# BK BIRLA CENTRE FOR EDUCATION

**SARALA BIRLA GROUP OF SCHOOLS**

**Senior Secondary co-ed day cum boys' residential school, Shirgaon**

### MID-TERM EXAMINATION 2023-24

**MATHEMATICS (041)**

Class: IX

Date: 21-10-2023

Admn: _____

Duration: 3 Hrs

Max. Marks: 80

Roll number: ____

**General Instructions:**

1  This question paper has 5 sections A, B, C, D and E.
2  Section A has 20 MCQs 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 (04 marks each) with subparts of the values 1, 1 and 2 marks each respectively.
7  All questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2Qs of 3 marks and 2 Qs of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
8  Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.

## SECTION – A

1  Which one of the following is an irrational number?

   (A)  $\sqrt{4}$        (B)  $3\sqrt{8}$        (C)  $\sqrt{100}$        (D)  $-\sqrt{0.64}$

2  If we add two irrational numbers, the resulting number

   (A)  is always an irrational number        (B)  is always a rational number

   (C)  may be a rational or an irrational number  (D)  always an integer

3  In the polynomial $(x) = 10 + x - \frac{\pi x^2}{2}$, the coefficient of $x^2$ is

   (A)  10        (B)  1        (C)  $-\frac{\pi}{2}$        (D)  $\frac{\pi}{2}$

4  If $x - 2$ is a factor of $x^3 - 3x + 5a$ then the value of $a$ is:

   (A)  1        (B)  $-1$        (C)  $\frac{2}{5}$        (D)  $-\frac{2}{5}$

5  Signs of the abscissa and ordinate of a point in the third quadrant are respectively:

   (A)  $(+, +)$        (B)  $(-, +)$        (C)  $(+, -)$        (D)  $(-, -)$

6  Point $(0, -2)$ lies:

   (A)  on the negative direction of x- axis (B)  on the negative direction of y-axis
   (C)  in the 3rd quadrant                (D)  in the 4th quadrant

7 In graphical representation of $y = -4$, line is:

(A) parallel to x-axis         (B) parallel to y-axis
(C) passes through origin        (D) none of these

8 The graph of the equation $y = x$ passes through the point

(A) $\left(\frac{3}{2}, -\frac{3}{2}\right)$      (B) $\left(0, \frac{3}{2}\right)$      (C) $(1, 1)$      (D) $\left(-\frac{1}{2}, \frac{1}{2}\right)$

9 For two parallel lines sum of interior angles on the same side of a transversal line is

(A) $100^0$      (B) $180^0$      (C) $90^0$      (D) $360^0$

10 In the figure, the value of the angle $y - x$ is

(A) $80^0$      (B) $50^0$

(C) $0^0$      (D) $130^0$
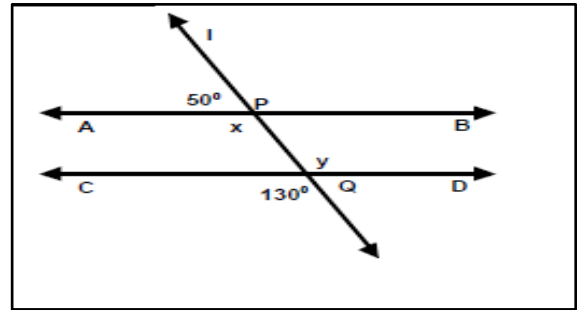
11 The value of $\frac{3\sqrt{12}}{6\sqrt{27}}$ is

(A) $\frac{1}{2}$      (B) $\sqrt{2}$      ( C) $\sqrt{3}$      (D) $\frac{1}{3}$

12 To rationalise the denominator of $\frac{1}{a+\sqrt{b}}$, we multiply this by

(A) $\frac{1}{a-\sqrt{b}}$      (B) $\frac{1}{a+\sqrt{b}}$      (C) $\frac{a+\sqrt{b}}{a+\sqrt{b}}$      (D) $\frac{a-\sqrt{b}}{a-\sqrt{b}}$

13 The zero of p(x) = 9x + 4 is

(A) $\frac{4}{9}$      (B) $\frac{9}{4}$      (C) $-\frac{4}{9}$      (D) $-\frac{9}{4}$

