PRACTICE PAPER -2025

PERIODIC TEST – 1

Class: X

Subject: Mathematics — M.M:40

Date : 05 - 07- 2025 — Time: 1Hour 30 Minutes

General Instructions:

1. The question paper consists of 22 questions divided into 3 sections A, B and C.
2. All questions are compulsory.
3. Section A comprises of 10 questions of 1 mark each.
4. Section B comprises of 6 questions of 2 marks each. Internal choice has been provided in two questions.
5. Section C comprises of 6 questions of 3 marks each. Internal choice has been provided in two questions.

SECTION – A

1. The HCF and LCM of two numbers are 9 and 360 respectively. If one number is 45, the other number is______. (1)

(A) 70 (B) 72 (C) 75 (D) 81

ANS: (B) 72

HCF × LCM = 45 × x

9 × 360 = 45 × x ⇒ x = 72

2. For what value of c will the following system of equations have infinite number of solutions? (1)

$2x + (c-2)y = c$, $6x + (2c-1)y = 2c + 5$.

(A) 7 (B) ± 5 (C) 5 (D) 3

ANS: (C) 5

$\frac{c-2}{2c-1} = \frac{c}{2c+5} = \frac{1}{3}$ ⇒ c = 5

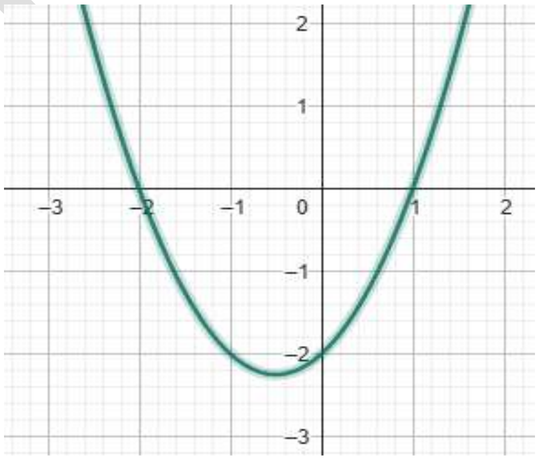
3. If $6370 = 2^m \times 5^n \times 7^k \times 13^p$ then find the value of $(m + n)(k + p)$. (1)

(A) 2 (B) 4 (C) 5 (D) 6

ANS: (D) 6

6370 $= 2 \times 5 \times 7^2 \times 13 =$ $so\ (m + n)(k + p) = (1+1)(2+1) = 6$

4. Given a graph of the quadratic polynomial. Find the polynomial. (1)



(A) $x^2 - x - 2$

(B) $x^2 + x - 2$

(C) $x^2 - x + 2$

(D) $x^2 - 2x - 1$

ANS: (B) $x^2 + x - 2$

The zeros are $x = -2, x = 1$

$\Rightarrow (x+2)(x-1)$

$\Rightarrow x^2 + x - 2$

5. There are 576 boys and 448 girls in a school that are to be divided into equal sections of either boys or girls alone. The total number of sections thus formed are: (1)

(A) 13 (B) 14 (C) 16 (D) 18

ANS: HCF of 576 and 448 = 64

∴ Number of sections = $\frac{576}{64} + \frac{448}{64} = 16$

6. The value of k for which the equation $x^2 + 2(k + 1)x + k^2 = 0$ has equal roots is _____ (1)

(A) $\frac{1}{2}$ (B) $\frac{-1}{2}$ (C) $\frac{1}{4}$ (D) 2

ANS: For equal roots, D = 0

$\Rightarrow [2(k + 1)]^2 – 4 \times k^2 = 0$
$\Rightarrow 4(k + 1)^2 – 4k^2 = 0$
$\Rightarrow 4(k^2 + 2k + 1) – 4k^2 = 0$
$\Rightarrow 8k + 4 = 0 \Rightarrow k = -\frac{1}{2}$

7. If the sum and product of the roots of the equation $kx^2 + 6x + 4k = 0$ are equal, then $k =$ _____ (1)
(A) $-\frac{3}{2}$ (B) $\frac{3}{2}$ (C) $\frac{2}{3}$ (D) $-\frac{2}{3}$
ANS: (A) $-\frac{3}{2}$

8. Write the discriminant of $(x - 1)(2x - 1) = 0$ (1)
(A) 1 (B) -1 (C) 2 (D) 0
ANS: (A) 1 $2x^2$ - 3x + 1 = 0 D = $(- 3^2)$ - 4 x 2 x 1
D = 9 - 8 = 1

9. Find the value of k, so that the following system of equations is inconsistent. (1)
$3x – y – 5 = 0;\ 6x – 2y + k = 0$
(A) $k \neq -10$ (B) $k \neq 5$ (C) $k \neq 10$ (D) $k \neq \frac{2}{5}$
ANS: (A) $k \neq -10$

In Qn: 10, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.
(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.

