HALF YEARLY EXAMINATION, 2024-25

MATHEMATICS

Time – 3:00 Hrs. **Class – X** **M.M. : 80**

Date – 12.09.2024 (Thursday)

Name of the student _____Section _____

GENERAL INSTRUCTIONS:

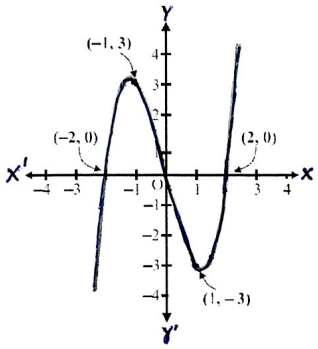
1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 Multiple Choice Questions carrying 1 mark each.
3. Section B has 5 questions carrying 2 marks each.
4. Section C has 6 questions carrying 3 marks each.
5. Section D has 4 questions carrying 5 marks each.
6. Section E has 3 case based integrated units of assessment (4 marks each).
7. All Questions are compulsory. However, an internal choice in 2 Questions of 5 marks, 2 Questions of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of each case study-based question of Section E.
8. Draw neat figures wherever required.

SECTION A

Q. 1. H.C.F. of two consecutive odd numbers is:

(a) 0 (b) 1 (c) 2 (d)3

Q. 2. The given polynomial y = f(x) has ….. zeroes?



(a) 0 (b) 1 (c) 2 (d) none of these

Q. 3. The roots of the quadratic equation $x^2 - 2x - 15 = 0$ are

(a) $-2, \frac{3}{2}$ (b) $5, -3$ (c) $-2, -5$ (d) $2, \frac{3}{2}$

Q. 4. What cannot be the difference between four consecutive terms of an arithmetic progression?

(a) 0, 0, 0 (b) $-2, -2, -2$ (c) 2, 3, 4 (d) $\frac{2}{7}, \frac{2}{7}, \frac{2}{7}$

Q. 5. If in two triangles ABC and PQR, $\frac{AB}{QR} = \frac{BC}{RP} = \frac{CA}{PQ}$, then

(a) $\Delta PQR \sim \Delta CAB$ (b) $\Delta PQR \sim \Delta ABC$ (c) $\Delta CBA \sim \Delta PQR$ (d) $\Delta BCA \sim \Delta PQR$

Q. 6. Point P divides the line segment joining the points $A\,(2, -5)$ and $B(5, 2)$ in the ratio $2:3$. Name the quadrant in which P lies.

(a) First quadrant (b) Second quadrant (c) Third quadrant (d) Fourth quadrant

Q. 7. Which of the following is not an irrational number?

(a) $\sqrt{3}$ (b) $\sqrt{6}$ (c) $\sqrt{9}$ (d) $\sqrt{12}$

Q. 8. The polynomial whose zeroes are 3 and 4 is:

(a) $x^2 - 7x + 7$ (b) $x^2 - 5x - 12$ (c) $x^2 - x - 12$ (d) $x^2 - 7x + 12$

Q. 9. The quadratic equation $9x^2 - 6x + 2 = 0$ has:

(a) No real roots (b) two equal real roots

(c) two distinct real roots (d) More than two real roots

Q. 10. In triangles ABC and DEF, $\angle B = \angle E$, $\angle F = \angle C$ and $AB = 3DE$. Then, the two triangles are

(a) congruent but not similar (b) similar but not congruent

(c) neither congruent nor similar (d) congruent as well as similar

Q. 11. H. C. F. of $3^3 \times 5^2$ and $3^2 \times 5^3$ is:

(a) 3^3 (b) 5^3 (c) $3^3 \times 5^3$ (d) $3^2 \times 5^2$

Q. 12. If one of the zeroes of the quadratic polynomial $(k-1)x^2 + kx + 1$ is -3, then the value of k is

(a) $-\frac{4}{3}$ (b) $\frac{4}{3}$ (c) $\frac{2}{3}$ (d) $-\frac{2}{3}$

Q. 13. Which of these is a quadratic equation having one of its roots as zero?

(i) $x^3 + x^2 = 0$ (ii) $x^2 - 2x = 0$ (iii) $x^2 - 9 = 0$

(a) only (i) (b) only (ii) (c) only (i) and (ii) (d) only (ii) and (iii)

