**OR**<br>A man standing on the deck of a ship, which is 10m above water level, observes the angle of elevation of the top of a hill as $60^0$ and the angle of depression of the base of the hill as $30^0$. Calculate the distance of the hill from the ship and the height of the hill. | 5 |
| 34 | A fraction is such that if the numerator is multiplied by 3 and the denominator is reduced by 3, we get 18/11, but if the numerator is increased by 8 and the denominator is doubled, we get 2/5. Find the fraction.<br>**OR**<br>A train covered a certain distance at a uniform speed. If the train could have been 10km/hr faster, it would have taken 2 hours less than the scheduled time. And, if the train were slower by 10km/hr; it would have taken 3 hours more than the scheduled time. Find the distance covered by the train. | 5 |
| 35 | In the given figure, three sectors of a circle of radius 5 cm, making angles 35°, 50° and 95° at the centre are shaded. Find the area of the shaded region. ($\pi$=3.14)<br> | 5 |
| | **SECTION-E (3× 4 = 12)** | |
| 36 | Jagdish has a field which is in the shape of a right angled triangle AQC. He wants to leave a space in the form of a square PQRS inside the field for growing wheat and the remaining for growing vegetables (as shown in the figure). In the field, there is a pole marked as O. | 1+ 2+ 1 |

| | | |
|---|---|---|
| | <br>Based on the above information, answer the following questions:<br>(i) Taking O as origin, coordinates of P are (−200, 0) and of Q are (200, 0). PQRS being a square, what are the coordinates of R and S?<br>(ii) What is the area of square PQRS?<br>OR<br>What is the length of diagonal PR in square PQRS?<br>(iii) If S divides CA in the ratio K:1, what is the value of K, where point A is (200, 800)? | |
| 37 | Amrita stood near the base of a lighthouse, gazing up at its towering height. She<br>measured the angle of elevation to the top and found it to be 60°. Then, she climbed a nearby observation deck, 40 metres higher than her original position and<br>noticed the angle of elevation to the top of lighthouse to be 45°<br><br><br>Based on the above information, answer the following questions:<br>(i) If CD is h meters find the distance BD in terms of 'h'.<br>(ii) Find distance BC in terms of 'h'.<br>(iii) (a) Find the height CE of the light house. [Use √3 = 1.73]<br>(OR)<br>(b) Find distance AE, if $AC$ = 100 $m$. | 1+1+2 |

| | | |
|---|---|---|
| 38 | Tamper proof tetra packed milk guarantees both freshness and security. This milk ensures uncompromised quality, preserving the nutritional values within and making it a reliable choice for health conscious individuals.<br> <br><br>500 ml milk is packed in a cuboidal container of dimensions $15cm \times 8cm \times 5cm$. These milk packets are then packed in cuboidal cartons of dimensions $30cm \times 3cm \times 15\ cm$ Based on the above given information, answer the following questions:<br>(i) Find the volume of the cuboidal carton.<br>(ii) (a) Find the total surface area of a milk packet. **OR**<br>(b) How many milk packets can be filled in a carton?<br>(iii) How much milk can the cup (as shown in the figure) hold?<br>********** | 1 + 2 + 1 |

| | | |
|---|---|---|
| | | |