14 If the area of an equilateral triangle is $16\sqrt{3}\ cm^2$ then the perimeter of the triangle is

(A) 48 cm      (B) 24 cm      (C) 12 cm      (D) 36 cm

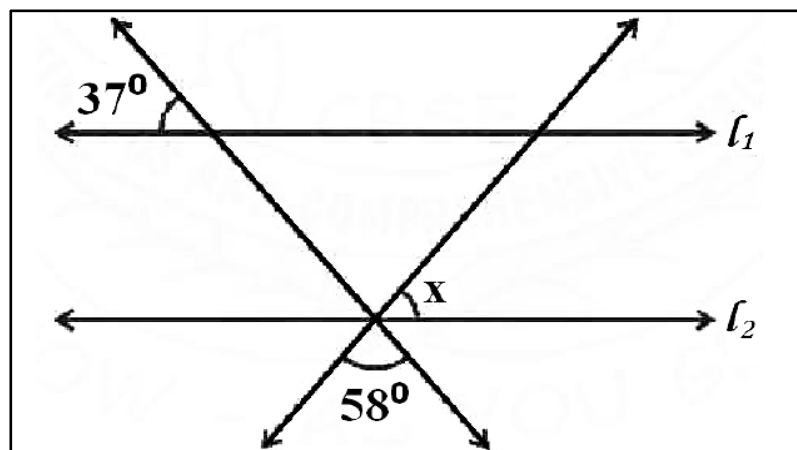15 The area of a triangular sign board of sides 5 cm, 12 cm and 13 cm is

(A) $\frac{65}{2}cm^2$      (B) $30\ cm^2$      (C) $60\ cm^2$      (D) $12\ cm^2$

16 The point whose ordinate is 4, and which lies on y-axis is

(A) $(4, 0)$      (B) $(0, 4)$

(C) $(1, 4)$      (D) $(4, 2)$

17 In figure, if $l_1 || l_2$ , what is the value of x.

(A) $90^0$      (B) $85^0$
(C) $75^0$      (D) $70^0$

18      A linear equation in two variables has
     (A)     no solution
     (B)     Only one solution
     (C)     Only two solutions
     (D)     Infinitely many solutions

**Assertion and Reasoning questions: In the following questions, 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 and R is not the correct explanation of A.
     (C)     A is true but R is false.
     (D)     A is false but R is true.

19      **Assertion:**    A point whose abscissa is 2 and ordinate is $(-3)$ lies in fourth quadrant
                **Reason:**      Points of the type $(-, +)$ lie in the second quadrant

20      **Assertion:**    The constant polynomial 0 is called zero polynomial
                **Reason:**      $\sqrt{x} + 3$ is a polynomial.

## SECTION – B

21      Determine the point of the linear equation $2x + 5y = 17$, whose ordinate is 3 times as its abscissa.

22      Plot the points $P(1, 0), Q(4, 0)$ and $S(1, 3)$. Find the coordinates of the point $R(x, y)$ such that PQRS form a square.

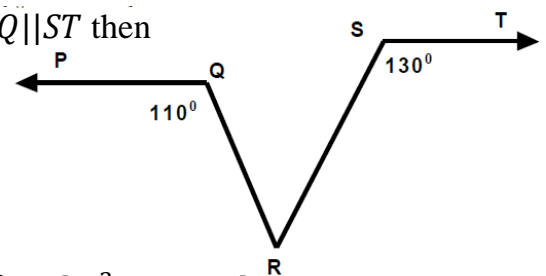23      Expand the following:     $(3a + 2b + 4c)^2$
                               **OR**
     Find the remainder when $x^3 - ax^2 + 6x - a$ is divided by x – a

24      An angle is $20^0$ more than 3 times the given angle. If the two angles are Supplementary, find the angles.
                               **OR**
     Find three rational numbers between 3 and 4

25      In the figure, if $\angle PQR = 110^0$ and $\angle RST = 130^0$ and $PQ||ST$ then find the value of $\angle QRS$.

## SECTION – C

26      Rationalise the denominator of     $\dfrac{5}{\sqrt{5}-\sqrt{3}}$.
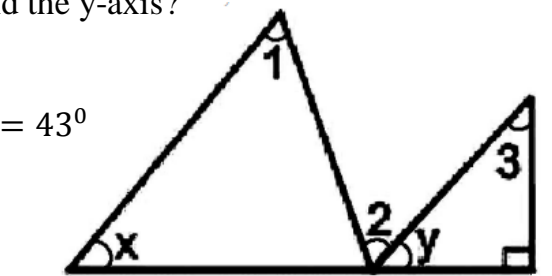
27      Find the value of $k$, if $x - 1$ is a factor of $p(x)$ where $p(x) = kx^2 - 3x + k$
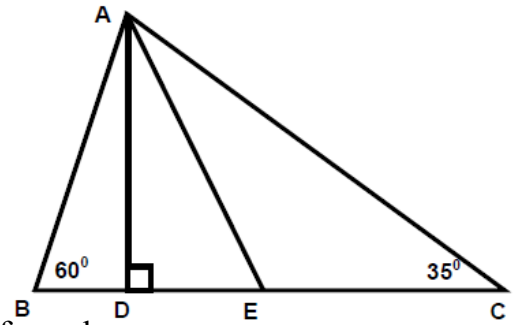                               **OR**
     Factorise:     $\dfrac{25}{4}x^2 - \dfrac{y^2}{9}$

