CLASS X (2019-20)
MATHEMATICS STANDARD(041)
SAMPLE PAPER-1

Time : 3 Hours **Maximum Marks : 80**

General Instructions :

(i) All questions are compulsory.
(ii) The questions paper consists of 40 questions divided into four sections A, B, C and D.
(iii) Section A comprises of 20 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each. Section C comprises of 8 questions of 3 marks each. Section D comprises of 6 questions of 4 marks each.
(iv) There is no overall choice. However, an internal choices have been provided in two questions of 1 mark each, two questions of 2 marks each, three questions of 3 marks each, and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
(v) Use of calculators is not permitted.

SECTION A

Q.1-Q.10 are multiple choice questions. Select the most appropriate answer from the given options.

Q1. If p_1 and p_2 are two odd prime numbers such that $p_1 > p_2$, then $p_1^2 - p_2^2$ is [1]
(a) an even number (b) an odd number
(c) an odd prime number (d) a prime number

Q2. The points (7, 2) and $(-1, 0)$ lie on a line [1]
(a) $7y = 3x - 7$ (b) $4y = x + 1$
(c) $y = 7x + 7$ (d) $x = 4y + 1$

Q3. If $\frac{1}{2}$ is a root of the equation $x^2 + kx - \frac{5}{4} = 0$, then the value of k is [1]
(a) 2 (b) -2
(c) $\frac{1}{4}$ (d) $\frac{1}{2}$

Q4. If the nth term of an A.P. is given by $a_n = 5n - 3$, then the sum of first 10 terms if [1]
(a) 225 (b) 245
(c) 255 (d) 270

Q5. It is given that $\Delta ABC \sim \Delta PQR$ with $\frac{BC}{QR} = \frac{1}{3}$. Then $\frac{\text{ar}(\Delta PRQ)}{\text{ar}(\Delta BCA)}$ is equal to [1]
(a) 9 (b) 3
(c) $\frac{1}{3}$ (d) $\frac{1}{9}$

Q6. Ratio in which the line $3x + 4y = 7$ divides the line segment joining the points (1, 2) and $(-2, 1)$ is [1]
(a) 3 : 5 (b) 4 : 6
(c) 4 : 9 (d) None of these

Q7. $(\cos^4 A - \sin^4 A)$ is equal to [1]
(a) $1 - 2\cos^2 A$ (b) $2\sin^2 A - 1$
(c) $\sin^2 A - \cos^2 A$ (d) $2\cos^2 A - 1$

Q8. Two chords AB and CD of a circle intersect at E such that $AE = 2.4$ cm, $BE = 3.2$ cm and $CE = 1.6$ cm. The length of DE is [1]
(a) 1.6 cm (b) 3.2 cm
(c) 4.8 cm (d) 6.4 cm

Q9. To divide a line segment AB in the ratio 3 : 4, we draw a ray AX, so that $\angle BAX$ is an acute angle and then mark the points on ray AX at equal distances such that the minimum number of these points is [1]

(a) 3 (b) 4

(c) 7 (d) 10

Q10. If the radius of the sphere is increased by 100%, the volume of the corresponding sphere is increased by [1]

(a) 200% (b) 500%

(c) 700% (d) 800%

(Q.11-Q.15) Fill in the blanks.

Q11. H.C.F. of 6, 72 and 120 is ..... [1]

Q12. If α and β are the zeroes of the quadratic polynomial $ax^2 + bx + c$, then $\alpha + \beta = -\ b/$..... and $\alpha\beta = c/$..... [1]

OR

Degree of remainder is always ..... than degree of divisor.

Q13. Length of arc of a sector angle 45° of circle of radius 14cm is ..... [1]

Q14. The length of the diagonal of a cube that can be inscribed in a sphere of radius 7.5 cm is ..... [1]

Q15. A dice is thrown once, the probability of getting a prime number is ..... [1]

(Q.16-Q.20) Answer the following

Q16. Find the positive root of $\sqrt{3x^2 + 6} = 9$. [1]

Q17. The diameter of a wheel is 1.26 m. What the distance covered in 500 revolutions. [1]

Q18. A rectangular sheet paper 40 cm $\times$ 22 cm is rolled to form a hollow cylinder of height 40 cm. Find the radius of the cylinder. [1]

OR

A cylinder, a cone and a hemisphere have same base and same height. Find the ratio of their volumes.

