

KENDRIYA VIDYALAYA SANGATHAN, LUCKNOW REGION

PRACTICE TEST (2020-21)

CLASS-X

SUBJECT-MATHEMATICS BASIC (CODE-241)

Time allowed: 3 hours

Maximum Marks: 80

General Instructions

1. This question paper contains two parts A and B.
2. Both part A and part B have internal choices.


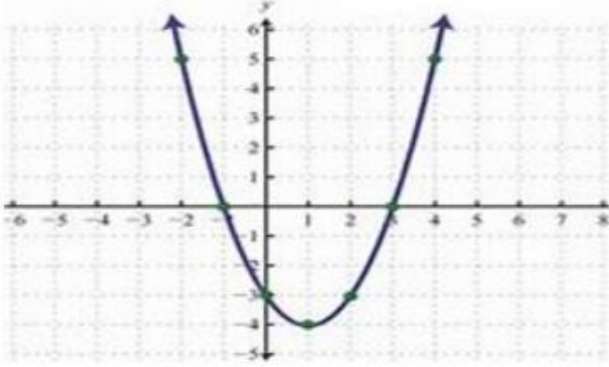
Part-A


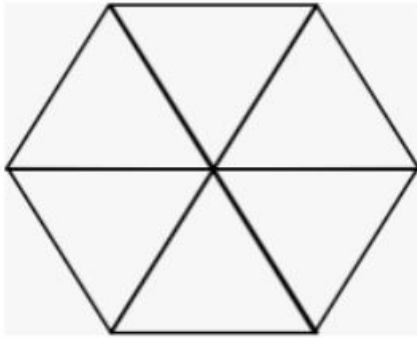
1. It consists two sections I and II.
2. Section I has 16 questions of 1 mark each, internal choice is provided in 5 questions.
3. Section II has 4 questions on case study. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts

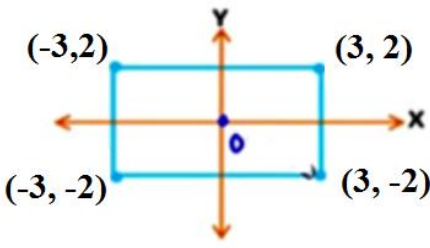
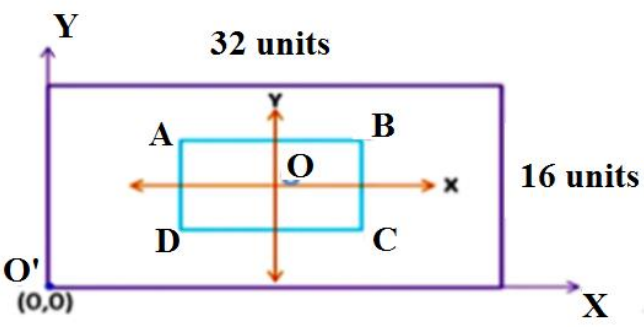

Part-B

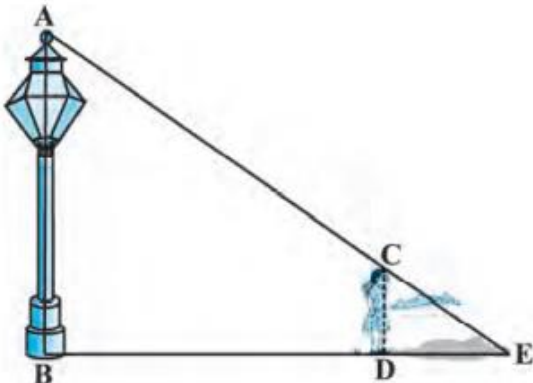
1. Question No.21 to 26 are Very short answer Type questions of 2 marks each.
2. Question No.27 to 33 are Short answer Type questions of 3 marks each.
3. Question No.34 to 36 are Long answer Type questions of 5 marks each.
4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.

PART-A		
SECTION-I		
Q.1	The L.C.M. of two co-prime numbers is always..... <p style="text-align: center;">OR</p> HCF(a,b) x LCM(a,b) =	1Mark
Q.2	The H.C.F. of two consecutive numbers is always.....	1Mark
Q.3	The decimal expansion of an irrational number is always..... <p style="text-align: center;">OR</p> The decimal expansion of rational number $\frac{3}{40}$ is (terminating/ non terminating reccuring)	1Mark
Q.4	The maximum number of zeroes a cubic polynomial can have, is.....	1Mark
Q.5	For what value of k, the following pair of linear equations has no solution: $2x + ky = 1; \quad 3x - 5y = 7$	1Mark
Q.6	Check whether the following system is consistent or not: $3x - y = 3; \quad 9x - 3y = 9$	1Mark
Q.7	State Basic Proportionality Theorem.	1Mark