28      Draw the graph of the equation $2x + 3y = 12$.
     At what points, the graph of the equation cuts the x-axis and the y-axis?

29      In the figure given by the side, If
                         $\angle 1 = 53^0, \angle 2 = 65^0$ and $\angle 3 = 43^0$
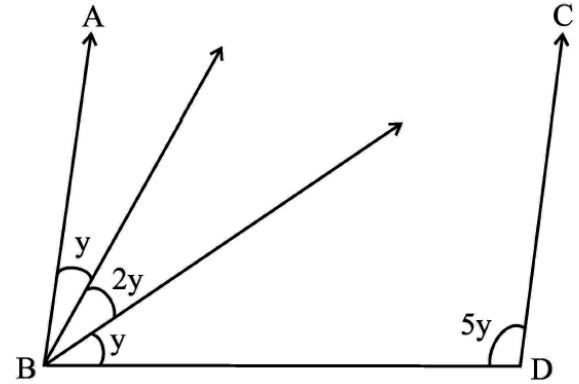     then find the measures of $\angle x$ and $\angle y$. Justify your answer.

30  In given figure, $AD \perp BC$, AE is the angle bisector of $\angle BAC$. Find $\angle DAE$.

31  The sides of a triangular plot are in the ratio $3:5:7$ and its perimeter is 300 m. Find its area using heron's formula.
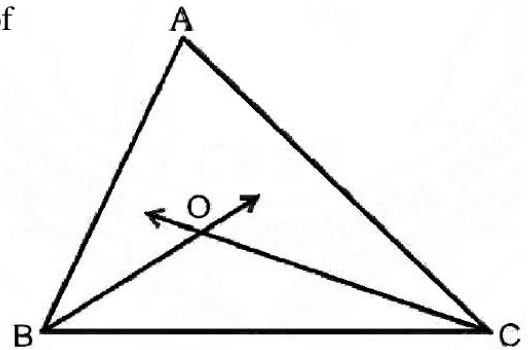
**OR**

In the figure, If $AB \parallel CD$, then what is the value of $y$?

**SECTION – D**

32  Find the area of a triangle, two sides of which are 8 cm and 11 cm and the perimeter is 32cm.

33  Angle bisectors of interior $\angle ABC$ and interior $\angle ACB$ of a $\triangle ABC$ intersect at the point O. (figure at the side)

Prove that $\angle BOC = 90^0 + \angle \frac{A}{2}$

**OR**

In the figures given below, decide whether $l \parallel m$. Give reasons for each answer.

(i)  126°  44°

(ii)  75°  75°

(iii)  57°  123°

(iv)  72°  98°
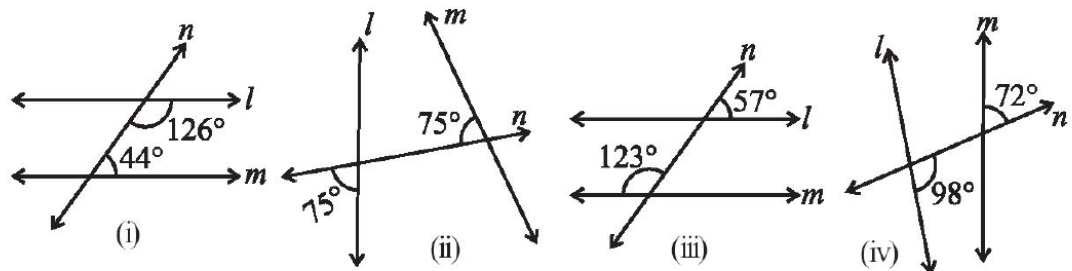
34  Show that the points $A(1, 2), B(-1, -16)$ and $C(0, -7)$ lie on the graph of the linear equation $y = 9x - 7$. Also draw the graph of the equation joining these points.

