

**KENDRIYA VIDYALAYA SANGATHAN , LUCKNOW REGION**  
**SECOND PRE-BOARD QUESTION PAPER (2023-24)**  
**SUBJECT : MATHEMATICS BASIC (241)**

CLASS : X

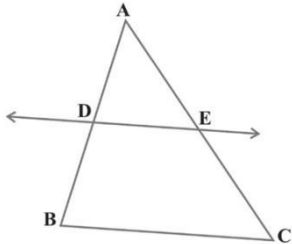
TIME : 3 hrs

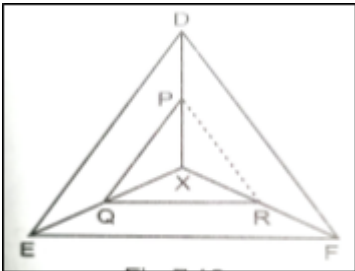
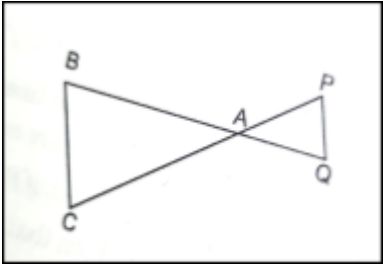
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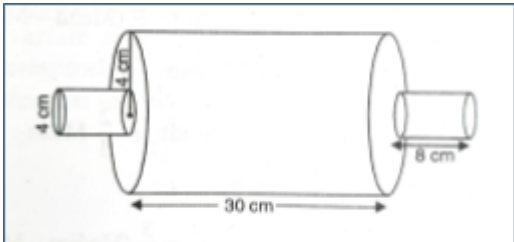
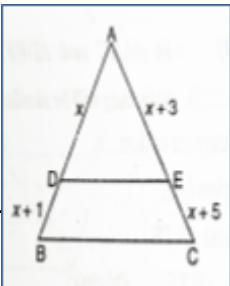
General Instructions:

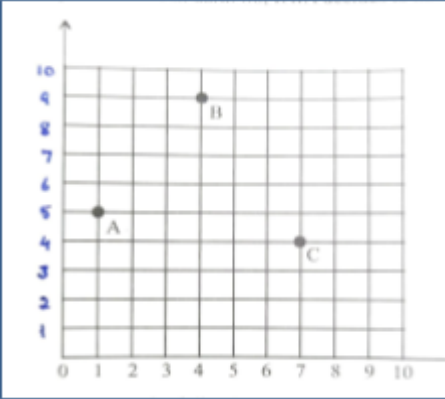
1. This Question Paper has 5 Sections A, B, C, D, and E.
2. Section A has 20 Multiple Choice Questions (MCQs) carrying 1 mark each
3. Section B has 5 Short Answer-I (SA-I) type questions carrying 2 marks each
4. Section C has 6 Short Answer-II (SA-II) type questions carrying 3 marks each.
5. Section 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.

<b>Section A</b>		
<i>It consists of 20 question 1 mark each</i>		
<b>S. No.</b>	<b>Questions</b>	<b>MARKS</b>
1	If two positive integers a and b are written as $a = x^3y^2$ and $b = x^2y^3$ ; where x, y are prime numbers, then HCF (a ,b) is: (a) $x^2y$ (b) $xy^2$ (c) $x^3y^3$ (d) $x^2y^2$	1
2	HCF of smallest prime and smallest composite number is (a)0      (b)1      (c)2      (d)none of these	1
3	The pair of equations $x + 2y + 5 = 0$ and $-3x - 6y + 1 = 0$ represents lines which are (a) parallel    (b) intersecting at a point    (c) intersecting at two points (d) coincident	1
4	If $x=2$ is a zero of the polynomial $x^2 + 3x + k$ , then the value of k is : (a)10      (b)-10      (c)3      (d)5	1
5	The quadratic equation $x^2 - \sqrt{3}x + 1 = 0$ has : a)Two distinct real roots    b)Two real equal roots    c)No real roots    d)more than two real roots	1
6	The distance of the point p ( -6, 8) from the origin is (a)8      (b) $2\sqrt{7}$ (c) 10      (d)6	1

