CLASS X (2019-20)
MATHEMATICS STANDARD(041)
SAMPLE PAPER-3

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

General Instructions :

(i) All questions are compulsory.
(ii) The questions paper consists of 40 questions divided into 4 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. (i) The L.C.M. of x and 18 is 36.
(ii) The H.C.F. of x and 18 is 2.
What is the number x? [1]
(a) 1 (b) 2
(c) 3 (d) 4

Q2. In a number of two digits, unit's digit is twice the tens digit. If 36 be added to the number, the digits are reversed. The number is [1]
(a) 36 (b) 63
(c) 48 (d) 84

Q3. The linear factors of the quadratic equation $x^2 + kx + 1 = 0$ are [1]
(a) $k \geq 2$ (b) $k \leq 2$
(c) $k \geq -2$ (d) $2 \leq k \leq -2$

Q4. An AP starts with a positive fraction and every alternate term is an integer. If the sum of the first 11 terms is 33, then the fourth term is [1]
(a) 2 (b) 3
(c) 5 (d) 6

Q5. Which of the following statement is false? [1]
(a) All isosceles triangles are similar.
(b) All quadrilateral triangles are similar.
(c) All circles are similar.
(d) None of the above

Q6. C is the mid-point of PQ, if P is $(4, x)$, C is $(y, -1)$ and Q is $(-2, 4)$, then x and y respectively are [1]
(a) -6 and 1 (b) -6 and 2
(c) 6 and -1 (d) 6 and -2

Q7. If $\tan 2A = \cot(A - 18^\circ)$, where $2A$ is an acute angle, then the value of A is [1]
(a) 12° (b) 18°
(c) 36° (d) 48°

Q8. An equation of the circle with centre at (0, 0) and radius r is [1]

(a) $x^2 + y^2 = r^2$ (b) $x^2 - y^2 = r^2$
(c) $x - y = r$ (d) $x^2 + r^2 = y^2$

Q9. The ratio of the sides of the triangle to be constructed with the corresponding sides of the given triangle is known as [1]
(a) scale factors (b) length factor
(c) side factor (d) K-factor

Q10. Ratio of volumes of two cylinders with equal height is [1]
(a) $H : h$ (b) $R : r$
(c) $R^2 : r^2$ (d) None of these

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

Q11. If p is a prime number and it divides a^2 then it also divides ....., where a is a positive integer. [1]

Q12. ..... equation is valid for all values of its variables. [1]

OR

The highest power of a variable in a polynomial is called its .....

Q13. Area of a circle is ..... [1]

Q14. The volume and surface area of a sphere are numerically equal, then the radius of sphere is ..... units. [1]

Q15. Someone is asked to make a number from 1 to 100. The probability that it is a prime is ..... [1]

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

Q16. Find the value (s) of k if the quadratic equation $3x^2 - k\sqrt{3}\,x + 4 = 0$ has real roots. [1]

Q17. A chord of a circle of radius 10 cm subtends a right angle at the centre. Find area of minor segment. $(Use\ \pi = 3.14)$ [1]

Q18. Volume and surface area of a solid hemisphere are numerically equal. What is the diameter of hemisphere ? [1]

OR

Find the number of solid sphere of diameter 6 cm can be made by melting a solid metallic cylinder of height 45 cm and diameter 4 cm.

Q19. What is abscissa of the point of intersection of the ''Less than type'' and of the ''More than type'' cumulative frequency curve of a grouped data ? [1]

Q20. A dice is thrown once. Find the probability of getting a prime number. [1]

SECTION B

Q21. Solve the following system of linear equations by substitution method: [2]

$$2x - y = 2$$
$$x + 3y = 15$$

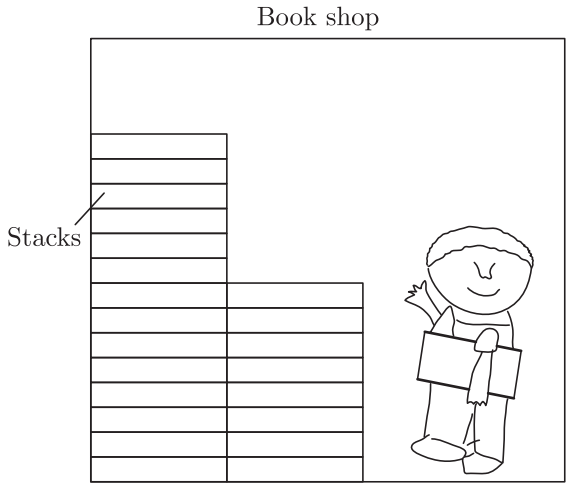
Q22. Let $\Delta ABC \sim \Delta DEF$. if ar$(\Delta ABC) = 100\ \text{cm}^2$, $ar(DEF) = 196\ \text{cm}^2$ and $DE = 7$, then find AB. [2]

Q23. If $A(5,2)$, $B(2,-2)$ and $C(-2,t)$ are the vertices of a right angled triangle with $\angle B = 90^\circ$, then find the value of t. [2]

OR

For what values of k are the points $(8,1), (3,-2k)$ and $(k,-5)$ collinear?

Q24. A book seller has 420 science stream books and 130 Arts stream books. He wants to stack them in such a way that each stack has the same number and they take up the least area of the surface. [2]



(i) What is the maximum number of books that can be placed in each stack for this purpose?
(ii) Which mathematical concept is used to solve the problems?

Q25. Write the relationship connecting three measures of central tendencies. Hence find the median of the give data if mode is 24.5 and mean is 29.75. [2]

OR

A bag contains cards bearing numbers from 11 to 30. A card is taken out from the bag at random. Find the probability that the selected card has multiple of 5 on it.

