

SAMPLE PAPER_180224

PRACTICE PAPER 08 - CHAPTER 01,02,03 & 04 (2023-24)

(ANSWERS)

SUBJECT: MATHEMATICS

MAX. MARKS: 40

CLASS: IX

DURATION: 1½ hrs

General Instructions:

- All questions are compulsory.
- This question paper contains 20 questions divided into five Sections A, B, C, D and E.
- Section A comprises of 10 MCQs of 1 mark each. Section B comprises of 4 questions of 2 marks each. Section C comprises of 3 questions of 3 marks each. Section D comprises of 1 question of 5 marks each and Section E comprises of 2 Case Study Based Questions of 4 marks each.
- There is no overall choice.
- Use of Calculators is not permitted

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. What is the value of $(256)^{0.16} \times (256)^{0.09}$?

(a) 4 (b) 16 (c) 64 (d) 256.25

Ans: (a) 4

$$(256)^{0.16} \times (256)^{0.09} = (256)^{(0.16 + 0.09)} \\ = (256)^{0.25} = (256)^{(25/100)} = (256)^{(1/4)} = (4^4)^{(1/4)} = 4^{4(1/4)} = 4$$

2. $\sqrt{6} \times \sqrt{27}$ is equal to:

(a) $9\sqrt{2}$ (b) $3\sqrt{3}$ (c) $2\sqrt{2}$ (d) $9\sqrt{3}$

Ans: (a) $9\sqrt{2}$

$$\sqrt{6} \times \sqrt{27} = \sqrt{2 \times 3 \times 3 \times 3 \times 3} = (3 \times 3)\sqrt{2} = 9\sqrt{2}$$

3. The value of $\sqrt{10}$ times $\sqrt{15}$ is equal to

(a) $5\sqrt{6}$ (b) $\sqrt{25}$ (c) $10\sqrt{5}$ (d) $\sqrt{5}$

Ans: (a) $5\sqrt{6}$

$$\sqrt{10} \times \sqrt{15} = (\sqrt{2} \cdot \sqrt{5}) \times (\sqrt{3} \cdot \sqrt{5}) = (\sqrt{5} \times \sqrt{5}) (\sqrt{2} \times \sqrt{3}) = 5\sqrt{6}$$

4. The value of $f(x) = 5x - 4x^2 + 3$ when $x = -1$, is:

(a) 3 (b) -12 (c) -6 (d) 6

Ans: (c) -6

$$f(x) = 5x - 4x^2 + 3$$

$$f(-1) = 5(-1) - 4(-1)^2 + 3 = -5 - 4 + 3 = -6$$

5. One of the linear factors of $3x^2 + 8x + 5$ is

(a) $(x + 1)$ (b) $(x - 2)$ (c) $(x + 2)$ (d) $(x - 4)$

Ans: (a) $(x + 1)$

$$3x^2 + 8x + 5 = 3x^2 + 3x + 5x + 5 = 3x(x + 1) + 5(x + 1) = (3x + 5)(x + 1)$$

Therefore, $(x+1)$ is one of the factors of $3x^2+8x+5$.

6. The coefficient of x in the expansion of $(x - 3)^3$ is

(a) 1 (b) 9 (c) 18 (d) 27

Ans: (d) 27

$$(x - 3)^3 = x^3 - (3)^3 - 3 \times x \times 3(x - 3)$$

$$= x^3 - 27 - 9x(x - 3) = x^3 - 27 - 9x^2 + 27x$$

7. Points $(1, -1)$, $(2, -2)$, $(4, -5)$, $(-3, -4)$

(a) Second quadrant (b) Do not lie in the same quadrant

- (c) Third quadrant (d) Fourth quadrant
Ans: (b) Do not lie in the same quadrant

8. Point (3, 4) lies on the graph of the equation $3y = kx + 7$. The value of k is:

- (a) $4/3$ (b) $5/3$ (c) 3 (d) $7/3$

Ans: (b) $5/3$

$$(3 \times 4) = (k \times 3) + 7 \Rightarrow 12 = 3k + 7 \\ \Rightarrow 3k = 12 - 7 \Rightarrow 3k = 5 \Rightarrow k = 5/3$$

In the following questions 9 and 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.