7	If $\sin A = \frac{1}{2}$ and $\cos B = \frac{1}{2}$ , then the value of $(A+B)$ is: (a) $90^\circ$ (b) $60^\circ$ (c) $30^\circ$ (d) $0^\circ$	1												
8	$(1 + \tan^2 A)$ is equal to (a) $\sin^2 A$ (b) $\cot^2 A$ (c) $\operatorname{cosec}^2 A$ (d) $\sec^2 A$	1												
9	If $\cos A = \frac{3}{4}$ , then the value of $\tan A$ will be (a) $\frac{1}{2}$ (b) $\frac{1}{\sqrt{2}}$ (c) $\frac{\sqrt{7}}{3}$ (d) $\frac{4}{5}$	1												
10	Which of the following is not a similarity criterion of triangles? a) AA (b) SAS (c) AAA (d) ASA	1												
11	In $\triangle ABC$ , D is a point on side AB and E is a point in side AC such that $\angle ADE = \angle ABC$ , $AD = 2$ cm, $BD = 3$ cm and $AE = 3$ cm, then find the value of CE? 	1												
12	The length of the tangent from a point A, at a circle of the radius 6 cm is 8cm . Then the distance of A from the centre of the circle is : (a) 10cm (b) 12cm (c) 14cm (d) $\sqrt{28}$ cm	1												
13	The circumference of a circle of a circle is 44cm , then its area is (a) $154 \text{ cm}^2$ (b) $164 \text{ cm}^2$ (c) $124 \text{ cm}^2$ (d) $156 \text{ cm}^2$	1												
14	If the circumference and area of a circle are numerically equal , then the diameter of the circle is (a) $\frac{\pi}{2}$ (b) $2\pi$ (c) $2\pi r$ (d) 4	1												
15	The radii of two cylinders are in the ratio 5: 7 and their heights are in the ratio 3:5, then the ratio of their curved surface area is (a) 3:7 (b) 7:3 (c) 4:7 (d) 7:4	1												
16	For the following distribution <table border="1"> <tbody> <tr> <td>Class</td> <td>0-5</td> <td>5-10</td> <td>10-15</td> <td>15-20</td> <td>20-25</td> </tr> <tr> <td>frequency</td> <td>10</td> <td>15</td> <td>12</td> <td>20</td> <td>9</td> </tr> </tbody> </table> The lower limit of modal class is (a) 10 (b) 15 (c) 20 (d) 5	Class	0-5	5-10	10-15	15-20	20-25	frequency	10	15	12	20	9	1
Class	0-5	5-10	10-15	15-20	20-25									
frequency	10	15	12	20	9									
17	The mean of first six whole numbers is (a) 3 (b) 2 (c) 3 (d) 2.5	1												
18	Which of the following cannot be the probability of an event (a) $\frac{1}{2}$ (b) 0.4 (c) 27% (d) $\frac{17}{16}$	1												
	Assertion reason based questions													

	<p>DIRECTION: In the question numbers 19 and 20 , a statement of assertion (A) is followed by a statement of Reason (R) are given. Read the questions carefully and answer it on the basis of the following options :</p> <p>(a) Both assertion (A) and reason ( R ) are true and Reason ( R ) is the correct explanation of assertion (A)</p> <p>(b) Both assertion (A) and reason (R) are true and Reason (R) is not the correct explanation of assertion (A)</p> <p>(c) Assertion (A) is true but reason ( R ) is false.</p> <p>(d) Assertion (A) is false but reason ( R ) is true</p>	
19	<p>Assertion: If <math>LCM(p,q) = 30</math> and <math>HCF(p,q) = 5</math> , then <math>p.q = 150</math></p> <p>Reason : <math>LCM(a ,b) \times HCF (a,b) = a.b</math></p>	1
20	<p>Assertion: The ratio in which the line segment joining ( 2, -3) and ( 5,6) internally divided by x-axis is 1 :2 .</p> <p>Reason: As formula for the internal division is <math>\left( \frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2} \right)</math></p>	1
<b>SECTION –B</b>		
<i>Section B consists of 5 questions of 2 marks each</i>		
21	<p>Check whether the following pair of equations has no solution , a unique solution or infinitely many solutions</p> $3x - \frac{24}{5}y + \frac{3}{5} = 0 ; 5x - 8y + 1 = 0$	2
22	<p>In the given figure <math>PQ \parallel DE</math> and <math>QR \parallel EF</math> , Show that <math>PR \parallel DF</math></p>  <p>OR</p> <p>In the given figure , <math>PQ \parallel BC</math> , prove that <math>\Delta PAQ \sim \Delta CAB</math></p> 	2
23	<p>Prove that in two concentric circles , the chord of the larger circle , which touches the smaller circle , is bisected at the point of contact</p>	2
24	<p>If <math>\tan (A+B) = \sqrt{3}</math> and <math>\cot (A-B) = \sqrt{3}</math> ,Find the value of A and B.</p>	2
25	<p>Find the area of the quadrant of a circle whose circumference is 22cm.</p> <p style="text-align: center;">OR</p> <p>A mall in a city is spreading a white light in night over a sector angle <math>70^\circ</math> to a distance of 10 km . Find the area of the city over which the light is spread.</p>	2
<b>SECTION- C</b>		
<i>Section C consists of 6 questions of 3 marks each</i>		

