KENDRIYA VIDYALAYA SANGATHAN ERANAKULAM REGION

PRE BOARD -1 EXAMINATION

MATHEMATICS STANDARD (041)

Maximum Marks: 80 **Time Allowed: 3 hours**

General Instructions:

Read the following instructions very carefully and strictly follow them:

(i) This Question paper contains 38 questions. All questions are compulsory.

(ii) This Question paper is divided into five Sections – A, B, C, D and E.

(iii) In Section A, Question number 1 to 18 are Multiple Choice Questions (MCQs) and Question number 19 and 20 are Assertion - Reason based questions of 1 mark each.

(iv) In Section B, Question number 21 to 25 are Very Short Answer (VSA)-type questions, carrying 2 marks each.

(v) In Section C, Question number 26 to 31 are Short Answer (SA)-type questions carrying 3 marks each.

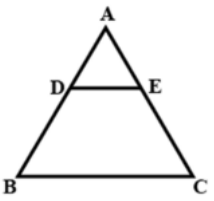
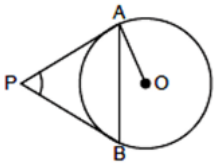
(vi) In Section D, Question number 32 to 35 are Long Answer (LA)-type questions carrying 5 marks each.

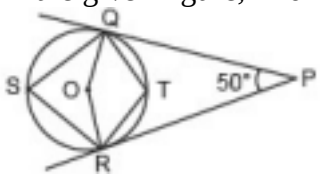
(vii) In Section E, Question number 36 to 38 are case study-based questions carrying 4 marks each.

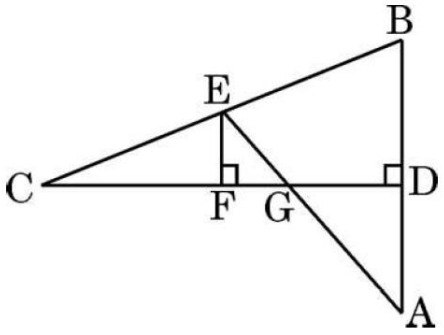
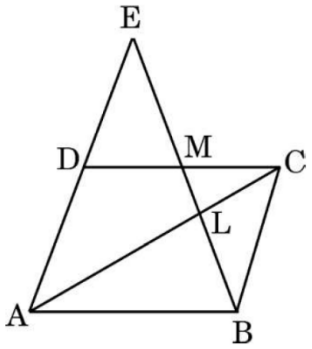
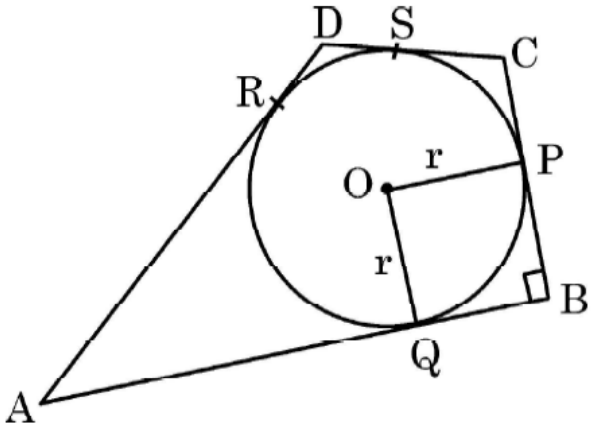
(viii) There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C and 2 questions in Section D. An internal choice has been provided in all the sub parts having 2 marks of questions in section E.

(ix) Draw neat and clean figures wherever required. Take π = 22/ 7 wherever required, if not stated. (x) Use of calculators is not allowed.

	SECTION A	
1.	If two positive integers $\boldsymbol{a}$ and $\boldsymbol{b}$are written as $a = p^6q^3$ and $b = p^5q^4; p, q$ are prime numbers, then HCF (p, q) is (a) p^6q^3 (b) p^5q^4 (c)p^5q^3 (d) $p^{11}q^7$	1
2.	If the zeros of the quadratic polynomial $\boldsymbol{x^2 + (a + 1)x + b}$ are 2 and 3, then (a) a = -7, b =-1 (b) a = 5, b = -1(c) a = 2, b = -6 (d) a =-6, b = 6	1
3.	A quadratic polynomial, whose zeros 7 and -8 is (a)$x^2 - x - 56$ (b)$x^2 + x - 56$ (c) $x^2 - 15x + 56$(d) $x^2 - x + 56$	1
4.	If $2x - 3y = 7\ and\ (a + b)x - (a + b - 3)y = 4a + b$ represent coincident lines, then a and b satisfies the equation (a)$a + 5b = 0$ (b) $5a + b = 0$ (c) $a - 5b = 0$ (d) $5a - b = 0$	1
5.	The pair of equations $x = a\ and\ y = b$ graphically represents lines which are (a) parallel (b) intersecting at (b,a) (c) Coincident (d) intersecting at (a,b)	1
6.	If the list price of a toy is reduced by **₹2,** a person can buy 2 toys more for **₹360.** The original price of the toy is (a) ₹ 18 (b) ₹ 20 (c) ₹19 (d)₹ 21	1
7.	If the equation $x^2 - kx + 4 = 0$ does not possess real roots, then (a) $-4 < k < 4$ (b) $k > 4$ (c) $k < -4$ (d) $k = \mp 4$	1