9. **Assertion (A):** $2 + \sqrt{3}$ is an irrational number.

Reason (R): Sum of a rational number and an irrational numbers is always an irrational number.

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

10. **Assertion (A):** The point (-2, 0) lies on y -axis and (0, 4) on x -axis.

Reason (R): Every point on the x -axis has zero distance from x -axis and every point on the y -axis has zero distance from y -axis.

Ans: We know that Every point on the x -axis has zero distance from x -axis and every point on the y -axis has zero distance from y -axis.

So, Reason is correct.

Now, point (-2, 0) lies on x-axis and (0, 4) on y-axis

So, Assertion is not correct

Correct option is (d) Assertion (A) is false but reason (R) is true.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. Find two different irrational numbers between the rational numbers $5/7$ and $9/11$.

Ans: The given two rational numbers are $5/7$ and $9/11$.

$$5/7 = 0.714285714..... \text{ and } 9/11 = 0.81818181.....$$

Hence, the three irrational numbers between $5/7$ and $9/11$ can be:

$$0.730730073000... \text{ and } 0.808008000...$$

12. Find the value of the polynomial $5x - 4x^2 + 3$ at $x = 2$ and $x = -1$.

Ans: Let the polynomial be $f(x) = 5x - 4x^2 + 3$

$$\text{Now, for } x = 2, f(2) = 5(2) - 4(2)^2 + 3 \Rightarrow f(2) = 10 - 16 + 3 = -3$$

Or, the value of the polynomial $5x - 4x^2 + 3$ at $x = 2$ is -3.

$$\text{Similarly, for } x = -1, f(-1) = 5(-1) - 4(-1)^2 + 3$$

$$\Rightarrow f(-1) = -5 - 4 + 3 = -6$$

The value of the polynomial $5x - 4x^2 + 3$ at $x = -1$ is -6.

13. Find the value of $9x^2 + 4y^2$ if $xy = 6$ and $3x + 2y = 12$.

Ans: Consider the equation $3x + 2y = 12$

Now, square both sides:

$$(3x + 2y)^2 = 12^2 \Rightarrow 9x^2 + 12xy + 4y^2 = 144 \Rightarrow 9x^2 + 4y^2 = 144 - 12xy$$

From the questions, $xy = 6$

$$\text{So, } 9x^2 + 4y^2 = 144 - 72$$

$$\text{Thus, the value of } 9x^2 + 4y^2 = 72$$

14. Without plotting the points indicate the quadrant in which they will lie, if

- (i) the ordinate is 5 and abscissa is -3
- (ii) the abscissa is -5 and ordinate is -3
- (iii) the abscissa is -5 and ordinate is 3
- (iv) the ordinate is 5 and abscissa is 3

Ans: (i) The point is (-3,5). Hence, the point lies in the II quadrant.

(ii) The point is (-5,-3). Hence, the point lies in the III quadrant.

(iii) The point is (-5,3). Hence, the point lies in the II quadrant.

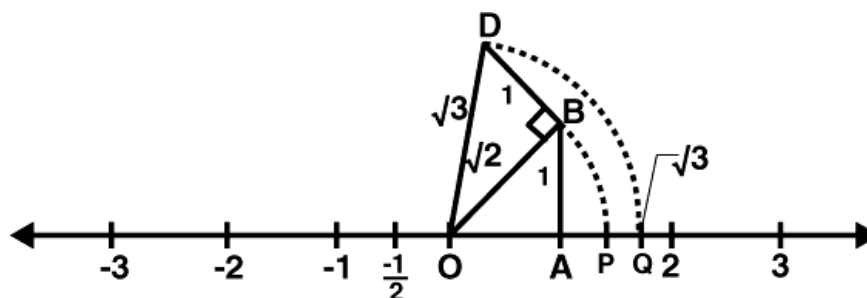
(iv) The point is (3,5). Hence, the point lies in the I quadrant.