35  Expand the following:     (i)  $\left(4 - \frac{x}{3}\right)^3$     (ii)  $\left(3a + \frac{b}{3}\right)^3$
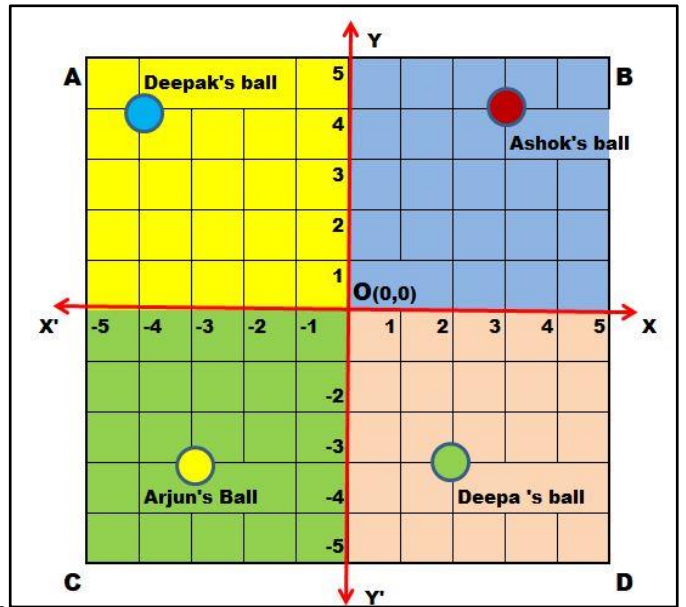
**OR**

Factorise:     (i)  $1 + 64x^3$     (ii)  $a^3 - 2\sqrt{2}b^3$

## SECTION – E

36a    What are the coordinates of Ashok's ball?

36b    what is the distance of Deepak's ball from y-axis on the picture given?

36c    What is the abscissa of the Deepa's ball?

What is the ordinate of the Arjun's ball?

OR

Write the coordinates of the ball of each student. Mention the quadrant in which they lie.



37    Maths teacher draws a straight line AB shown on the blackboard as per the figure given above.
1. Now he told Raju to draw another line CD as in the figure
2. The teacher told Ajay to mark $\angle AOD = 2z$
3. Suraj was told to mark $\angle AOC = 4y$
4. Clive made an angle $\angle COE = 60^0$
5. Peter marked $\angle BOE = y$ and $\angle BOD = x$ respectively



37a    What is the value of $x$?

37b    What is the value of y?

37c    What is the relation between y and z?
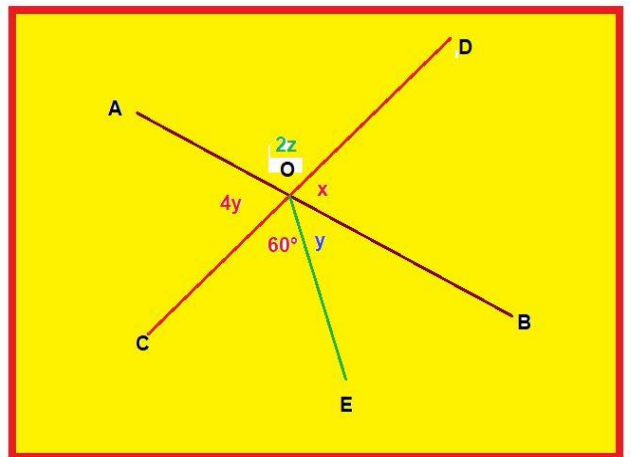
OR

Which set of angles form supplementary angles as per the figure.

38    On one day, principal of a particular school visited the classroom. Class teacher was teaching the concept of polynomial to students. He was very much impressed by her way of teaching. To check, whether the students also understand the concept taught by her or not, he asked various questions to students, some of them are given below. Answer them.

38a    which one of the following is not a polynomial?

(A)    $4x^2 + 2x - 1$(B)    $y + \frac{3}{y}$    (C)    $x^3 - 1$    (D)    $y^2 + 5y + 1$

38b    The polynomial of the type $ax^2 + bx + c, a \neq 0$ is called
(A)    Linear polynomial    (B)    Quadratic    (C)    Cubic    (D)    biquadratic

38c    The value of $k$, if $(x - 1)$ is a factor of $4x^3 + 3x^2 - 4x + k$
(A)    1    (B)    $-2$    (C)    $-3$    (D)    3

OR

What are the factors of the polynomial $x^2 - 1$.