Q. 14. In an AP, if $a = 3.5, d = 0, n = 101$, then a_n will be

(a) 0 (b) 3.5 (c) 103.5 (d) 104.5

Q. 15. $x = -1, y = 2$ is a solution of the linear equation:

(a) $2x + 3y - 4 = 0$ (b) $3x + 2y - 4 = 0$

(c) $2x - 3y + 4 = 0$ (d) $2x + 3y + 4 = 0$

Q. 16. The distance of a point $(-6, 8)$ from the origin is

(a) -6 (b) 6 (c) 8 (d) 10

Q. 17. Two APs have the same common difference. The first term of one of these is -1 and that of the other is -8. Then the difference between their 4th terms is

(a) -1 (b) -8 (c) 7 (d) -9

Q. 18. The $[HCF \times LCM]$ for the number 70 and 90 is

(a) 10 (b) 100 (c) 630 (d) 6300

Direction: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of reason (R). Choose the correct option.

Q. 19. Assertion (A): 10th term of an AP is 41 whose first term is 5 and common difference is 4.

Reason (R): nth term of an AP is $a_n = a + (n-1)d$, where *a* = first term, d = common difference.

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

Q. 20. Assertion (A): In a ΔABC, if $DE \parallel BC$ and intersects AB in D and AC in E, then $\frac{AB}{AD} = \frac{AC}{AE}$.

Reason (R): If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then these sides are divided in the same ratio.

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

SECTION - B

Q. 21. Two numbers are in the ratio $15:11$. If their HCF is 13, then find their LCM.

Q. 22. Find a quadratic polynomial, the sum and product of whose zeroes are –3 and 2, respectively.

Q. 23. Find the discriminant of the quadratic equation $2x^2 - 4x + 3 = 0$, and hence find the nature of its roots.

Q. 24. In a flower bed, there are 23 rose plants in the first row, 21 in the second, 19 in the third, and so on. There are 5 rose plants in the last row. How many rows are there in the flower bed?

OR

If p, q and r are in AP, then prove that $(p + 2q - r)(2q + r - p)(r + p - q) = 4pqr$.

Q. 25. Find the coordinates of the point which divides the line segment joining the points (4, – 3) and (8, 5) in the ratio $3 : 1$ internally.

OR

Find the ratio in which the *y*-axis divides the line segment joining the points (5, – 6) and (–1, – 4).

SECTION - C

Q. 26. Prove that $\sqrt{3}$ is irrational.

OR

Prove that $2 + \sqrt{5}$ is irrational.

Q. 27. 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.

OR

Five years ago, Nuri was thrice as old as Sonu. Ten years later, Nuri will be twice as old as Sonu. How old are Nuri and Sonu?

Q. 28. Solve for x : $\frac{1}{x+1} + \frac{1}{5x+1} = \frac{5}{x+4}, x \neq -1, \frac{-1}{5}, -4$

Q. 29. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio.

OR

ABC is an isosceles triangle in which AB = AC = 10 cm and BC = 12 cm. PQRS is a rectangle inside the isosceles triangle. If PQ = SR = y cm, PS = QR = 2*x*, then prove that $x = 6 - \frac{3y}{4}$.

Q.30. Do the points (3, 2), (–2, –3) and (2, 3) form a triangle? If so, name the type of triangle formed.

Q.31. E is a point on the side AD produced of parallelogram ABCD and BE intersects CD at F. Show that Δ ABE ~ Δ CFB.

SECTION - D

Q.32. If one zero of the quadratic polynomial $f(x) = 4x^2 - 8kx + 8x - 9$ is negative of the other, then find zeroes of $kx^2 + 3kx + 2$.

