KENDRIYA VIDYALAYA SANGATHAN JABALPUR REGION
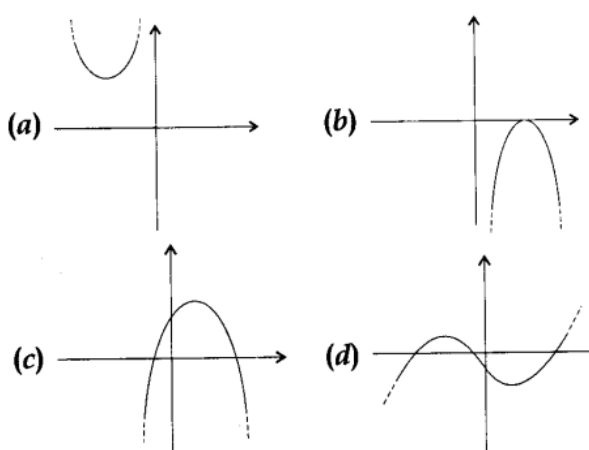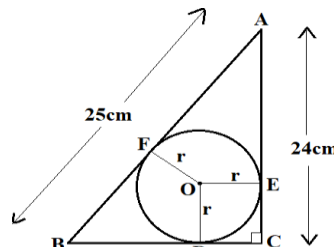## CLASS-X
SUBJECT-MATHEMATICS (BASIC-241)

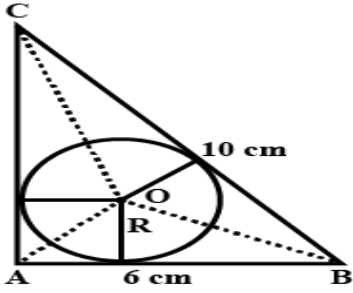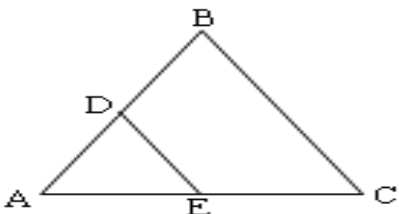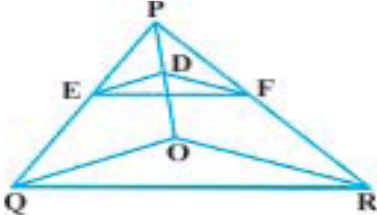**Time Allowed: 3 Hours**   **Maximum Marks: 80**
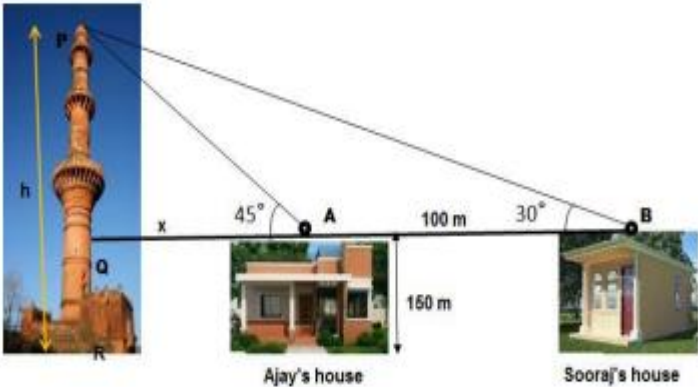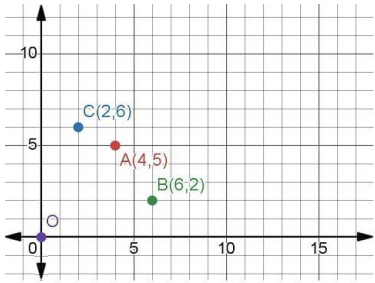
General Instructions:
1. *This Question Paper has 5 Sections A, B, C, D, and E.*
2. *Section A has 20 Multiple Choice Questions (MCQs) carrying 1 mark each.*
3. *Section B has 5 Short Answer-I (SA-I) type questions carrying 2 marks each.*
4. *Section C has 6 Short Answer-II (SA-II) type questions carrying 3 marks each.*
5. *Section D has 4 Long Answer (LA) type questions carrying 5 marks each.*
6. *Section E has 3 Case Based integrated units of assessment (4 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.*
7. *All Questions are compulsory. However, an internal choice in 2 Qs of 2 marks, 2 Qs of 3 marks and 2 Questions of 5 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.*
8. *Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.*

