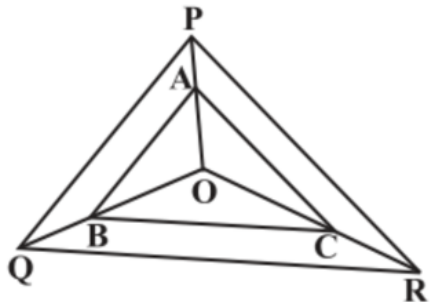
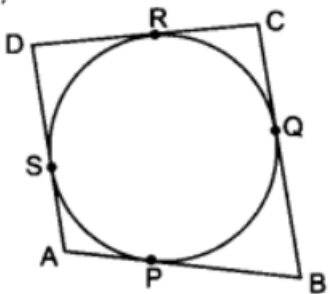


KENDRIYA VIDYALAYA SANGATHAN, REGIONAL OFFICE LUCKNOW**Pre-Board Exam 2022-23 (Class-10)****Subject: Mathematics-Basic (241)****Time Allowed: 3 Hours****Maximum Marks: 80****General Instructions:**

1. This question paper has 5 sections A-E
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. section E has 3 case based integrated units of assessment (04 marks each) with sub parts of the values 1, 1 and 2 marks each respectively.
7. All questions are compulsory. However internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Qs of 2 marks has been provided. An internal choice has been provided in 2 marks questions of section E.
8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$, wherever required if not stated.

Q. No.	Section-A	Marks
1	If two positive integers a and b are written as $a = x^3 y^2$ and $b = xy^3$; x, y are prime numbers, then HCF (a, b) is a) xy b) $x^2 y^2$ c) xy^2 d) $x^3 y^3$	1
2	If LCM (54, 102) = 51m, then value of m is a) 18 b) 27 c) 6 d) 9	1
3	If $m^n = 32$, then the value of m^{m+n} is a) 64 b) 128 c) 10 d) 7	1
4	A quadratic polynomial can have..... a) at most one zero b) at most two zeros c) at most three zeros d) at least two zeros	1
5	The highest power of a variable in a polynomial is called.....of the polynomial. a) zero b) value c) degree d) term	1
6	A system of two linear equations in two variables is said to be inconsistent if has..... a) at least one solution b) at least two solutions c) no solution d) many solutions	1
7	Which of the following is not a quadratic equation? a) $(x - 2)^2 + 1 = 2x - 3$ b) $x(x + 1) + 8 = (x + 2)(x - 2)$ c) $x(2x + 3) = x^2 + 1$ d) $(x + 2)^3 = x^3 - 4$	1
8	The 10 th term of the AP 2, 7, 12, is a) 74 b) 47 c) 23 d) 32	1
9	Which of the following is not progression? a) 2, 2, 2, 2, 2..... b) 10, 5, 0, -5, -10, -15 c) 1, 4, 9, 16, 25..... d) 1, -2, 3, -4, 5, -6,	1
10	If the points A(4, 3) and B(x, 5) are on the circle with centre O(2, 3), then the value of x is a) 0 b) 1 c) 2 d) 3	1