Q19. If the median of a series exceeds the mean by 3, find by what number the mode exceeds its mean? [1]

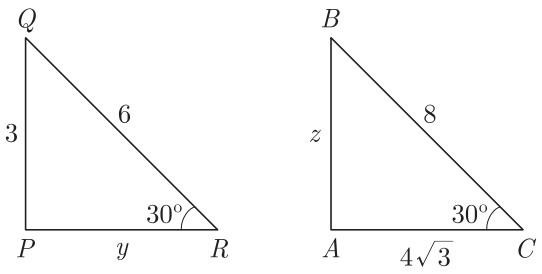
Q20. 20 tickets, on which numbers 1 to 20 are written, are mixed thoroughly and then a ticket is drawn at random out of them. Find the probability that the number on the drawn ticket is a multiple of 3 or 7. [1]

SECTION B

Q21. Solve the following pair of linear equations by cross multiplication method: [2]

$$x + 2y = 2$$
$$x - 3y = 7$$

Q22. In the given figure, $\Delta\, ABC \sim \Delta\, PQR$. Find the value of $y + z$. [2]

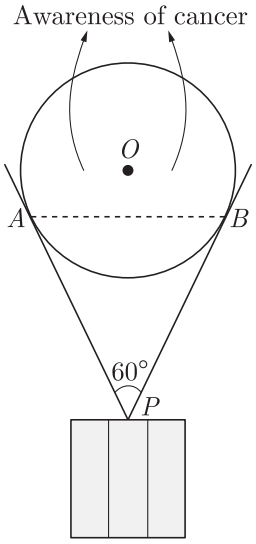


Q23. If the point $P(x, y)$ is equidistant from the points $Q(a + b, b - a)$ and $R(a - b, a + b)$, then prove that $bx = ay$. [2]

OR

Show that the points $A(0,1), B(2,3)$ and $C(3,4)$ are collinear.

Q24. As a part of a campaign, a huge balloon with message of "AWARENESS OF CANCER" was displayed from the terrace of a tall building. It was held by string of length 8 m each, which inclined at an angle of 60° at the point, where it was tied as shown in the figure. [2]



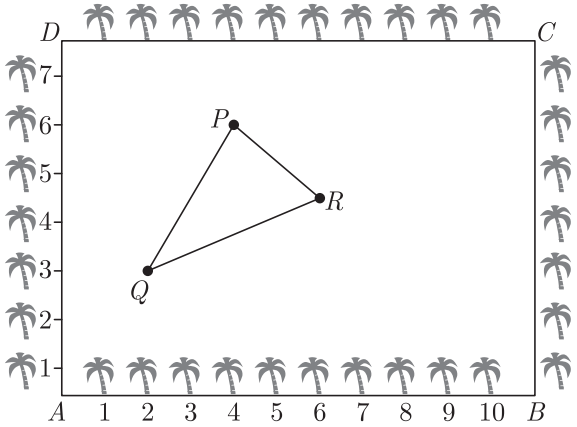
i. What is the length of AB?
ii. If the perpendicular distance from the centre of the circle to the chord AB is 3 cm, then find the radius of the circle.

Q25. Find the mean of the data using an empirical formula when it is given that mode is 50.5 and median in 45.5. [2]

OR

A bag contains 6 red and 5 blue balls. Find the probability that the ball drawn is not red.

Q26. The Class XII students of a senior secondary school in Kishangarh have been allotted a rectangular plot of land for this gardening activity as shown in figure [2]



Sapling of Neem tree are planted on the boundary at a distance of 1 m from each other. There is a triangular grassy lawn in the plot as shown in above figure.
The students are to sow seeds of flowering plants on the remaining area of the plot.
Then, taking A a origin, find the area of the triangle in this case.

SECTION C

Q27. Quadratic polynomial $2x^2 - 3x + 1$ has zeroes as α and β. Now form a quadratic polynomial whose zeroes are 3α and 3β . [3]

OR

If α and β are the zeroes of a quadratic polynomial such that $\alpha + \beta = 24$ and $\alpha - \beta = 8$. Find the quadratic polynomial having α and β as its zeroes.

Q28. Solve using cross multiplication method: [3]

$$5x+4y-4 = 0$$
$$x-12y-20 = 0$$

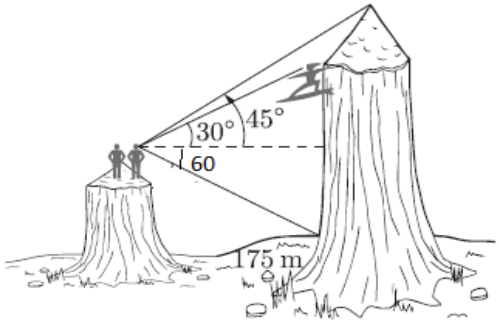
Q29. Find the 20^{th} term of an A.P. whose 3^{rd} term is 7 and the seventh term exceeds three times the 3^{rd} term by 2. Also find its n^{th} term (a_n). [3]

OR

In an A.P. the sum of first n terms is $\frac{3n^2}{2}+\frac{13n}{2}$. Find the 25^{th} term.

