ATOMIC ENERGY CENTRAL SCHOOL No.2,
MUMBAI

PERIODIC TEST- 1

(2023- 24) Date 17.07.23

M.M: 40 Class: X

Subject: MATHEMATICS Time: 90 minutes

General Instructions:

1. *The question paper contains three parts A, B, C, D and E.*
2. *Section A consists of 4 questions of 2 mark each.*
3. *Section B consists of 4 questions of 3mark each.*
4. *Section C consists of 4 questions of 5 mark each, two Case Studies.*

SECTION A **(1 x 10 = 10Marks)**

1. If p and q are the zeroes of the polynomial $p(x) = ax^2+bx+c$. The polynomial g(x) whose zeroes are $\frac{1}{p}$ and $\frac{1}{q}$ will be?

(a) $g(x) = ax^2+cx+b$ (b) $g(x) = cx^2+bx+a$ (c) $g(x) = bx^2+ax+c$ (d) $g(x) = cx^2+ax+b$

2. Let a and b be two positive integers such that $a = p^3q^4$ and $b = p^2q^3$, where p and q are prime numbers. If HCF(a, b) = p^mq^n and LCM(a, b) = p^rq^s, then (m + n)(r + s) =

(a) 15 (b) 30 (c) 35 (d) 72

3. Which of the following is a quadratic equation?

(a) $x^2 + 2x + 1 = (4 – x)^2 + 3$ (b) $(x^2 + 2x)^2 = x^4 + 3 + 4x^3$

(c) $(k + 1)\, x^2 + \frac{3}{2}x = 7$, where $k = –1$ (d) $x^3 – x^2 = (x – 1)^3$

4. If α and β are the zeros of a polynomial $f(x) = px^2 – 2x + 3p$ and α + β = αβ, then p is

(a) -2/3 (b) 2/3 (c) 1/3 (d) -1/3

5. If α and β are the zeroes of the polynomial $p(x) = 2x^2 + 5x + k$ satisfying the relation $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$, then the value of k is

(a) 1 (b) 2 (c) 3 (d) 4

6. The values of x and y respectively if $99x + 101y = 499$ and $101x + 99y = 501$ are:

(a) 3 and 2 (b) 5 and 6 (c) –3 and 2 (d) –3 and –2

7. For what value of **k**, the equation $9x^2 + 6\mathbf{k}x + 4 = 0$ has equal roots?

(a) k = 2 (b) k = -2 (c) k = 0 (d) Both (a) and (b)

8. Let p be a prime number. The quadratic equation having its roots as factors of p is

(a) x^2 –px +p=0 (b) x^2 –(p+1)x +p=0

(c) x^2+(p+1)x +p=0 (d) x^2 –px+p+1=0

9. For which of the following values of m and n do the equations $mx + 4y - 6 = 0$ and $ny - 12x + 12 = 0$ have infinitely many solutions?

(a) m = -1 and n = 2 (b) m = -1 and n = 3

(c) m = 6 and n = -8 (d) m = 6 and n = -2

10. **Assertion (A):** L.C.M. and H.C.F. of **a** and 20 are 100 and 10 respectively, then a = 50.
Reason (R): L.C.M ×H.C.F. = First number ×Second number

(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 (2 x 3 = 6Marks)

11. Find the greatest possible length which can be used to measure exactly the lengths 7 m, 3m 85 cm and 12 m 95 cm

OR

Three measuring rods are 64 cm, 80 cm and 96 cm in length. Find the least length of cloth that can be measured an exact number of times, using any of the rods.

12. Find the value of k for which the following pair of linear equations has infinitely many solutions: $2x - 3y = 7$, $(k + 1)x + (1 - 2k)y = (5k - 4)$.

13. If one zero of the polynomial $\mathbf{(a^2 + 9)x^2 + 13x + 6a}$ is reciprocal of the other, find the value of a.

SECTION C (3 x 2 = 6 Marks)

14. Prove that $\sqrt{5}$ is irrational. Hence prove that $7 - 2\sqrt{5}$ is an irrational number.

15. Obtain the zeroes of the quadratic polynomial $\sqrt{3}x^2 - 8x + 4\sqrt{3}$ and verify the relation between its zeroes and coefficients.

OR

If α and β are zeroes of the quadratic polynomial $x^2 - 6x + \mathbf{a}$. Find the value of '**a**' if $3\alpha + 2\beta = 20$.

SECTION D (5 x 2 = 10 Marks)

16. Determine graphically the coordinates of the vertices of triangle, the equations of whose sides are given by $2y - x = 8$, $5y - x = 14$, $y - 2x = 1$

17. Find the value of m for which the quadratic equation $(m+1)y^2 - 6(m+1)y + 3(m+9) = 0$, has equal roots. Hence find the roots of the equation.