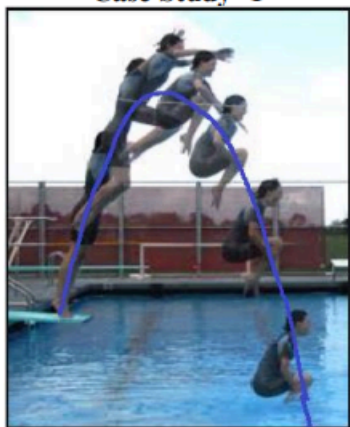
11	The distance of the point $(-4, 3)$ from y-axis is a) 4 b) -4 c) 5 d) 7	1
12	ΔABC is an equilateral triangle with each side of length $2p$. If $AD \perp BC$ then the value of AD is (a) $\sqrt{3}$ (b) $\sqrt{3}p$ (c) $2p$ (d) $4p$	1
13	If in triangles ABC and DEF , $\frac{AB}{DE} = \frac{BC}{FD}$, then they will be similar, when a) $\angle B = \angle E$ b) $\angle A = \angle D$ c) $\angle B = \angle D$ d) $\angle A = \angle F$	1
14	If $2 \sin 2\theta = \sqrt{3}$, then the value of $\cos 2\theta$ is a) $\frac{\sqrt{3}}{2}$ b) $\frac{1}{\sqrt{2}}$ c) $\frac{1}{2}$ d) 1	1
15	If $\sin A + \sin^2 A = 1$, then the value of the expression $(\cos^2 A + \cos^4 A)$ is a) 1 b) $\frac{1}{2}$ c) 2 d) 3	1
16	If $\sin \alpha = \frac{1}{2}$ and $\cos \beta = \frac{1}{2}$, then the value of $(\alpha + \beta)$ is a) 0° b) 30° c) 60° d) 90°	1
17	A tree casts a shadow 15 m long on the level of ground, when the angle of elevation of the sun is 45° . The height of a tree is (a) 10 m (b) 14 m (c) 8 m (d) 15 m	1
18	The ratio of the length of a rod and its shadow is $1 : \sqrt{3}$. The angle of elevation of the sun is a) 90° b) 60° c) 30° d) 45°	1
19	A sector of circle is known as quadrant if its degree measure is a) 45° b) 180° c) 60° d) 90°	1
20	Area of a sector of angle θ is (in degree) of a circle with radius 'r' is given by a) $\frac{\theta}{90^\circ} \times \pi r^2$ b) $\frac{\theta}{180^\circ} \times \pi r^2$ c) $\frac{\theta}{360^\circ} \times \pi r^2$ d) $\frac{\theta}{60^\circ} \times \pi r^2$	1
	Section-B	
21	Explain why $7 \times 11 \times 13 + 13$ is composite number. OR Express the composite number 140 as the product of its prime factors.	2
22	Find the ratio in which the line segment joining the points $(-3, 10)$ and $(6, -8)$ is divided by $(-1, 6)$	2
23	To a circle of radius 7 cm, tangent PT is drawn from a point P such that $PT = 24$ cm. If O is the centre of the circle, then find the length of PR .	2
24	Prove the trigonometric identity $\cos^2 A + \sin^2 A = 1$ OR Prove that: $\frac{1 + \sec A \sec A}{\sec A \sec A} = \frac{\sin^2 A}{1 - \cos A \cos A}$	2
25	The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes.	2
	Section-C	
26	Prove that $\sqrt{5}$ is irrational.	3
27	Diagonals AC and BD of a trapezium $ABCD$ with $AB \parallel DC$ intersect each other at the point O . Using a similarity criterion for two triangles, show that $\frac{OA}{OC} = \frac{OB}{OD}$	3

28	<p>In given figure, A, B and C are points on OP, OQ and OR respectively such that $AB \parallel PQ$ and $AC \parallel PR$. Show that $BC \parallel QR$</p> 	3
29	<p>A quadrilateral ABCD is drawn to circumscribe a circle (see adjoining figure). Prove that $AB + CD = AD + BC$</p> 	3
30	<p>Prove that: $\frac{\cot \cot A - \cos \cos A}{\cot \cot A + \cos \cos A} = \frac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1}$</p> <p style="text-align: center;">OR</p> <p>Prove that: $\sqrt{\frac{1 + \sin A}{1 - \sin A}} = \sec A + \tan A$</p>	3
31	<p>In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find the area of sector formed by the arc.</p> <p style="text-align: center;">OR</p> <p>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.</p>	3
Section-D		
32	<p>The sum of a two-digit number and the number obtained by reversing the digits is 66. If the digits of the number differ by 2, find the number. How many such numbers are there?</p> <p style="text-align: center;">OR</p> <p>Solve $2x + 3y = 17$ and $x - 4y = -19$ and hence find the value of 'm' for which $y = mx + 3$.</p>	5
33	<p>If the sum of the first 'n' terms of an AP is $4n - n^2$, what is the first term (that is S_1) ? What is the sum of first two terms? What is the second term? Similarly find the 10^{th} and the n^{th} terms.</p>	5
34	State and prove basic proportionality theorem.	5
35	<p>From a point on the ground, the angle of elevation of the bottom and the top of a transmission tower fixed at the top of a 20 m high building are 45° and 60° respectively. Find the height of the tower.</p> <p style="text-align: center;">OR</p> <p>A 1.5 m tall boy is standing at some distance from a 30 m tall building. The angle of elevation from his eyes to the top of the building increases from 30° to 60° as he walks towards the building. Find the distance he walked towards the building.</p>	5