	OR	
	Two triangles are similar if their corresponding angles are equal and corresponding sides are.....	
Q.8	Find the value of $\sin^2\theta + \frac{1}{1+\tan^2\theta}$	1Mark
	OR	
	Find the value of acute angle θ satisfying: $\sin\theta = \sqrt{3}\cos\theta$.	
Q.9	Find the angle of elevation of the sun when the shadow of a pole, h metres high, is $\sqrt{3}$ h metres long.	1Mark
Q.10	What is the angle between tangent of a circle and radius, at point of contact?	1Mark
Q.11	The area of a semi-circular field is 7700 sq m, then find the diameter of the field.	1Mark
Q.12	Write the formula to find the length of an arc of a circle with central angle θ , where r is the radius of the circle.	1Mark
Q.13	Find the ratio of volumes of a cylinder and a cone of same radius and same height.	1Mark
Q.14	Write the empirical relationship among mean, median and mode.	1Mark
Q.15	What is the probability of an impossible event.	1Mark
	OR	
	A fair die is thrown. Find the probability of getting a number 7 on the upper face of a die.	
Q.16	If $P(E) = 0.95$ then $P(\text{not } E) = \dots\dots\dots$	1Mark
	SECTION-II	
Q.17	Case Study-1	
	 <p>Due to heavy storm an electric wire got bent as shown in the figure. It followed a mathematical shape. Answer the following questions below.</p> 	

	i) Name the shape in which the wire is bent a) Spiral b) ellipse c) linear d) Parabola	1Mark
	ii)) How many zeroes are there for the polynomial (shape of the wire) a) 2 b) 3 c) 1 d) 0	1Mark
	iii) The zeroes of the polynomial are a) -1, 5 b) -1, 3 c) 3, 5 d) -4, 2	1Mark
	iv) What will be the expression of the polynomial? a) x^2+2x-3 b) x^2-2x+3 c) x^2-2x-3 d) x^2+2x+3	1Mark
	v) What is the value of the polynomial if $x = -1$? a) 6 b) -18 c) 18 d) 0	1Mark
Q.18	<p>Case Study-2</p> <p style="text-align: center;">Beehive</p> <p>A beehive is an enclosed cell structure in which some honeybee species of the subgenus Apis live and raise their young. Each cell is the form of hexagonal shape. In a regular hexagon, there are six edges of equal lengths. Taking O as centre, join all the vertices with the centre.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <p><i>Similarity of Triangles:</i> Two triangles are said to be similar if - Corresponding angles are equal and - Corresponding sides are proportional.</p>	
	i) Find the number of equilateral triangles in the given figure. (a) 6 (b) 4 (c) 3 (d) 8	1Mark
	ii) If the areas of two equilateral triangles are equal, then these are always (a) Similar only (b) Congruent only (c) Both similar and congruent (d) None of these	1Mark
	iii) How many triangles are similar in the given figure (a) 6 (b) 4 (c) 3 (d) 8	1Mark
	iv) Find the area of equilateral triangle if each edge is 6 units. (a) 2 sq units (b) $6\sqrt{3}$ sq units (c) $4\sqrt{3}$ sq units (d) $9\sqrt{3}$ sq units	1Mark
	v) Find the area of hexagon, if each edge is 6 units. (a) 12 sq units (b) $54\sqrt{3}$ sq units (c) $36\sqrt{3}$ sq units (d) $24\sqrt{3}$ sq units	1Mark

<p>Q.19</p>	<p>Case Study-3</p> <p>Plotter:</p> <p>Suresh has a rectangular sketch, which he needs to draw on a paper of length and breadth 32 units and 16 units respectively, using a plotter. Plotter is a device which is attached to a computer like a printer. It is used for drawing complicated sketches. Plotter accepts only positive coordinates where the point (0, 0) is the left bottom corner of the paper. The sketch ABCD needs to be centrally aligned on the paper. Find the coordinates of A, B, C and D to be plotted to get the sketch plotted as needed.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>(Sketch 1)</p> </div> <div style="text-align: center;">  <p>(Sketch 2)</p> </div> </div>	
	<p>i) The coordinates of point O in the sketch 2 is _____.</p> <p>a) (0, 0) b) (16, 8) c) (8, 16) d) (16, 32)</p>	<p>1Mark</p>
	<p>ii) The coordinates of A, B, C, D are :</p> <p>a) (32, 10), (32, -10), (32, 6), (32, -6) b) (19, 10), (19, -10), (13, 6), (13, -6)</p> <p>c) (13, 10), (19, 10), (19, 6), (13, 6) d) (13, -10), (19, 10), (13, -6), (19, -6)</p>	<p>1Mark</p>
	<p>iii) In the sketch 2, if the point O divides \overline{AC} in the ratio k : 1 , then the value of k is _____.</p> <p>a) 2 b) 1 c) 1/2 d) 3</p>	<p>1Mark</p>
	<p>iv) The point on the y-axis (in sketch 2) which is equidistant from the points B and C is _____.</p> <p>a) (0, 8) b) (8, 0) c) (-8, 0) d) (0, -8)</p>	<p>1Mark</p>
	<p>v) The point on the x-axis (in sketch 2) which is equidistant from the points C and D is _____.</p> <p>a) (0, -16) b) (16, 0) c) (-16, 0) d) (0, 16)</p>	<p>1Mark</p>
<p>Q.20</p>	<p>Case Study-4</p> <p>WATER SUMP :</p> <p>Underground water sump is popular in India. It is usually used for large water sump storage and can be built cheaply using cement-like materials. Underground water sumps are typically chosen by people who want to save space. The water in the underground sump is not affected by extreme weather conditions. The underground sump maintains cool temperatures in both winter and summer.</p> <div style="text-align: center;">  </div>	