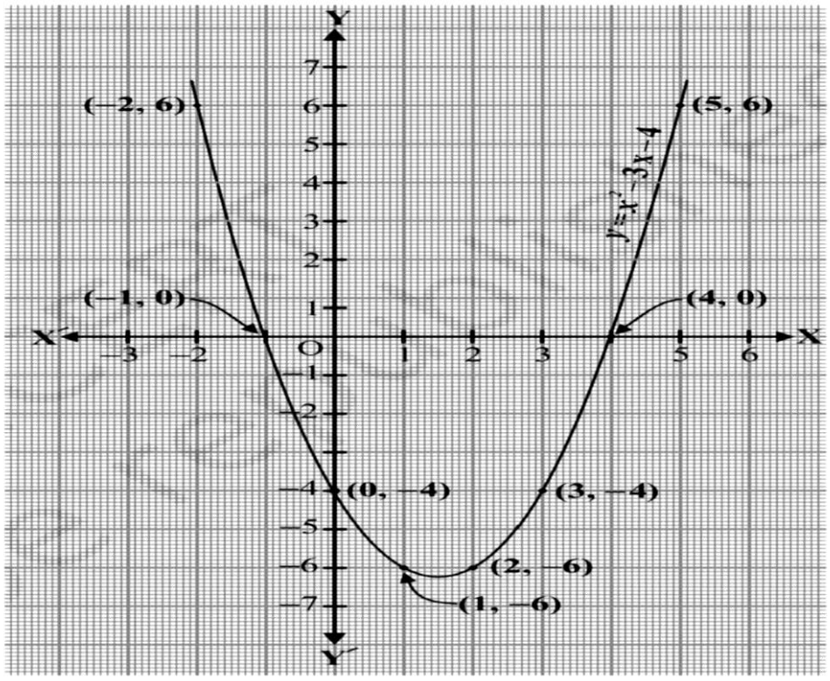
OR

Sum of the areas of two squares is 468 m^2. If the difference of their perimeters is 24 m, find the sides of the two squares.

SECTION E (4 x 2 = 8 Marks)

18. **Case Study – 1**

A student made a temporary swing on the ceiling of his room by using a rope as shown in the figure. It followed a mathematical shape. Answer the following questions below.



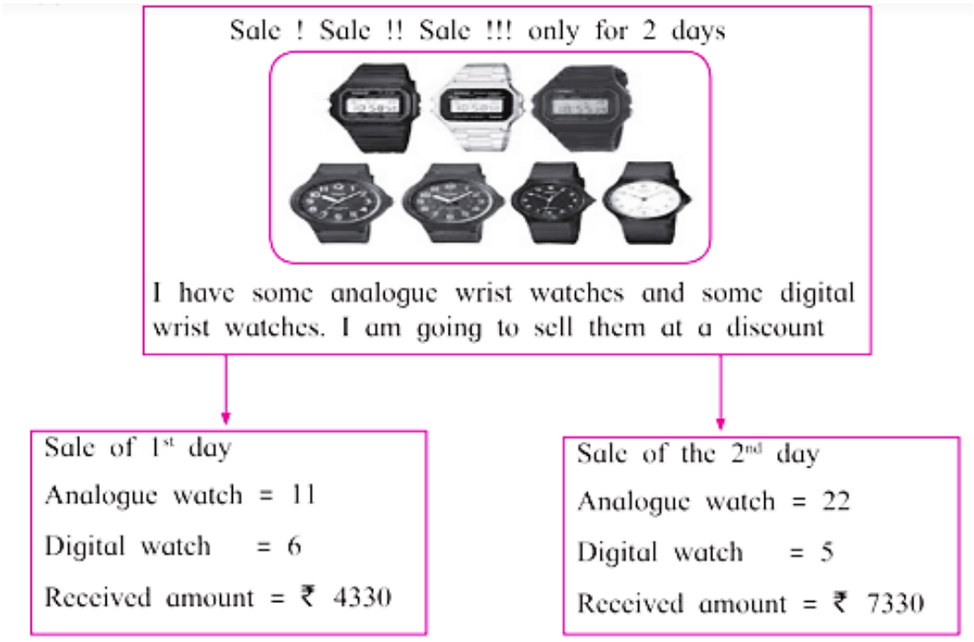
(a) What is the shape of the rope? (1m)

(b) How many zeroes are there for the polynomial (shape of the rope)? What are they? (2m)

(c) What is the expression of the polynomial represented by the rope? (1m)

19. **Case Study 2**

A company provides numerous wrist watch for men on the basis of relevance, price range, discount offers, fresh arrivals, and popularity. Refer the given data in image to answer the questions:



(a) Let the selling price of each analog watch be 'x' Selling price of each digital watch be 'y'. What is the pair of linear equation in two variables according to given conditions? (1m)

(b) Find the selling price of wrist watches of each type. (2m)

(c) What are the conditions for a pair of linear equations to be consistent? (1m)