10. Assertion (A): *The set of values of p for which the given equation* $2x^2 + px + 3 = 0$ *has real roots* when $p^2 \geq 24$. (1)
Reason (R): *For a quadratic equation* $ax^2 + bx + c = 0$ *, the roots are real if* $D = b^2 – 4ac \leq 0$

ANS: (C) A is true but R is false.

$2x^2 + px + 3 = 0$
$D = p^2 – 4 \times 2 \times 3 = p^2 – 24$
For real roots, $D \geq 0$
$p^2 – 24 \geq 0$ $p^2 \geq 24$ $p \geq \sqrt{24}$, $p \leq -\sqrt{24}$

SECTION B

11. Solve for *x* and *y* using substitution method: $7x + 2y + 5 = 0,\ 2y + 3 = 0$ (2)
ANS: Given pair of linear equations is
$7x + 2y + 5 = 0$ ...(i) and $2y + 3 = 0$ ...(ii)
From equation (ii), we get
$2y + 3 = 0$
$y = -\frac{3}{2}$
Substituting $y = -\frac{3}{2}$ in equation (i), we get
$7x + 2\left(-\frac{3}{2}\right) + 5 = 0$
$7x – 3 + 5 = 0$ $7x = – 2$ $x = -\frac{2}{7}$
$x = -\frac{2}{7}, y = -\frac{3}{2}$

12. If α and β are roots of the equation $2x^2 – 6x + a = 0$ and 2 α + 5 β = 12, find the value of *a*. (2)

OR

Find the condition that on a, b *and* c so that one zero of the polynomial $ax^2 + bx + c$ is the square of the other.
ANS: Given quadratic equation is $2x^2 – 6x + a = 0$
α and β are roots of the equation

$\alpha + \beta = -\frac{B}{A} = -\frac{(-6)}{2} = 3 \Rightarrow \alpha = 3 - \beta$
$2\alpha + 5\beta = 12$
$2(3 - \beta) + 5\beta = 12$
$6 - 2\beta + 5\beta = 12 \Rightarrow \beta = 2$
$\alpha = 3 - 2 - 1$, product of roots $\alpha.\ \beta = \frac{C}{A} \Rightarrow \quad \frac{a}{2} = 2 \Rightarrow a = 4$

OR

ANS: let α and β are zeroes of $ax^2 + bx + c$ given $\beta = \alpha^2$
$\alpha + \beta = -\frac{b}{a}$, $\alpha.\beta = \frac{c}{a}$
$\alpha + \alpha^2 = -\frac{b}{a} \Rightarrow \alpha(1+\alpha) = -\frac{b}{a}$
and $\alpha.\alpha^2 = \frac{c}{a} \Rightarrow \alpha^3 = \frac{c}{a}$
$\alpha(1+\alpha) = -\frac{b}{a} \Rightarrow \alpha^3(1+\alpha)^3 = \left(-\frac{b}{a}\right)^3$
$\Rightarrow \frac{c}{a}[1 + \alpha^3 + 3\alpha(1+\alpha)] = -\frac{b^3}{a^3}$
$\Rightarrow \frac{c}{a}\left[1 + \frac{c}{a} + 3 \times -\left(\frac{b}{a}\right)\right] = -\frac{b^3}{a^3}$
$\Rightarrow \frac{c}{a^2}[a + c - 3b] = -\frac{b^3}{a^3}$
$\Rightarrow (ac + c^2 - 3bc)a = -b^3$
$\Rightarrow a^2c + ac^2 + b^3 = 3abc$

13. Find HCF and LCM of 448, 1008 and 168 using fundamental theorem of arithmetic. (2)
ANS: $448 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 7 = 2^6 \times 7$
$1008 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 7 = 2^4 \times 3^2 \times 7$
$168 = 2 \times 2 \times 2 \times 3 \times 7 = 2^3 \times 3 \times 7$
HCF = $2^3 \times 7 = 56$
HCF = $2^3 \times 7 = 56$ LCM = $2^6 \times 7 \times 3^2 = 4032$

14. If $p(x) = 2x^2 - 6x - 3$. The two zeroes are of the form $\frac{3 \pm \sqrt{k}}{2}$, where k is a real number. Use the relationship between the zeros and coefficients of a polynomial to find thw value of k. (2)

OR

If the sum of the zeroes of the quadratic polynomial $ky^2 + 2y - 3k$ is equal to twice their product, find the value of k.

