

MATHEMATICS
WORKSHEET_290126 - CHAPTER 01,02 & 03
(ANSWERS)

SUBJECT: MATHEMATICS

MAX. MARKS : 40

CLASS : IX

DURATION : 1½ hrs

General Instructions:

- (i). All questions are compulsory.
- (ii). This question paper contains 20 questions divided into five Sections A, B, C, D and E.
- (iii). **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.
- (iv). There is no overall choice.
- (v). Use of Calculators is not permitted

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. On dividing $6\sqrt{27}$ by $2\sqrt{3}$, we get

(a) $3\sqrt{9}$ (b) 6 (c) 9 (d) none of these

Ans: (c) 9

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

2. On simplifying $(3 + \sqrt{5})(3 - \sqrt{5})$, we get

(a) 8 (b) 4 (c) 2 (d) $\sqrt{2}$

Ans: (b) 4

$$(3 + \sqrt{5})(3 - \sqrt{5}) = (3)^2 - (\sqrt{5})^2 \quad [\because (a + b)(a - b) = a^2 - b^2]$$

$$= 9 - 5 = 4$$

3. Value of $\sqrt[4]{(81)^{-2}}$ is

(a) $\frac{1}{9}$ (b) $\frac{1}{3}$ (c) 9 (d) $\frac{1}{81}$

Ans: (a) $\frac{1}{9}$

$$\sqrt[4]{(81)^{-2}} = [(9^2)^{-2}]^{\frac{1}{4}} = 9^{-2 \times 2 \times \frac{1}{4}} = 9^{-1} = \frac{1}{9}$$

4. The coefficient of x in the expansion of $(x + 3)^3$ is

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

Ans: (d) 27

$$(x + 3)^3 = x^3 + (3)^3 + 3 \times x \times 3(x + 3) \\ = x^3 + 27 + 9x(x + 3) = x^3 + 27 + 9x^2 + 27x$$

5. If $64x^2 - y = \left(8x + \frac{1}{2}\right)\left(8x - \frac{1}{2}\right)$, then the value of y is

(a) 0 (b) $\frac{1}{\sqrt{2}}$ (c) $\frac{1}{4}$ (d) $\frac{1}{2}$

Ans: (c) $\frac{1}{4}$

6. If polynomial $p(x) = 3x^4 - 4x^3 - 3x - 1$ is divided by $(x - 1)$, then remainder is
 (a) 3 (b) -4 (c) -1 (d) $p(1)$
 Ans: (d) $p(1)$
7. If the coordinates of the two points are $P(-5, 3)$ and $Q(8, -9)$, then (abscissa of Q) - (abscissa of P) is
 (a) 4 (b) -12 (c) 13 (d) -13
 Ans: (c) 13
 (abscissa of Q) - (abscissa of P) = $8 - (-5) = 8 + 5 = 13$
8. Which of the following points does not lie in III quadrant?
 (a) $(-1, 2)$ (b) $(-2, -5)$ (c) $(-1, -2)$ (d) $(-6, -3)$
 Ans: (a) $(-1, 2)$

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):** The abscissa of a point $(5, 2)$ is 5.

Reason (R): The perpendicular distance of a point from y-axis is called its abscissa.

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

10. **Assertion (A):** 5 is a rational number.

Reason (R): The square roots of all positive integers are irrationals.

Ans: (c) A is true but R is false.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. If -1 is a zero of the polynomial $p(x) = ax^3 - x^2 + x + 4$, then find the value of ' a '.

Ans: If -1 is a zero of the polynomial $p(x)$, then

$$p(-1) = 0$$

$$\Rightarrow a(-1)^3 - (-1)^2 + (-1) + 4 = 0$$

$$\Rightarrow -a - 1 - 1 + 4 = 0$$

$$\Rightarrow -a + 2 = 0 \Rightarrow a = 2$$

12. Find the coordinates of a point:

(i) whose ordinate is 6 and lies on the y-axis

(ii) whose abscissa is -3 and lies on the x-axis.