Q26. Rajesh starts walking from his house to office. Instead of going to the office directly, he goes to a mall first, from there to his wife's office and then reaches the office. What is the extra distance travelled by Rajesh in reaching his office? Assume that all distance covered are in straight lines, if the house is situated at (2,4), mall at (5,8), wife's office at (13,14) and office at (13,26) and coordinates are in kilometre. [2]

SECTION C

Q27. Find the zeroes of the quadratic polynomial $x^2 - 2\sqrt{2}\,x$ and verify the relationship between the zeroes and the coefficients. [3]

OR

What should be added to $x^3 + 5x^2 + 7x + 3$ so that it is completely divisible by $x^2 + 2x$.

Q28. Solve for x and y : [3]

$$\frac{x}{2} + \frac{2y}{3} = -1$$

$$x - \frac{y}{3} = 3$$

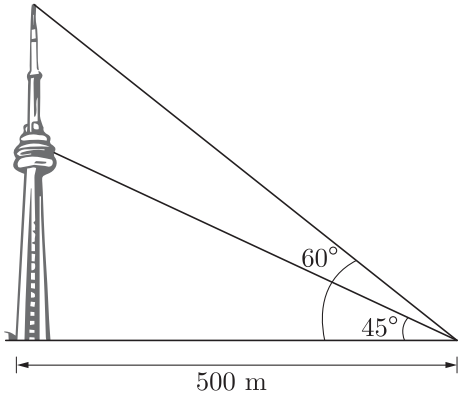
Q29. For what value of n, are the n^{th} terms of two A.Ps 63, 65, 67, ... and 3, 10, 17, ... equal? [3]

OR

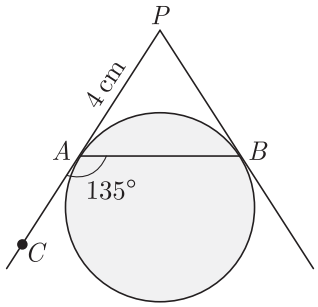
In an A.P., if the 12^{th} term is -13 and the sum of its first four terms is 24, find the sum of its first ten terms.

Q30. ABC is a triangle, PQ is the line segment intersecting AB in P and AC in Q such that $PQ \,||\, BC$ and divides $\Delta\, ABC$ into two parts, equal in area, find BP: AB, [3]

Q31. The tallest free-standing tower in the world is the CN Tower in Toronto, Canada. The tower includes a rotating restaurant high above the ground. From a distance of 500 m the angle of elevation to the pinnacle of the tower is $60°$. The angle of elevation to the restaurant from the same vantage point is $45°$. How tall is the CN Tower? How far below the pinnacle of the tower is the restaurant located? [3]



Q32. In the given figure, PA and PB are tangents to a circle from an external point P such that $PA = 4cm$ and $\angle BAC = 135^{0}$. Find the length of chord AB. [3]



OR

Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that

$$\angle PTO = \angle OPQ$$

Q33. Construct an isosceles triangle whose base is 7.5 cm and altitude 3.5 cm then another triangle whose sides are $\frac{4}{7}$ times the corresponding sides of the isosceles triangle. [3]

Q34. A boy, standing on the top of a tower 20 meter height, saw the top of a building at an elevation of 50° and its base at a depression of 30° [3]

(a) Draw a rough figure according to the given data.
(b) Find the distance between the tower and the building.
(c) Find the distance from the top of the tower to the base of the building.
[use $\sin 50^{\circ} = 0.77$, $\cos 50^{\circ} = 0.64$, $\tan 50^{\circ} = 1.2$, $\sqrt{3} = 1.7$]

SECTION D

Q35. Show that the square of any positive integer is of the forms $4m$ or $4m+1$, where m is any integer. [4]

OR

Express the HCF/LCM of 48 and 18 as a linear combination.

Q36. The denominator of a fraction is two more than its numerator. If the sum of the fraction and its reciprocal is $\frac{34}{15}$, find the fraction. [4]

Q37. Find the values of k so that the area of the triangle with vertices $(k+1,1), (4,-3)$ and $(7,-k)$ is 6 sq. units. [4]

OR

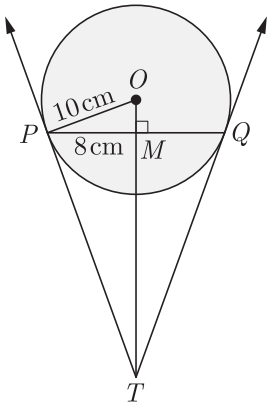
The base QR of an equilateral triangle PQR lies on x-axis. The co-ordinates of point Q are $(-4,0)$ and the origin is the mid-point of the base. find the co-ordinates of the point P and R.

Q38. The angle of elevation of a cloud from a point 120 m above a lake is 30° and the angle of depression of its reflection in the lake is 60°. Find the height of the cloud. [4]

OR

The angle of depression of two ships from an aeroplane flying at the height of 7500 m are 30° and 45°. if both the ships are in the same that one ship is exactly behind the other, find the distance between the ships.

Q39. In figure, PQ, is a chord of length 16 cm, of a circle of radius 10 cm. the tangents at P and Q intersect at a point T. Find the length of TP. [4]



Q40. Monthly expenditures on milk in 100 families of a housing society are given in the following frequency distribution : [4]

Monthly expenditure (in Rs.)	0- 175	175-350	350-525	525-700	700-875	875-1050	1050-1125
Number of families	10	14	15	21	28	7	5

Find the mode and median for the distribution.