Q. No.	SECTION A	MARKS
1	The exponent of 5 in the prime factorization of 2025 is (a) 1 (b) 2 (c) 3 (d) 4	1
2	Which of the following is not the graph of quadratic polynomial? 	1
3	The pair of equations $2x - 5y = 7$ and $-4x + 10y = 8$ have (a) a unique solution (b) infinitely many solutions (c) no solution (d) two solutions	1
4	What is the area of the sector of a circle of radius 7 cm and angle 60º (a) 77/6 (b) 77/3 (c) 154/3 (d) 154/6	1
5	The value of $\sin^2 60^0 + \cos^2 60^0$ (a) 1 (b) 0 (c) -1 (d) 2	1
6	If one root of the quadratic equation $2x^2 + kx - 6 = 0$ is 2, the value of k is (a) 1 (b) -1 (c) 2 (d) -2	1
7	If the diameter of two circles are in the ratio of 3 : 4, then their perimeters are in the ratio of: (a) 4:3 (b) 3:4 (c) 16:9 (d) 9:16	1
8	The total surface area of a solid hemisphere of diameter 14 cm is:	1

	(a) 462 cm^2 (b) 231 cm^2 (c) 115.5 cm^2 (d) 464 cm^2	
9	**If the angle between two radii of a circle is 110º, then the angle between the tangents at the ends of the radii is:** (a) 90º (b) 50º (c) 70º (d) 40º	1
10	**If ABC and DEF are two triangles and $\frac{AB}{DE} = \frac{BC}{FD}$, then the two triangles are similar if** (a) ∠A=∠F (b) ∠B=∠D (c) ∠A=∠D (d) ∠B=∠E	1

11	In the figure given below, radius **r** of the circle which touches the sides of the triangle is
	
	    (a) 3 cm
	    (b) 6 cm
	    (c) 7 cm
	    (d) 4 cm
	
		1

12	Which one of the following is **not** equal to Unity? (a) $\sin^2 x + \cos^2 x$ (b) $\cot^2 x - \csc^2 x$ (c) $\sec^2 x - \tan^2 x$ (d) $\tan x . \cot x$	1
13	**The value of sin 60° cos 30° + sin 30° cos 60° is:** (a) 0 (b) 1 (c) 2 (d) 4	1
14	There is a circular path around a sports field. Priya takes 18 minutes to drive one round of the field. Harish takes 12 minutes. Suppose they both start at the same point and at the same time and go in the same direction. After how many minutes will they meet? **(a) 36 minutes (b) 18 minutes (c) 6 minutes (d) They will not meet**	1
15	**If the mean of the following distribution is 8.1, then the value of x is**	1

If the mean of the following distribution is 8.1, then the value of x is

Variable (x)	1	3	5	7	9	11	13
Frequency	1	2	1	x	6	2	3

(a) 3   (b) 5   (c) 13   (d)24

16	If the points A(6, 1), B(8, 2), C(9, 4) and D(p, 3) are the vertices of a parallelogram, taken in order, then the value of p is (a) 4 (b) -6 (c) 7 (d) -2	1
17	A card is selected at random from a well shuffled deck of 52cards.The probability of its being a face card is (a)3/13 (b) 6/52 (c) 6/13 (d)1/52	
18	**For the following distribution:**	

Class	0-5	5-10	10-15	15-20	20-25
Frequency	10	15	12	20	9

the modal class is
    (a) 10-15   (b) 15-20   (c) 20-25   (d) 5-10

19	**Assertion (A):** A number N when divided by 15 gives the remainder 2. Then he remainder is same when N is divided by 5. **Reason(R):** $\sqrt{5}$ is an irrational number (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.	
20	**Assertion (A):** The point (0, 4) lies on y-axis. **Reason(R):** The x-coordinate on the point on y-axis is zero. (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.	
	<center>SECTION B</center>	
21	If the lines $3x + 2ky - 2 = 0$ and $2x + 5y + 1 = 0$ are parallel, then find the value of k.	2
22	If sec $\theta = \frac{5}{4}$, then evaluate $\frac{\tan\theta}{1+\tan^2\theta}$.	2
23	A right angle triangle ABC, right angled at A, circumscribes a circle of radius 'r'. If AB & BC are of lengths 6cm and 10 cm respectively, find the value of 'r'	2
24	In the given figure DE ‖BC, if BD = 3cm, AD = 2 cm, AE = 4 cm, then find the value of AC. <center>**(OR)**</center> In the given figure, DE ‖ OQ and DF‖ OR, Show that EF ‖ QR.	2
25.	The perimeter of a sector of a circle of radius 5.7 m is 27.2 m. Find the area of the sector. <center>**(OR)**</center> The radii of two circles are 8cm and 6 cm respectively. Find the radius of the circle having area equal to the sum of the area of the two circles.	2
	<center>SECTION-C</center>	