Ans: For the point (x, y) , x represents abscissa and y represents ordinate. Hence,

(i) The coordinates of a point whose abscissa is zero lies on the y-axis.

Therefore, required coordinates = $(0, 6)$.

(ii) The coordinates of a point whose ordinate is zero and lies on the x-axis. Therefore, required coordinates = $(-3, 0)$

13. In which quadrant the following points lie?

$(3, 2)$, $(2, -3)$, $(-4, 4)$ and $(-2, -3)$

Ans: Point $(3, 2)$ lies in Ist quadrant

Point $(2, -3)$ lies in IVth quadrant

Point $(-4, 4)$ lies in IIInd quadrant

Point $(-2, -3)$ lies in IIIrd quadrant

14. Find the value of x for which $\left(\frac{3}{4}\right)^6 \times \left(\frac{16}{9}\right)^5 = \left(\frac{4}{3}\right)^{x+2}$.

Ans:

$$\text{Given } \left(\frac{3}{4}\right)^6 \times \left(\frac{16}{9}\right)^5 = \left(\frac{4}{3}\right)^{x+2}$$

$$\Rightarrow \left(\frac{4}{3}\right)^{-6} \times \left[\left(\frac{4}{3}\right)^2\right]^5 = \left(\frac{4}{3}\right)^{x+2}$$

$$\Rightarrow \left(\frac{4}{3}\right)^{-6} \times \left(\frac{4}{3}\right)^{10} = \left(\frac{4}{3}\right)^{x+2}$$

$$\Rightarrow \left(\frac{4}{3}\right)^{10-6} = \left(\frac{4}{3}\right)^{x+2}$$

$$\Rightarrow \left(\frac{4}{3}\right)^4 = \left(\frac{4}{3}\right)^{x+2} \Rightarrow 4 = x + 2 \Rightarrow x = 2$$

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. Simplify $\frac{4+\sqrt{5}}{4-\sqrt{5}} + \frac{4-\sqrt{5}}{4+\sqrt{5}}$ by using rationalizing the denominator

Ans:

$$\begin{aligned} \frac{4+\sqrt{5}}{4-\sqrt{5}} + \frac{4-\sqrt{5}}{4+\sqrt{5}} &= \left(\frac{4+\sqrt{5}}{4-\sqrt{5}}\right) \times \left(\frac{4+\sqrt{5}}{4+\sqrt{5}}\right) + \left(\frac{4-\sqrt{5}}{4+\sqrt{5}}\right) \times \left(\frac{4-\sqrt{5}}{4-\sqrt{5}}\right) \\ &\quad \text{(Rationalising both denominators)} \\ &= \frac{(4+\sqrt{5})^2}{(4)^2 - (\sqrt{5})^2} + \frac{(4-\sqrt{5})^2}{(4)^2 - (\sqrt{5})^2} = \frac{16+5+8\sqrt{5}}{16-5} + \frac{16+5-8\sqrt{5}}{16-5} \\ &= \frac{1}{11}[21+8\sqrt{5}+21-8\sqrt{5}] = \frac{42}{11} \end{aligned}$$

16. If $2x + 3y = 12$ and $xy = 6$, find the value of $8x^3 + 27y^3$.

Ans: We know that $(x+y)^3 = x^3 + y^3 + 3xy(x+y)$

$$\Rightarrow x^3 + y^3 = (x+y)^3 - 3xy(x+y)$$

$$\text{Now, } 8x^3 + 27y^3 = (2x)^3 + (3y)^3 = (2x+3y)^3 - 3(2x)(3y)(2x+3y)$$

$$= 12^3 - 18 \times 6 \times 12$$

$$[\text{Given } 2x + 3y = 12 \text{ and } xy = 6]$$

$$= 1728 - 1296 = 432$$

$$\text{Hence, } 8x^3 + 27y^3 = 432$$

17. Find the value of a and b so that $x+1$ and $x-1$ are factors of $x^4 + ax^3 + 2x^2 - 3x + b$.

Ans: Let $f(x) = x^4 + ax^3 + 2x^2 - 3x + b$ be the given polynomial and $g(x) = x+1$, $h(x) = x-1$