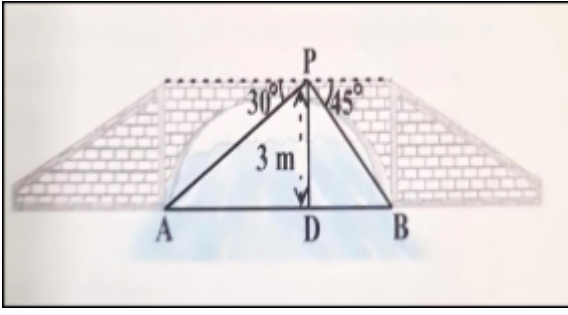
26	Prove that $5+2\sqrt{3}$ is irrational, given that $\sqrt{3}$ is an irrational number.	3
27	The taxi charges in a city consist of a fixed charge together with the charge for the distance covered. For a distance of 6 km, the charges paid are Rs. 58 while for a journey of 10 km, the charges paid are Rs. 90. Find the charge per km and the fixed charge.  OR The coach of a cricket team buys 7 bats and 6 balls for Rs. 3800. Later she buys 3 bats and 5 balls for Rs. 1750. Find the cost of each bat and each ball.	3
28	Find the zeroes of the quadratic polynomial $4x^2 - 3x - 1$ and verify the relationship between the zeroes and the coefficients.	3
29	Prove that : $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1}$  OR Evaluate : $\frac{3 \tan^2 30^\circ - 3 \tan^2 60^\circ + \operatorname{cosec} 30^\circ + \tan 45^\circ}{\cot^2 45^\circ}$	3
30	If all the sides of parallelogram touch. Show that the parallelogram is a rhombus.	3
31	One card is drawn from a well-shuffled of 52 cards. Find the probability of getting (i) a king of red colour (ii) a face card (iii) a spade	3
<b>SECTION – D</b>		
<i>Section D consists of 4 questions of 5 marks each</i>		
32	A rolling pin is made by joining 3 cylindrical pieces of wood as shown in the figure .Find the mass of rolling pin with given measurement if 1 cm <sup>3</sup> of wood had approximately 1/2 gram of mass.[ Use $\pi=3.14$ ]    OR A vessel is in the form of an inverted cone. Its height is 8 cm and the radius of its top, which is open, is 5 cm. It is filled with water up to the brim. When lead shots, each of which is sphere of radius 0.5 cm are dropped into the vessel, one -fourth of the water flows out. Find the number of lead shots dropped in the vessel	5
33	Prove that if a line is drawn parallel to one side of a triangle intersecting the other two sides in distinct points, then the other two sides are divided in the same ratio. In the given figure, if $DE \parallel BC$ , then find the value x  	5

34	<p>A train travels a distance of 300km at a constant speed. If speed of the train is increased by 5km /hr , the journey will take 2 hours less. Find the speed of the train.</p> <p style="text-align: center;">OR</p> <p>The sum of the area of two squares is <math>468\text{m}^2</math> . If the difference of their perimeters is 24m , find the sides of the two squares.</p>	5																
35	<p>Find the median and mode of the following data :</p> <table border="1"> <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> <td>100-120</td> <td>120-140</td> </tr> <tr> <td>Frequency</td> <td>6</td> <td>8</td> <td>10</td> <td>12</td> <td>6</td> <td>5</td> <td>3</td> </tr> </table>	Class Interval	0-20	20-40	40-60	60-80	80-100	100-120	120-140	Frequency	6	8	10	12	6	5	3	5
Class Interval	0-20	20-40	40-60	60-80	80-100	100-120	120-140											
Frequency	6	8	10	12	6	5	3											
<p><b>SECTION – E</b></p> <p><i>Case based study questions</i></p>																		
36	<p><b>Case study -1</b></p> <p>Resident welfare association (RWA) of a society put up three electric poles A,B and C in a society's park. Despite these three poles, some parts of the park a still in dark. So RWA decides to have one more electric pole D in the park.</p> <div style="text-align: center;">  </div> <p>Based on the above information answer the following questions:</p> <p>(i) Find the position of pole C and B.</p> <p>(ii) Find the distance of the pole B from the corner O of the park.</p> <p>(iii) Find the position of 4th pole D so that 4 points A ,B ,C, and D form a parallelogram.</p> <p style="text-align: center;">OR</p> <p>(iii)Find the coordinates of the point P which divides the line AC in the ratio 2:1</p>	<p>1</p> <p>1</p> <p>2</p>																

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**Case study-2**

A man is standing on a point P on a bridge across a river. From P the angles of depression of two points A and B (of the banks) on the opposite sides of the river are  $30^\circ$  and  $45^\circ$ , respectively. The height of the bridge is 3m from the banks.



Based on the above information answer the following questions:

- (i) What is the measure of  $\angle PAD$ .
- (ii) Find the distance AD.
- (iii) Find the width of the river.

Or

Find the distance of point A or B which is nearer to P.

1  
1  
2

38

**Case study – 3**

Sumit wants to buy a car and plans to take loan from a bank for his car. He repays his total loan of rupees 118000 by paying every month starting with the first installment of rupees 1000 and it increases the installment by rupees 100 every month.



Based on the above information answer the following questions:

- (i) Find the amount paid by him in 30th installment.
- (ii) Find the amount paid by him in 30 installments.
- (iii) What amount does he still have to pay after 30th installment

Or

(iii) If the total installments are 40 then amount paid by him in the last installment.

1  
1  
2