OR

If $p(x) = x(x - 2) + 6$, then find the value of the following:

(i) $\alpha + \beta$ [1]

(ii) $\alpha^2 + \beta^2 - 3\alpha^2\beta - 3\alpha\beta^2$ [2]

(iii) $\alpha^3 + \beta^3 - \alpha^2 - \beta^2$ [2]

Q.33. A natural number, when increased by 12, equals 160 times its reciprocal. Find the number.

Q.34. The ratio of incomes of two persons is $9 : 7$ and the ratio of their expenditures is $4 : 3$. If each of them manages to save Rs 2000 per month, find their monthly incomes.

Q.35. Show that the points (1, 7), (4, 2), (–1, –1) and (– 4, 4) are the vertices of a square.

OR

Find the coordinates of the points which divide the line segment joining A(– 2,2) and B (2, 8) into four equal parts.

SECTION - E

Q. 36. Lokesh is a production manager in Mumbai, hires a taxi everyday to go to his office. The taxi charges in Mumbai consists of a fixed charges together with the charges or the distance covered. His office is at a distance of 10 km from his home. For a distance of 10 km to his office, Lokesh paid Rs. 105. While coming back home, he took another route. He covered a distance of 15 km and the charges paid by him were Rs. 155.

Based on the above information, answer the following questions:

(i) What are the fixed charges? [1]

(ii) What are the charges per km? [1]

(iii) If fixed charges are Rs. 20 and charges per km are Rs. 10, then how much Lokesh have to pay for travelling a distance of 10 km. [2]

OR

Find the total amount paid by Lokesh for travelling 10 km from home to office and 25 km from office to home. {Fixed charges and charges per km are same as in parts (i) and (ii)} [2]

Q. 37. Vishal gets pocket money from his parents every day. Out of the pocket money, he saves Rs. 0.50 on first day, Re. 1 on second day, Rs. 1.50 on third day and so on.

Based on the above information, answer the following questions:

(i) What is the total amount saved by Vishal in 10 days? [1]

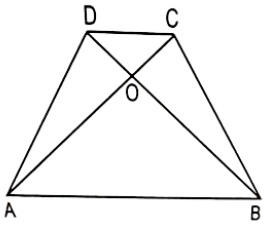
(ii) What is the amount saved by Vishal on 15^{th} day? [1]

(iii) What is the total amount saved by Vishal in the month of June if he starts saving from 1st June? [2]

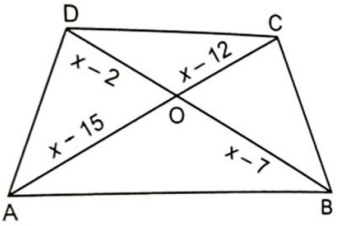
OR

(iii) What is the amount saved by Vishal till 15th day? [2]

Q. 38. Karamveer a carpenter designs a trapezium ABCD shaped model as shown in the figure, in which $AB \parallel DC$ and diagonal AC and BD divides each other the ratio $1:3$. Later he finds that side AB is three times the CD. After that he designed various other trapezium shaped model with some other measurements as mentioned in some questions given below. Help him to determine the measurements.

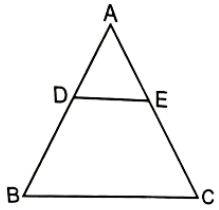


(i) In the given model (trapezium shaped) ABCD, $AB \parallel DC$ then find x. [2]

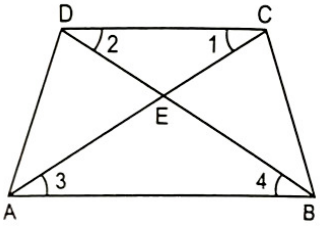


OR

Karamveer designed a model as shown below. Here $DE \parallel BC$, AD = 5 cm, BD = 10 cm, AE = 3 cm and CE = 6 cm. If DE = 6 cm then find BC. [2]



(ii) He designed a quadrilateral ABCD, such that $\angle 1 = \angle 3$ and $\angle 2 = \angle 4$. If $\frac{EC}{AE} = \frac{DE}{BE} = \frac{1}{2}$ and DC = 4 cm, then find AB. [1]



(iii) In all the trapezium shaped models, which theorem he is using? [1]