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Second Pre-Board Exam 2023-24 (Class-X)

Subject: Mathematics-Standard (041)

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.

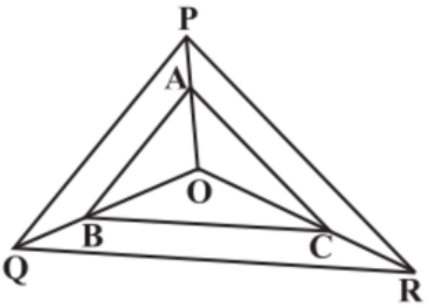
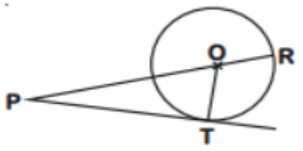
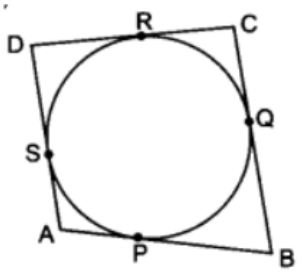
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub parts of the values 1, 1 and 2 marks each respectively.

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	A cylindrical pencil sharpened at one edge is the combination of which two solid figures? a) Sphere and cone b) cone and triangle c) cuboid and cone d) cylinder and cone	1
2	The area of a sector of a circle of radius 2 cm is π sq cm, then what is the central angle of the sector? a) 90^0 b) 45^0 c) 30^0 d) 60^0	1
3	If $m^n = 32, where\ \ m, n\ are\ natural\ number$; then the value of m^{m+n} is a) 64 b) 128 c) 10 d) 7	1
4	Area of a sector of angle θ is (in degree) of a circle with radius 'r' is given by a) $\frac{\theta}{90^0}\times\pi r^2$ b) $\frac{\theta}{360^0}\times 2\pi r$ c) $\frac{\theta}{360^0}\times\pi r^2$ d) $\frac{\theta}{60^0}\times\pi r^2$	1
5	The highest power of a variable in a non-zero 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 it 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) $(x-3)^2+1=2x-3$ b) $x(x+1)+8=(x+2)(x-2)$ c) $x(2x+5)=x^2+1$ d) $(x-2)^3=x^3-4$	1
8	The 10^{th} term of the AP 3, 8, 13, …….. is a) 84 b) 48 c) 23 d) 43	1
9	Which of the following is an A P ? a) 1, 2, 1, 2, 1, . . . b) -1, -3, -5, 5, 3, 1 . . . c) -1, -4, -7, -10, . . . d) 1, -2, 3, -4, 5, -6, . . .	1
10	If the points A(4, y) and B(2, 5) are on the circle with centre O(2, 3), then the value of y is :	1

	a) 0 b) 1 c) 2 d) 3	
11	The distance of the point $(5, -3)$ from x-axis is a) 3 b) 4 c) 5 d) 2	1
12	The median of the following data is: 1, 7, 9, 3, 4, 5, 6 a) 3 b) 4 c) 5 d) 6	1
13	If in triangles ABC and DEF, $\frac{AB}{DE} = \frac{AC}{EF}$, then they will be similar, when a) $\angle B = \angle E$ b) $\angle A = \angle D$ c) $\angle B = \angle F$ *d)* $\angle A = \angle E$	1
14	For the following distribution: Class | 0-5 | 5-10 | 10-15 | 15-20 | 20-25 frequency | 10 | 15 | 12 | 20 | 9 The sum of the upper limit and lower limit of the modal class is a) 25 b) 35 c) 45 d) 20	1
15	A card is selected at random from a well shuffled deck of 52 cards. The probability of its being a red face card is a) $\frac{3}{26}$ b) $\frac{3}{13}$ c) $\frac{2}{13}$ d) $\frac{1}{2}$	1
16	If $tan\,\alpha = \frac{1}{\sqrt{3}}$ and $cot\,\beta = \frac{1}{\sqrt{3}}$, then the value of $(\alpha + \beta)$ *is* a) 0^0 b) 30^0 c) 60^0 d) 90^0	1
17	How many parallel tangents can be drawn on a circle? a) 2 b) 3 c) 4 d) 10	1
18	If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle 100^0, then $\angle POA$ is equal to a) 50^0 b) 60^0 c) 40^0 d) 80^0	1
19	**Assertion (A):** The ratio of the length of a rod and its shadow is $\sqrt{3}:1$, *then the* angle of elevation of the sun is 60^0. **Reason (R)** : $\tan 60^0 = \sqrt{3}$ 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.	1
20	**Assertion (A):** $x^2 + 4x + 5$ has two real zeroes. **Reason (R)** : A quadratic polynomial can have at the most two zeroes. 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.	
	Section-B	
21	Explain why 1×2×3×4×5 + 3 is composite number.	2