Q30. In a trapezium $ABCD$, diagonals AC and BD intersect at O and $AB = 3DC$, then find ratio of areas of triangles COD and AOB. [3]

Q31. A local Outdoors Club has just hiked to the south rim of a large canyon, when they spot a climber attempting to scale the taller northern face. Knowing the distance between the sheer walls of the northern and southern faces of the canyon is approximately 175m, they attempt to compute the distance remaining for the climbers to reach the top of the northern rim. Using a homemade transit, they sight an angle of depression of 60° to the bottom of the north face, and angles of elevation of 30° and 45° to the climbers and top of the northern rim respectively.
(a) How high is the southern rim of the canyon?
(b) How high is the northern rim?
(c) How much farther until the climber reaches the top? [3]



Q32. ABC is a triangle. A circle touches sides AB and AC produced and side BC at BC at X, X, Y and Z respectively. Show that $AX = \frac{1}{2}$ perimeter of ΔABC. [3]

OR

In ΔABD, $AB = AC$. If the interior circle of ΔABC touches the sides AB, BC and CA at D, E and F respectively. Prove that E bisects BC.

Q33. Construct a ΔABC in which $AB = 4$ cm, $BC = 5$cm and $AC = 6$cm. Then construct another triangle whose sides are $\frac{2}{3}$ times the corresponding sides of ΔABC. [3]

Q34. Hari, standing on the top of a building, sees the top of a tower at an angle of elevation of 50° and the foot of the tower at an angle of depression of 20°. Hari is 1.6 metre tall and the height of the building on which he is standing is 9.2 mitres. [3]
(a) Draw a rough sketch according to the given information.
(b) How far is the tower from the building?
(c) Calculate the height of the tower.
[$\sin 20^\circ = 0.34$, $\cos 20^\circ = 0.94$, $\tan 20^\circ = 0.36$

$\sin 50^\circ = 0.77$, $\cos 50^\circ = 0.64$, $\tan 50^\circ = 1.19$]

SECTION D

Q35. For any positive integer n, prove that $n^3 - n$ is divisible by 6. [4]

OR

Prove that $\sqrt{3}$ is an irrational number. Hence, show that $7+2\sqrt{3}$ is also an irrational number.

Q36. Solve for x : $\left(\frac{2x}{x-5}\right)^2+\left(\frac{2x}{x-5}\right)-24 = 0, x \neq 5$ [4]

Q37. The base BC of an equilateral triangle ABC lies on y-axis. The co-ordinates of point C are $(0,3)$. The origin is the mid-point of the base. Find the co-ordinates of the point A and B. Also find the co-ordinates of another point D such that

$BACD$ is a rhombus. [4]

OR

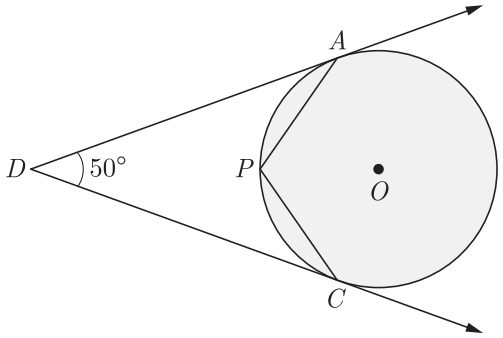
Prove that the area of a triangle with vertices $(t, t-2), (t+2, t+2)$ and $(t+3)$ is independent of t.

Q38. From the top of tower, 100 m high, a man observes two cars on the opposite sides of the tower with the angles of depression 30° & 45° respectively. Find the distance between the cars. (Use $\sqrt{3} = 1.73$) [4]

OR

From the top of a 7 m high building, the angle of elevation of the top of a tower is 60° and the angle of depression of its foot is 45°. Find the height of the tower. (Use $\sqrt{3} = 1.732$)

Q39. In the given figure, O is the centre of the circle. Determine $\angle APC$, if DA and DC are tangents and $\angle ADC = 50^\circ$. [4]



Q40. The following distribution gives the weights of 60 students of a class. Find the mean and mode weights of the students. [4]

Weight (in kg)	40-44	44-48	48-52	52-56	56-60	60-64	64-68	68-72
Number of students	4	6	10	14	10	8	6	2