ANS: Two zeroes are $\frac{3 \pm \sqrt{k}}{2}$
Product = $-\frac{c}{a}$
$\left(\frac{3+\sqrt{k}}{2}\right)\left(\frac{3-\sqrt{k}}{2}\right) = -\frac{3}{2}$
$9 - k = -6$
$k = 15$

OR

ANS: $p(y) = ky^2 + 2y - 3k$

$a = k$, $b = 2$, $c = -3k$ Sum of zeroes = 2 × product of zeroes

$-\frac{b}{a} = 2 \times \frac{c}{a} \Rightarrow -\frac{2}{k} = 2 \times -\frac{3k}{k} \Rightarrow k = \frac{1}{3}$

15. Three numbers are in the ratio 2 : 5 : 7. Their LCM is 490. Find the square root of the largest number. (2)
ANS: Let numbers are $2x$, $5x$ and $7x$.
∴ LCM of $2x$, $5x$ and $7x = 2 \times 5 \times 7 \times x$
Also LCM = 490 ⇒ $2 \times 5 \times 7 \times x = 490 \Rightarrow x = 7$ So, numbers are 2 × 7, 5 × 7, 7 × 7 = 14, 35 and 49
Largest number = 49 ∴ The square root of largest number = 7.

16. The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides (use factorisation method). (2)

Let the base of right triangle = x

altitude of right triangle = x − 7

$x^2 + (x - 7)^2 = 13^2$

$x^2 + x^2 + 49 - 14x = 169$

$2x^2 - 14x - 120 = 0$

$x^2 - 7x - 60 = 0$

$x^2 - 12x + 5x - 60 = 0$

$x(x - 12) + 5(x - 12) = 0$

$(x - 12)(x + 5) = 0$

$x = 12$

$x - 7 = 5$ ⇒ Base = 12 cm , altitude = 5 cm

SECTION C

17. Solve for *x* and *y* using substitution method: $x + 2y - 3 = 0$; $3x - 2y + 7 = 0$. (3)

OR

Find the value of a for which the given pair of linear equations has infinite many solutions.

$\alpha x + 9y + 10 = 0$, $12x + 12\alpha y + 3\alpha - 31 = 0$

ANS: Given equations are

$x + 2y - 3 = 0$ ...(i)

$3x - 2y + 7 = 0$ ...(ii)

From equation (i), we get

$x + 2y - 3 = 0$ $x = 3 - 2y$ ...(iii)

Substituting $x = 3 - 2y$ in equation (ii), we get

$3(3 - 2y) - 2y + 7 = 0$

$9 - 6y - 2y + 7 = 0$

$-8y = -16$, $y = 2$

When $y = 2$, equation (iii) becomes

$x = 3 - 2 \times 2$ $x = -1$

$x = -1, y = 2$

OR

ANS: $\alpha x + 9y + 10 = 0$, $12x + 12\alpha y + 3\alpha - 31 = 0$

For infinite solutions, the condition is $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ ⇒ $\frac{\alpha}{12} = \frac{9}{12\alpha} = \frac{10}{3\alpha - 31}$

(i) (ii) (iii)

Take (i) and (ii) $\alpha^2 = 9 \Rightarrow \alpha = \pm 3$

Take (ii) and (iii) $\frac{9}{12\alpha} = \frac{10}{3\alpha - 31} \Rightarrow 27\alpha - 279 = 120\alpha$

$93\alpha - 279$. ⇒ $\alpha = -3$

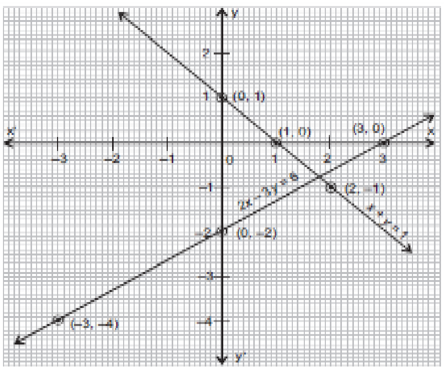
18. Determine, by drawing graphs, whether the following system of linear equations has a unique solution or not: 2x – 3y = 6, x + y = 1. (3)

Solution table for 2x – 3y = 6 is

x	3	0	–3
y	0	–2	–4

Solution table for x + y = 1 is

x	1	0	2
y	0	1	–1



Clearly from the graph, these

equations have unique solution.