If $g(x)$ is a factor of $f(x)$, then by factor theorem,

$$f(-1) = 0$$

$$\Rightarrow (-1)^4 + a(-1)^3 + 2(-1)^2 - 3(-1) + b = 0$$

$$\Rightarrow 1 - a + 2 + 3 + b = 0$$

$$\Rightarrow -a + b = -6 \dots(i)$$

If $h(x)$ be a factor of $f(x)$, then, again by factor theorem, $f(1) = 0$

$$\Rightarrow 1^4 + a(1)^3 + 2(1)^2 - 3(1) + b = 0$$

$$\Rightarrow 1 + a + 2 + 3 + b = 0$$

$$\Rightarrow a + b = 0 \dots(ii)$$

Adding (i) and (ii), we get

$$2b = -6 \text{ or } b = -3$$

From (ii), we have $a - 3 = 0 \Rightarrow a = 3$

Hence, required value of a and b are 3 and -3 respectively.

SECTION – D

Questions 18 carry 5 marks.

18. Prove that $\frac{1}{3-\sqrt{8}} - \frac{1}{\sqrt{8}-\sqrt{7}} + \frac{1}{\sqrt{7}-\sqrt{6}} - \frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{5}-2} = 5$.

Ans:

$$\begin{aligned} & \frac{1}{3-\sqrt{8}} - \frac{1}{\sqrt{8}-\sqrt{7}} + \frac{1}{\sqrt{7}-\sqrt{6}} - \frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{5}-2} \\ &= \left[\frac{1}{3-\sqrt{8}} \times \frac{3+\sqrt{8}}{3+\sqrt{8}} \right] - \left[\frac{1}{\sqrt{8}-\sqrt{7}} \times \frac{\sqrt{8}+\sqrt{7}}{\sqrt{8}+\sqrt{7}} \right] + \left[\frac{1}{\sqrt{7}-\sqrt{6}} \times \frac{\sqrt{7}+\sqrt{6}}{\sqrt{7}+\sqrt{6}} \right] \\ & - \left[\frac{1}{\sqrt{6}-\sqrt{5}} \times \frac{\sqrt{6}+\sqrt{5}}{\sqrt{6}+\sqrt{5}} \right] + \left[\frac{1}{\sqrt{5}-2} \times \frac{\sqrt{5}+2}{\sqrt{5}+2} \right] \\ &= \left[\frac{3+\sqrt{8}}{9-8} \right] - \left[\frac{\sqrt{8}+\sqrt{7}}{8-7} \right] + \left[\frac{\sqrt{7}+\sqrt{6}}{7-6} \right] - \left[\frac{\sqrt{6}+\sqrt{5}}{6-5} \right] + \left[\frac{\sqrt{5}+2}{5-4} \right] \\ &= [3+\sqrt{8}] - [\sqrt{8}+\sqrt{7}] + [\sqrt{7}+\sqrt{6}] - [\sqrt{6}+\sqrt{5}] + [\sqrt{5}+2] \\ &= 3+\sqrt{8}-\sqrt{8}-\sqrt{7}+\sqrt{7}+\sqrt{6}-\sqrt{6}-\sqrt{5}+\sqrt{5}+2=5 \end{aligned}$$

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. In January 2021, the vaccination drive for COVID -19 started in 7 states of a country. More than 60% of the people were vaccinated in 4 states out of 7 states, In one of the state vaccination drive has not been started due to flood although vaccine dose was supplied to that state in advance. In February 2021, 4 more states were included in this drive and 2 states have got remarkable response from the people and more than 80% of the population got vaccinated there. Using this information answer the following questions:



(a) In January 2021, more than 60% of people were vaccinated in 4 states out of 7 states. Find the decimal representation of $\frac{4}{7}$ (2)

(b) In 2 states out of 11 states, more than 80% of people participated in vaccination drive in two months. Find the decimal form of $\frac{2}{11}$ (2)

OR

(b) The fraction for state where vaccination not started in January 2021 is $\frac{1}{7}$ and its decimal form is 0.142857. Find the decimal form of $\frac{6}{7}$.