	OR Express the composite number 270 as the product of its prime factors.	
22	In given figure, A, B and C are points on OP, OQ and OR respectively such that $AB \| PQ$ and $AC \| PR$. Show that BC$\|QR$ 	2
23	In figure, on 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: $\frac{1+\text{sec}sec\ A}{\text{sec}sec\ A} = \frac{sin^2 A}{1-\text{cos}cos\ A}$	2
25	The largest possible sphere is carved out of wooden solid cube of edge 7 cm. What is the radius of this sphere?	2
	Section-C	
26	Prove that $\sqrt{5}$ is irrational.	3
27	A bag contains 3 red and 5 blue balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is: a) Red b) yellow c) not green ball	3
28	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? **OR** Solve $3x - 2y = -7\ and\ x - 4y = -19\ and$ hence find the value of 'm' for which $y = mx + 3$.	3
29	A quadrilateral ABCD is drawn to circumscribe a circle (see adjoining figure). Prove that AB + CD = AD + BC 	3
30	Prove that: $\frac{\text{cot}cot\ A-\text{cos}cos\ A}{\text{cot}cot\ A+\text{cos}cos\ A} = \frac{cosec\ A-1}{cosec\ A+1}$ **OR**	3

	Prove that: $\sqrt{\frac{1+\sin\sin A}{1-\sin\sin A}} = \sec sec\ A + \tan tan\ A$	
31	Determine the AP whose third term is 5 and seventh term is 9.	3
	Section-D	
32	A right cylindrical container of radius 6 cm and height 15 cm is full of ice-cream, which has to be distributed to 10 children in equal cones having hemispherical shape on the top. If the height of the conical portion is four times its base radius, find the radius of the ice-cream cone.	5
33	**The following frequency distribution gives the monthly consumption of an electricity of 68 consumers in a locality. Find the median of the data.** Monthly consumption: 65-85 | 85-105 | 105-125 | 125-145 | 145-165 | 165-185 | 185-205 No. of customers: 4 | 5 | 13 | 20 | 14 | 8 | 4 **OR** A survey conducted on 20 households in a locality by a group of students resulted in the following frequency table for the number of family members in a household: Family size: 1-3 | 3-5 | 5-7 | 7-9 | 9-11 Number of families: 7 | 8 | 2 | 2 | 1 Find the mode of this data.	5
34	State and prove basic proportionality theorem.	5
35	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 45^0 and 60^0 respectively. Find the height of the tower. **OR** 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.	5

Section-E

36 1+1+2

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

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

a) What is the value of k?

b) At what time will she touch the water in the pool?

c) Rita's height (in feet) above the water level is given by another polynomial p(t) with zeroes -2 ans 3. Then find the polynomial p(t).

OR

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

37 1+1+2

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:

	a) Find the point on x-axis which is equidistant from I and E. b) Find the coordinates of the point on y-axis which is equidistant from points B and C. 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** c) 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. a) If x is taken as which describes t b) How many nu c) How many nu How many numb 	1+1+2