19. Using quadratic formula, solve the following quadratic equation for x: $p^2x^2 + (p^2 - q^2)x - q^2 = 0$. (3)
ANS: $p^2x^2 + (p^2 - q^2)x - q^2 = 0$
Here $a = p^2$, $b = (p^2 - q^2)$, $c = -q^2$,
$D = b^2 - 4ac = (p^2 - q^2)^2 - 4 \times p^2 \times (-q^2) = (p^2 + q^2)^2$
Now
$x = \frac{-b \pm \sqrt{D}}{2a}$, $x = \frac{-(p^2 - q^2) \pm \sqrt{(p^2 + q^2)^2}}{2 \times p^2}$
$\Rightarrow x = \frac{q^2}{p^2}$, $x = -1$

20. A two-digit number is seven times the sum of its digits and is also equal to 12 less than three times the product of its digits. Find the number. (3)

OR

The length of the hypotenuse of a right triangle is one unit more than twice the length of the shortest side and the other side is one unit less than twice the length of the shortest side. Find the lengths of the other two sides.
ANS: Let digit at unit's place be x and digit at ten's place be y
Number = $10y + x$
ATQ $10y + x = 7(x + y)$
$10y + x = 7x + 7y$
$6x = 3y \Rightarrow y = 2x$ ...(i)
Also $10y + x = 3xy - 12$
$10 \times 2x + x = 3x \cdot 2x - 12$
$6x^2 - 21x - 12 = 0$
$2x^2 - 7x - 4 = 0$
$2x^2 - 8x + x - 4 = 0$
$2x(x - 4) + 1(x - 4) = 0 \Rightarrow (x - 4)(2x + 1) = 0 \Rightarrow x = 4$ or $x = -\frac{1}{2}$ (rejecting)
When $x = 4$, $y = 2 \times 4 = 8$

OR

ANS: Let shortest side be x units
Hypotenuse = $(2x + 1)$ units and other side = $(2x - 1)$ units
Using Pythagoras theorem, we get
$(2x + 1)^2 = x^2 + (2x - 1)^2$
$\Rightarrow 4x^2 + 4x + 1 = x^2 + 4x^2 - 4x + 1$
$\Rightarrow x^2 - 8x = 0 \Rightarrow x(x - 8) = 0 \Rightarrow x = 8$ or $x = 0$ but $x \neq 0$.
When $x = 8$, hypotenuse = $2 \times 8 + 1 = 17$ and other side = $2 \times 8 - 1 = 15$
Sides of right-angled triangle are 8 units, 17 units and 15 units.

21. If α and β are the zeroes of the polynomial $2x^2 - 6x + 3$,find the value of (3)
$\alpha^3 + \beta^3 - 3\alpha\beta(\alpha^2 + \beta^2) - 3\alpha\beta(\alpha + \beta)$.
ANS: $\alpha + \beta = \frac{6}{2} = 3$, $\alpha\beta = \frac{3}{2}$
$\alpha^3 + \beta^3 - 3\alpha\beta(\alpha^2 + \beta^2) - 3\alpha\beta(\alpha + \beta) = (\alpha + \beta)^3 - 3\alpha\beta(\alpha + \beta) - 3\alpha\beta[(\alpha + \beta)^2 - 2\alpha\beta] - 3\alpha\beta(\alpha + \beta)$.
$= 27 - \frac{27}{2} - \frac{9}{2}(9 - 3) - \frac{27}{2} = -27$

22. Given that $\sqrt{3}$ *is irrational,* show that $5 - 2\sqrt{3}$ is an irrational number. (3)
ANS: Let $5 - 2\sqrt{3} = \frac{p}{q}$ be a rational number.
$5 - \frac{p}{q} = 2\sqrt{3}$ or $\frac{5q - p}{2q} = \sqrt{3}$
which is contradiction because $\sqrt{3}$ is an irrational number and $\frac{5q - p}{2q}$ is a rational.
Our supposition is wrong and hence, $5 - 2\sqrt{3}$ is irrational.