8.	The common difference of the AP $\frac{1}{p}, \frac{(1-p)}{p}, \frac{(1-2p)}{p}$ .... is (a) p (b) – p (c) –1 (d) 1	1
9.	The 21st term of the AP whose first two terms are –3 and 4 is (a) 17 (b) 137 (c) 143 (d) –143	1
10.	Points A(3, 1), B(5, 1), C(a, b) and D(4, 3) are vertices of a parallelogram ABCD. The values of a and b are respectively (a) a = 6, b = 3 (b) a = 2, b = 1 (c) a = 4, b = 2 (d) None of these	1
11.	In the ΔABC, DE ‖ BC and AD = 3x − 2, AE = 5x − 4, BD = 7x − 5, CE = 5x − 3, then find the value of x  (a) 1 (b) 7/10 (c) both (a) & (b) (d) none of these	1
12.	In the figure PA and PB are tangents to the circle with centre O. If $< APB = 60^0$,then $< OAB$ is  (a) 30^0 (b) 60^0 (c)90^0 (d) 15^0	1
13.	Sec A= (a) $\frac{1}{\cot A}$ (b) $\frac{1}{cosec\ A}$ (c) $\frac{1}{\sqrt{1+cot^2 A}}$ (d) $\frac{\sqrt{1+cot^2 A}}{cotA}$	1
14.	If sinθ + cosθ = √2, then tanθ + cot θ = (a) 1 (b) 2 (c) 3 (d) 4	1
15.	Two poles are 25 m and 15 m high and the line joining their tops makes an angle of 45° with the horizontal. The distance between these poles is (a) 5 m (b) 8 m (c) 9 m (d) 10 m	1
16.	The minute hand of a clock is 84 cm long. The distance covered by the tip of minute hand from 10:10 am to 10:25 am is : (a) 44 cm (b) 88 cm (c) 132 cm (d) 176 cm	1
17.	. If a square ABCD is inscribed in a circle of radius ‘r’ and AB = 4 cm, then the value of r is: (a) 2 cm (b) 2 √2 cm (c) 4 cm (d) 4 √2 cm	1
18.	The radius of a sphere (in cm) whose volume is 12π cm^3, is (a) 3 cm (b) 3√3 cm (c) $3^{\frac{2}{3}}$ cm (d) $3^{\frac{1}{3}}$ cm	1

	In the following questions 19 and 20, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as: (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 but 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.	
19.	**Assertion (A):** The point (–1, 6) divides the line segment joining the points (–3, 10) and (6, –8) in the ratio 2 : 7 internally. **Reason (R):** Given three points, i.e. A, B, C form an equilateral triangle, then AB = BC = AC.	1
20.	**Assertion (A):** If the angle between two tangents drawn from an external point P to a circle of radius 5 cm and centre O is 90°, then length of each tangent is 10 cm. **Reason (R):** Opposite angles of a cyclic quadrilateral is supplementary.	1
	SECTION B	
21.	Find HCF and LCM of 135 and 225 and verify the that HCF x LCM = Product of the two given numbers. OR The LCM of two numbers is 14 times their HCF. The sum of LCM and HCF is 600. If one number is 280, then find the other number.	2
22.	In the given figure, find ∠QSR 	2
23.	In ΔABC, DE ‖ BC such that AD = 7x - 4 cm, AE = 5x - 2 cm , DB = 3x + 4 cm and EC = 3xcm . Then find the value of x. OR Two right triangles ABC and DBC are drawn on the same hypotenuse BC and on the same side of BC. If AC and BD intersect at P. Prove that AP × PC = BP × PD.	2
24.	The area of a square is the same as the area of a circle. Find the ratio of their perimeters	2
25.	Find the coordinates of the point which divides the line segment joining A(−7, 11) and B(8, −4)internally in the ratio 3:2	2
	SECTION C	
26.	(a) The angle of elevation of the top of a building from the foot of a tower is 45°, and the angle of elevation of the top of the tower from the foot of the building is 60°. If the tower is 40 m high, find the height of the building. **OR** (b) From a point on a bridge across a river, the angles of depression of the banks on opposite sides of the river are 30° and 60°, respectively. If the bridge is 4 m above the banks, find the width of the river.	3

27.	A chord of a circle of radius 14 cm subtends an angle of 30° at the centre. Find the area of the corresponding minor segment. *(Use $\pi = 3.14$ and $\sqrt{3} = 1.73$)*	3
28.	Find the zeroes of the quadratic polynomial $x^2 - 15$ and verify the relationship between the zeroes and the coefficients of the polynomial.	3
29.	(a) In the given figure, CD is the perpendicular bisector of AB. EF is perpendicular to CD. AE intersects CD at G. Prove that $\frac{CF}{CD} = \frac{FG}{DG}$  OR (b) In the given figure, ABCD is a parallelogram. BE bisects CD at M and intersects AC at L. Prove that EL = 2BL.  	3
30.	Three bells ring at intervals of 6, 12 and 18 minutes. If all the three bells rang at 6 a.m., when will they ring together again ?	3
31.	In the given figure ,a circle is inscribed in a quadrilateral ABCD in which $\angle B = 90^0$ .If AD = 17cm, AB = 20cm and DS = 3cm, then find the radius of the circle.  	3