Ans:

(a) Dividing 4 by 7 as:

$$\begin{array}{r}
 7 \overline{)4.0000000(0.571428} \\
 \underline{-35} \\
 50 \\
 \underline{-49} \\
 10 \\
 \underline{-7} \\
 30 \\
 \underline{-28} \\
 20 \\
 \underline{-14} \\
 60 \\
 \underline{-56} \\
 40
 \end{array}$$

$$\text{Ans.} = 0.\overline{571428}$$

(b) Decimal form of

$$\frac{2}{11} = 0.181818 = 0.\overline{18}$$

$$\begin{array}{r}
 11 \overline{)2.0000000(0.181818} \\
 \underline{-11} \\
 90 \\
 \underline{-88} \\
 20 \\
 \underline{-11} \\
 90 \\
 \underline{-88} \\
 20 \\
 \underline{-11} \\
 90 \\
 \underline{-88} \\
 20
 \end{array}$$

OR

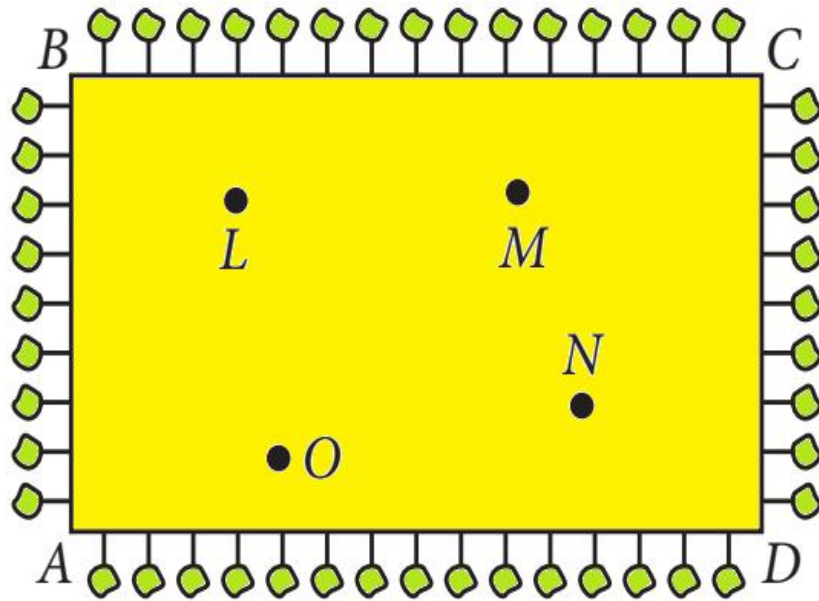
$$\text{If } \frac{1}{7} \text{ is } 0.\overline{142857}$$

$$\text{then } \frac{6}{7} \text{ is}$$

$$6 \times \frac{1}{7} = 0.\overline{857142}$$

20. On the occasions of 'Diwali' a rectangular plot have been allotted for 'Diwali Mela' to students of secondary school in Hyderabad. In order to reduce smog and pollution they decided to keep little leaf linden plant on the boundary at a distance of 1 m from each other. Four air purifier machines

have also been set up at points L, M, N, O. (Answer the following questions considering A as origin).



- (a) What are the coordinates of L? (1 mark)
 (b) What are the coordinates of N? (1 mark)
 (c) Find the distance between L and N (2 marks)

Ans: (a) (4, 7)

(b) (12, 3)

(c) By Pythagoras theorem,

$$LN^2 = AL^2 + AN^2$$

$$\Rightarrow LN^2 = 4^2 + 8^2 = 16 + 64$$

$$\Rightarrow LN^2 = 80$$

$$\Rightarrow LN = 4\sqrt{5} \text{ units}$$

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