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. Locate $\sqrt{3}$ on the number line. Write steps also.

Ans: Construct BD of unit length perpendicular to OB (here, OA = AB = 1 unit) as shown in the figure.



By Pythagoras theorem, $OD = \sqrt{(2 + 1)} = \sqrt{3}$

Taking O as the centre and OD as radius, draw an arc which intersects the number line at the point Q using a compass.

Therefore, Q corresponds to the value of $\sqrt{3}$ on the number line.

16. Show that the points A (1, 2), B (-1, -16) and C (0, -7) lie on the graph of the linear equation $y = 9x - 7$.

Ans: We have the equation, $y = 9x - 7$

For A (1, 2), Substituting (x,y) = (1, 2),

We get, $2 = 9(1) - 7 \Rightarrow 2 = 9 - 7 \Rightarrow 2 = 2$

For B (-1, -16), Substituting (x,y) = (-1, -16),

We get, $-16 = 9(-1) - 7 \Rightarrow -16 = -9 - 7 \Rightarrow -16 = -16$

For C (0, -7), Substituting (x,y) = (0, -7),

We get, $-7 = 9(0) - 7 \Rightarrow -7 = 0 - 7 \Rightarrow -7 = -7$

Hence, the points A (1, 2), B (-1, -16) and C (0, -7) satisfy the line $y = 9x - 7$.

Thus, A (1, 2), B (-1, -16) and C (0, -7) are solutions of the linear equation $y = 9x - 7$

Therefore, points A (1, 2), B (-1, -16), C (0, -7) lie on the graph of linear equation $y = 9x - 7$.

17. Find the value of a and b if $\frac{3 + \sqrt{2}}{3 - \sqrt{2}} = a + b\sqrt{2}$

Ans:

$$\begin{aligned} \frac{3 + \sqrt{2}}{3 - \sqrt{2}} &= \frac{(3 + \sqrt{2})}{(3 - \sqrt{2})} \times \frac{(3 + \sqrt{2})}{(3 + \sqrt{2})} = \frac{(3 + \sqrt{2})^2}{(3)^2 - (\sqrt{2})^2} \\ &= \frac{3^2 + (\sqrt{2})^2 + 2 \times 3 \times \sqrt{2}}{9 - 2} = \frac{9 + 2 + 6\sqrt{2}}{7} = \frac{11 + 6\sqrt{2}}{7} \end{aligned}$$

$$\begin{aligned} \therefore \frac{3 + \sqrt{2}}{3 - \sqrt{2}} &= a + b\sqrt{2} \Leftrightarrow \frac{11}{7} + \frac{6}{7}\sqrt{2} = a + b\sqrt{2} \\ &\Leftrightarrow a = \frac{11}{7} \text{ and } b = \frac{6}{7} \end{aligned}$$

SECTION – D

Questions 18 carry 5 marks.

- 18.** Find the value of $x^3 + y^3 + z^3 - 3xyz$ if $x^2 + y^2 + z^2 = 83$ and $x + y + z = 15$

Ans: Consider the equation $x + y + z = 15$

From algebraic identities, we know that $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$

So, $(x + y + z)^2 = x^2 + y^2 + z^2 + 2(xy + yz + xz)$

From the question, $x^2 + y^2 + z^2 = 83$ and $x + y + z = 15$

So, $15^2 = 83 + 2(xy + yz + xz)$

$\Rightarrow 225 - 83 = 2(xy + yz + xz)$

$\Rightarrow xy + yz + xz = 142/2 = 71$

Using algebraic identity $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$,