	SECTION D	
32.	(a) Solve the following system of equations graphically: $2x + 3y = 5, -3x + y = -2$ **OR** (b) The sum of the digits of a 2-digit number is 11. The number obtained by interchanging its digits exceeds the given number by 9.To know the number (i) Form the linear equation representing the above situation (ii) Verify that the equation have unique solution (iii) Solve the equation to get the given 2- digit number .	5
33.	(a) State and prove Basic proportionality theorem . (b)In ΔABC, D lies on AB and E lies on AC. Given AD = 6 cm, DB = 4 cm, AE = 9 cm and EC = 6 cm. Verify whether DE ∥ BC.	5
34.	Prove that : $\frac{sec^3\theta}{sec^2\theta-1} + \frac{cosec^3\theta}{cosec^2\theta-1} = \sec\theta \times cosec\theta\,(sec\theta + cosec\theta)$ **OR** If $\frac{sec\propto}{cosec\beta} = p$ and $\frac{tan\alpha}{cosec\,\beta} = q$ then prove that $(p^2 - q^2)sec^2\alpha = p^2$	5
35.	A right circular cylinder and a right circular cone have equal bases and equal heights. If their curved surface areas are in the ratio 4: 3, find the ratio of the radius of their bases to their height. **OR** (b) A solid is in the form of a hemisphere surmounted by a cone. The radius of the hemisphere is 7 cm and the height of the cone is 24 cm. Find the total surface area of the solid. *(Use $\pi = \frac{22}{7}$)*	5
	SECTION – E (3 x 4 = 12) This section comprises of 3 case-study-based questions of 4 marks each with sub parts. Each case study questions has three sub parts (i), (ii), (iii) of marks 1, 1, 2 respectively.	
36.	India is competitive manufacturing location due to the low cost of manpower and strong technical and engineering capabilities contributing to higher quality production runs. The production of TV sets in a factory increases uniformly by a fixed number every year. It produced 16000 sets in 6th year and 22600 in 9th year. Based on the above information, answer the following questions: (i) Find the production during first year. (ii) Find the production during 8th year. (iii) In which year, the production is Rs 29,200. **OR** (iii) Find the difference of the production during 7th year and 4th year	1 1 2
37.	A group of children went for a walk. Rahul observes a vertical tower standing on a horizontal plane and surmounted by a flagstaff of height 6 m. From a point on the ground, the angles of elevation of the top and bottom of the flagstaff are 60° and 30°, respectively. (Take √3 = 1.73)	



(i) Find the height of the tower Rahul observed 1

(ii) Find the distance of Rahul from the tower. 1

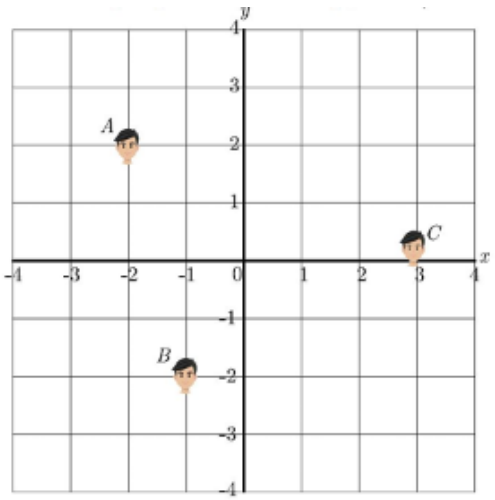
(iii) Ananya observes another tower with a flagstaff fixed at its top. She is standing 100 m away from the tower. The angle of elevation of the top of the tower is 45°, while the angle of elevation of the top of the flagstaff is 60°.

(a) Find the height of the flagstaff Ananya observed. (Take $\sqrt{3} = 1.73$)

OR

(a) Find the height of the tower Ananya observed. (Take $\sqrt{3} = 1.73$) 2

38. Ayush, Ram and Das are fast friend since childhood. They always want to sit in a row in the classroom . But teacher doesn't allow them and rotate the seats row-wise everyday. Ram is very good in maths and he does distance calculation everyday. He consider the centre of class as origin and marks their position on a paper in a co-ordinate system. One day Ram make the following diagram of their seating position marked Ayush as A, Ram as B and Das as C.



(i) What is the distance between A and B ? 1

(ii) What is the distance between B and C ? 1

(iii) A point D lies on the line segment between points A and B such that AD :DB = 4 : 3 . What are the the coordinates of point D ?

OR

(iii) If the point P(k, 0) divides the line segment joining the points A(2, –2) and B(–7, 4) in the ratio 1 : 2, then find the value of k 2