Section-E

36

Case Study -1



The figure given alongside shows the path of a diver, when she takes a jump from the diving board. Clearly it is a parabola.

Annie was standing on a diving board, 48 feet above the water level. She took a dive into the pool. Her height (in feet) above the water level at any time 't' in seconds is given by the polynomial h(t) such that

$$h(t) = -16t^2 + 8t + k.$$

- What is the value of k?
- At what time will she touch the water in the pool?
- Rita's height (in feet) above the water level is given by another polynomial p(t) with zeroes -1 and 2. Then find the polynomial p(t).

OR

Find a quadratic polynomial, the sum and product of whose zeroes are -3 and 2, respectively.

1+1+2

37

Case Study -2

A **hockey field** is the playing surface for the game of hockey. Historically, the game was played on natural turf (grass) but nowadays it is predominantly played on an artificial turf.

It is rectangular in shape - 100 yards by 60 yards. Goals consist of two upright posts placed equidistant from the centre of the backline, joined at the top by a horizontal crossbar. The inner edges of the posts must be 3.66 metres (4 yards) apart, and the lower edge of the crossbar must be 2.14 metres (7 feet) above the ground.

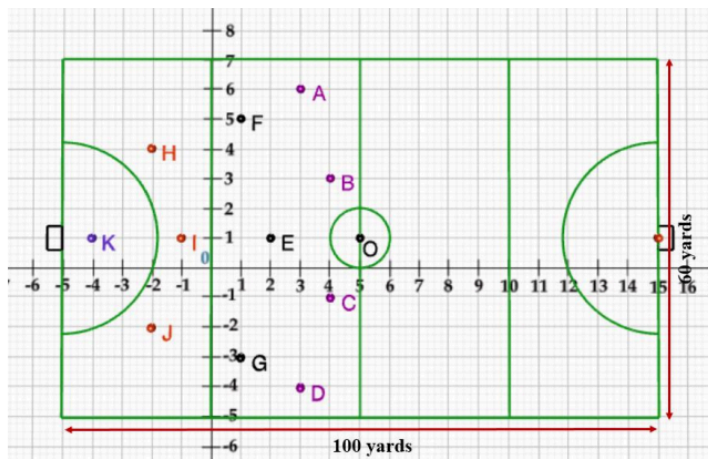
Each team plays with 11 players on the field during the game including the goalie.

Positions you might play include-

- **Forward:** As shown by players A, B, C and D.
- **Midfielders:** As shown by players E, F and G.
- **Fullbacks:** As shown by players H, I and J.
- **Goalie:** As shown by player K.

Using the picture of a hockey field below, answer the questions that follow:

1+1+2



- Find the point on x-axis which is equidistant from I and E.
- Find the coordinates of the point on y-axis which is equidistant from points B and C.
- What are the coordinates of the position of player Q such that his distance from K is twice his distance from E, and K, Q and E are collinear?

OR

If a player P needs to be at equal distances from A and G, such that A, P and G are in straight line, then find the coordinates of the position of P.

38 Case-study-3

In an auditorium, seats are arranged in rows and columns. The number of rows were equal to the number of seats in each row. When the number of rows were doubled and the number of seats in each row was reduced by 10, the total number of seats increased by 300.



1+1+2

	<p>a) If x is taken as number of rows in original arrangement. Find the quadratic equation which describes the situation?</p> <p>b) How many numbers of rows are there in the original arrangement?</p> <p>c) How many numbers of seats are there in the auditorium in original arrangement?</p> <p style="text-align: center;">OR</p> <p>How many numbers of seats are there in the auditorium after re-arrangement?</p>	
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