	A builder wants to build a sump to store water in an apartment. The volume of the rectangular sump will be modelled by $V(x) = (x + 1)(x^2 - 4)$	
	i) He planned it to be of length $(x + 1)$ units and breadth $(x + 2)$ units. How much he has to dig? a) $(x + 1)$ b) $(x - 2)$ c) $(x - 3)$ d) $(x + 2)$	1Mark
	ii) If $x = 3$ meter, what is the volume of the sump? a) $30 m^3$ b) $20 m^3$ c) $15 m^3$ d) $60 m^3$	1Mark
	iii) If $x = 3$ and the builder wants to paint the entire inner portion (excluding roof) on the sump, what is the total area to be painted? a) $38 m^2$ (b) $20 m^2$ (c) $45 m^2$ (d) $62 m^2$	1Mark
	iv) If the cost of paint is Rs. 40/ per square metre, what is the cost of painting? a) Rs 800 (b) Rs 1800 (c) Rs 1520 (d) Rs 2480	1Mark
	v) What is the storage capacity of this sump? a) 3000 litre (b) 6000 litre (c) 60000 litre (d) 20000 litre	1Mark
	PART-B	
Q.21	Find the 15 th term of the AP: -4, 4, 12, 20,	2Marks
Q.22	Prove that the square of the hypotenuse of a right triangle is equal to the sum of squares of the other two sides. OR A girl of height 90 cm is walking away from the base of a lamp post at a speed of 1.2 m/s. If the lamp is 3.6 m above the ground, find the length of her shadow after 4 seconds. 	2Marks
Q.23	Find the coordinates of the point which divides the join of $(-1, 7)$ and $(4, -3)$ in the ratio 2:3. OR Find the point on the x-axis which is equidistant from $(2, -5)$ and $(-2, 9)$	2Marks
Q.24	Evaluate: $2\tan^2 45^\circ + \cos^2 30^\circ - \sin^2 60^\circ$	2Marks
Q.25	Draw a circle of radius 6 cm. From a point 10 cm away from its centre, construct the pair of tangents to the circle .	2Marks
Q.26	Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle.	2Marks
Q.27	Prove that $\sqrt{5}$ is an irrational number.	3Marks
Q.28	A fraction becomes $\frac{1}{3}$ when 1 is subtracted from the numerator and it becomes $\frac{1}{4}$ when 8 is added to its denominator. Find the fraction.	3Marks

Q.29	Check whether the equation $6x^2 - 7x + 2 = 0$ has real roots, and if it has, find them. OR Find the roots of the quadratic equation $3x^2 - 2\sqrt{6}x + 2 = 0$.	3Marks														
Q.30	Prove that $1 + \frac{\cot^2 \alpha}{1 + \operatorname{cosec} \alpha} = \operatorname{cosec} \alpha$ OR Show that: $\tan^4 \theta + \tan^2 \theta = \sec^4 \theta - \sec^2 \theta$	3Marks														
Q.31	Prove that the lengths of tangents drawn from an external point to the circle are equal.	3Marks														
Q.32	A solid metallic sphere of radius 10.5 cm is melted and recast into a number of small cones, each of radius 3.5 cm and height 3 cm. Find the number of cones so formed.	3Marks														
Q.33	One card is drawn from a well-shuffled pack of 52 playing cards. Find the probability of getting i) A king of black colour ii) Either a red card or a Jack iii) Not a face card	3Marks														
Q.34	Which term of the AP: 20, 17, 14, . . . is -82 ? Will zero appear in the above AP? Give reason for your answer.	5Marks														
Q.35	The angles of depression of the top and bottom of a 8m tall building from the top of a multi storied building are 30° and 45° , respectively. Find the height of the multi storied building and the distance between the two buildings. OR The shadow of a tower standing on a level plane is found to be 50 m longer when Sun's elevation is 30° than when it is 60° . Find the height of the tower.	5Marks														
Q.36	A survey regarding the heights in (cm) of 50 girls of class X of a school was conducted and the following data was obtained. Find the median height and the mean using the formulae. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Height(cm)</th> <th>135-140</th> <th>140-145</th> <th>145-150</th> <th>150-155</th> <th>155-160</th> <th>160-165</th> </tr> </thead> <tbody> <tr> <td>Number of Girls</td> <td>4</td> <td>7</td> <td>12</td> <td>15</td> <td>10</td> <td>2</td> </tr> </tbody> </table>	Height(cm)	135-140	140-145	145-150	150-155	155-160	160-165	Number of Girls	4	7	12	15	10	2	5Marks
Height(cm)	135-140	140-145	145-150	150-155	155-160	160-165										
Number of Girls	4	7	12	15	10	2										