$x^3 + y^3 + z^3 - 3xyz = (x + y + z)(x^2 + y^2 + z^2 - (xy + yz + xz))$

Now, $x + y + z = 15$, $x^2 + y^2 + z^2 = 83$ and $xy + yz + xz = 71$

So, $x^3 + y^3 + z^3 - 3xyz = 15(83 - 71)$

$\Rightarrow x^3 + y^3 + z^3 - 3xyz = 15 \times 12$

$\Rightarrow x^3 + y^3 + z^3 - 3xyz = 180$

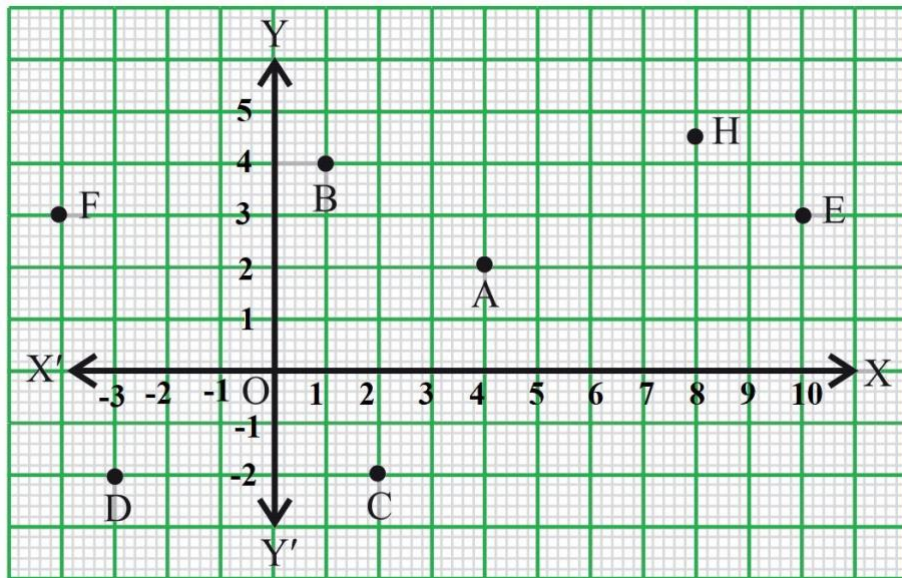
SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

- 19.** Students of class IX are on visit of Sansad Bhawan. Teacher assign them the activity to observe and take some pictures to analyses the seating arrangement between various MP and speaker based on coordinate geometry. The staff tour guide explained various facts related to Math's of Sansad Bhawan to the students, students were surprised when teacher ask them you need to apply coordinate geometry on the seating arrangement of MP's and speaker.



Calculate the following refer to the below image and graph. Answer the following questions :



- (i) What are the coordinates of position 'F'? (1)
 - (ii) What are the coordinates of position 'D'? (1)
 - (iii) In which quadrant, the point 'C' lie? (1)
 - (iv) Find the perpendicular distance of the point E from the y-axis. (1)
- Ans: (i) (-4, 3)
(ii) (-3, -2)
(iii) IV quadrant
(iv) 10 units

20. Sanjay bought 5 notebooks and 2 pens for Rs. 120. He told to guess the cost of each notebook and pen to his friends Mohan and Anil. Sanjay has given the clue that both the costs are positive integers and divisible by 5 such that the cost of a notebook is greater than that of a pen.



Now, Mohan and Anil tried to guess.

Mohan said that price of each notebook could be Rs. 18. Then five notebooks would cost Rs.90, the two pens would cost Rs.30 and each pen could be for Rs. 15.

Anil felt that Rs. 18 for one notebook was too little. It should be at least Rs. 20. Then the price of each pen would also be Rs.10.

- (i) Form the linear equations in two variables from this situation by taking cost of one notebook as Rs. x and cost of one pen as Rs. y . (1)
- (ii) If the cost of one notebook is Rs. 15 and cost of one pen is 10, then find the total amount. (1)
- (iii) If the cost of one notebook is twice the cost of one pen, then find the cost of one pen?
- (iv) Write the standard form of linear equations $y = 4$ in two variable.

Ans: (i) Here, the cost of one notebook be Rs. x and that of pen be Rs. y .

According to the statement, we have $5x + 2y = 120$

(ii) Rs. 95

(iii) Rs. 10

(iv) $0.x + 1.y - 4 = 0$