26.	A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears **(i) a two digit number** **(ii) a perfect square** **(iii) a number divisible by 5**	
27	If α and β are the zeroes of a polynomial $x^2 - 5\sqrt{3}x + \sqrt{3}$, then write the value of a, b and c, also find the value of $\alpha + \beta - 2\alpha\beta$.	3
28	Prove that $3 + 2\sqrt{5}$ is an irrational number, where $\sqrt{5}$ is an irrational number.	3
29	Prove that the lengths of tangents from an external point to a circle are equal.	3
30	The taxi charges in a city consist of a fixed charge together with the charge for the distance covered. For a distance of 10km, the charge paid is Rs105, and for a journey of 15 km, the charge paid is Rs.155. a) What are the fixed charges and charges per kilometer? b) How much does a person have to pay for travelling a distance of 25Km? (OR) A fraction becomes $\frac{4}{5}$ if 1 is added to both the numerator and denominator. If 5 is subtracted from both the numerator and denominator, the fraction becomes $\frac{1}{2}$. Find the fraction.	3
31.	Prove that $\dfrac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \dfrac{1}{\sec\theta - \tan\theta}$ using the identity $\sec^2\theta = 1 + \tan^2\theta$. **(OR)** Prove that $\dfrac{\cot A - \cos A}{\cot A + \cos A} = \dfrac{\cosec A - 1}{\cosec A + 1}$	3
	SECTION D (LONG ANSWER TYPE)	
32	The sum of the areas of two squares is 640 m². If the difference of their perimeters is 64m, find the sides of the two squares. (OR) A train covers a distance of 300 km at a uniform speed. If the speed of the train is increased by 5 km/hr, it takes 2 hours less in the journey. Find the original speed of the train.	5
33	Prove that If a line is drawn parallel to one side of a triangle to intersect other two sides in distinct points, the other two sides are divided in the same ratio.	5
34	Find the mode of the following distribution: 	Class	0-20	20-40	40-60	60-80	80-100	100-120
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Frequency	10	35	52	61	38	29		5
35	A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 meters, find the area of canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of Rs.500 per m^2. **(OR)** From a solid cylinder whose height is 8 cm and radius is 6 cm, a conical cavity of height 8 cm and the base radius 6 cm is hollowed out. Find the volume of the remaining solid correct to two places of decimal. Also, find the total surface area of the remaining solid. (Take $\pi = 3.14$)	5
	SECTION E(CASE BASED QUESTIONS)	

| 36 | Running is one of the most straightforward ways to get the important benefits of exercise. Since it improves aerobic fitness, running is a great way to help improve cardiovascular health. Plus, it burns calories and can build strength, among other things.

Your friend Palak wants to participate in a 200 m race.
She can currently run that distance in 51 seconds and with each
day of practice it takes him 2 seconds less. She wants to do in
31 seconds.

(i) What is the minimum number of days she needs to practice till her goal i
(ii) Find the total running time of Palak, if she runs 1000 m daily till her goal is achieved.
(iii) Find the speed of Palak when she achieved her goal. | 1
2
1 |
|---|---|---|
| 37. | The houses of Ajay and Sooraj are at 100 m distance and the height of their houses is the same as approx 150m. One big tower was situated near their house. Once both friends decided to measure the height of the tower. They measure the angle of elevation of the top of the tower from the roof of their houses. The angle of elevation of Ajay's house to the tower and Sooraj's house to the tower are 45° and 30° respectively as shown in the figure.

(i)   Draw a neat diagram using above information,
(ii)   Find the height of the tower.
(iii)What is the distance between the tower and the house of Sooraj? | 1
2
1 |
| 38. | Carpooling is the sharing of car journeys so that more than one person travels in a car, and prevents the need for others to have to drive to a location themselves. By having more people using one vehicle, carpooling reduces each person's travel costs such as: fuel costs, tolls, and the stress of driving. Carpooling is also a more environmentally friendly and sustainable way to travel as sharing journeys reduces air pollution, carbon emissions, traffic congestion on the roads, and the need for parking spaces.

Three friends Amar, Bhavin and Chetanya live in societies represented by the points A(4,5), B(6,2) and C(2,6) respectively. They all work in offices located in a same | |

building represented by the point O(0,0). Since they all go to same building every day, they decided to do carpooling to save money on petrol. Based on the above information, answer the following questions.

   i) What is the distance between B and C?

  ii) If Bhavin and Chetanya planned to meet at a club situated at the mid-point of the line joining the points B and C, find the coordinates of this point.

 iii) **(A)** Which society is farthest from the office? Also find its distance from the office.

<div align="center">**OR**</div>

  (B) Out of B and C which society is nearer to A? Also find their distances.

1

1

2