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परमाणु ऊर्जा शिक्षा संस्था , मुंबई

Atomic Energy Education Society, Mumbai

Session : 2023 – 24

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Class: IX   **Subject: MATHEMATICS**

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WORKSHEET NO.- 1

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Name of the Chapter : NUMBER SYSTEMS (CHAPTER – 1)

General Instructions:

1. There are 5 sections in this worksheet.
2. Section – A has 10 multiple choice questions of 1 mark each.
3. Section – B has 10 very short answer questions of 1 mark each.
4. Section – C has 10 short answer questions of 2 marks each.
5. Section – D has 5 short answer questions of 3 marks each.
6. Section – E has 5 long answer questions of 5 marks each.
7. Draw neat diagrams wherever necessary.
8. Use of calculator is not permitted.

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SECTION – A (1 x 10 = 10)

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1   Which of the following is an irrational number   **[1]**

a) $\sqrt{225}$

b) $7.\overline{478}$

c) $\sqrt{23}$

d) 0.3799

2   The simplest rationalising factor of $2\sqrt{5} - \sqrt{3}$,is   **[1]**

a) $\sqrt{5} + \sqrt{3}$

b) $2\sqrt{5} + 3$

c) $\sqrt{5} - \sqrt{3}$

d) $2\sqrt{5} + \sqrt{3}$

3   The value of $\sqrt{p^{-1}q} \cdot \sqrt{q^{-1}r} \cdot \sqrt{r^{-1}p}$ is   **[1]**

a) - 1

b) 1

c) 2

d) 0

4   The value of $\sqrt{20} \times \sqrt{5}$ is   **[1]**

a) $20\sqrt{5}$

b) $4\sqrt{5}$

c) $2\sqrt{5}$

d) 10

5   The simplest rationalising factor of $\sqrt[3]{500}$, is   **[1]**

a) $\sqrt{3}$

b) $\sqrt[3]{2}$

c) none of these

d) $\sqrt[3]{5}$

6   If x=$\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$ and $y = \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$, then x + y + xy =   **[1]**

a) 5

b) 9

c) 17

d) 7

7   The value of $x^{a-b} \times x^{b-c} \times x^{c-a}$ is   **[1]**

a) 1

b) 2

c) x

d) 0

8   Which of the following is the value $(\sqrt{11} - \sqrt{7})(\sqrt{11} + \sqrt{7})$?   **[1]**

a) $\sqrt{7}$

b) 4

c) $\sqrt{11}$

d) - 4

9   π is   **[1]**

a) a rational number

b) an integer

c) an irrational number

d) a whole number

10   After simplification, $\dfrac{13^{1/5}}{13^{1/3}}$ is   **[1]**

a) $13^{8/15}$

b) $13^{2/15}$

c) $13^{-2/15}$

d) $13^{1/3}$

SECTION – B (1 x 10 = 10)

11   Evaluate: $(25)^{\frac{3}{2}}$.   **[1]**

12   Evaluate: $5^4 \times 5^2$ **[1]**

13   Simplify: $\dfrac{3^n \times 9^{n+1}}{3^{n-1} \times 9^{n-1}}$ **[1]**

14   Find the value to three places of decimal: It is given that $\sqrt{2} = 1.414$, $\sqrt{3} = 1.732$, $\sqrt{10} =$ **[1]**
3.162 and $\sqrt{5} = 2.236$ (approx.) $\dfrac{1}{\sqrt{3}}$

15   Examine, whether $\sqrt{7}$ is rational or irrational.   **[1]**

16   Rationalise the denominator of $\dfrac{4\sqrt{3}+5\sqrt{2}}{\sqrt{48}+\sqrt{18}}$ **[1]**

17   Classify the number 4.1276 as rational or irrational. Give reasons to support your   **[1]**
answer.

18   Add $\left(2\sqrt{2} + 5\sqrt{3} - 7\sqrt{5}\right)$ and $\left(3\sqrt{3} - \sqrt{2} + \sqrt{5}\right)$.   **[1]**

19   Simplify $\left(\sqrt{5} - \sqrt{2}\right)\left(\sqrt{2} - \sqrt{3}\right)$.   **[1]**

20   Given $4725 = 3^a \, 5^b \, 7^c$, find the integral values of a, b and c.   **[1]**

SECTION – C(2 x 10 = 20)

21 Rationalise the denominator of $\frac{1}{\sqrt{2}}$ **[2]**

22 Express $0.\overline{4}$ in the form $\frac{p}{q}$ **[2]**

23 It is given that $\sqrt{2} = 1.414$, $\sqrt{3} = 1.732$, $\sqrt{5} = -2.236$ and $\sqrt{10} = 3.162$, find the value to three places of decimal $\frac{2}{\sqrt{5}}$. **[2]**

24 Given, $\sqrt{2} = 1.414$ and $\sqrt{6} = 2.449$, find the value of $\frac{1}{\sqrt{3}-\sqrt{2}-1}$ to 3 places of decimal. **[2]**

25 Express $0.\overline{001}$ as a fraction in the simplest form. **[2]**

26 Find the value to three places of decimals, it being given that $\sqrt{2} = 1.4142$, $\sqrt{3} = 1.732$, $\sqrt{5} = 2.2360$, $\sqrt{6} = 2.4495$ and $\sqrt{10} = 3.162$ $\frac{1+\sqrt{2}}{3-2\sqrt{2}}$ **[2]**

27 Simplify the following by rationalizing the denominator : $\frac{1}{\sqrt{6}-\sqrt{5}}$ **[2]**

28 Simplify $\frac{2\sqrt{30}}{\sqrt{6}} - \frac{3\sqrt{140}}{\sqrt{28}} + \frac{\sqrt{55}}{\sqrt{99}}$. **[2]**

29 Simplify : $\frac{3}{\sqrt{8}} + \frac{1}{\sqrt{2}}$ **[2]**

30 Write in decimal form and say what kind of decimal expansion : $\frac{2}{11}$ **[2]**

SECTION – D(3x 5 = 15)

31 If $a = 2 + \sqrt{3}$, then find the value of $a - \frac{1}{a}$. **[3]**

32 State whether the following statements are true or false. Give reasons for your answers. (i) Every natural number is a whole number. (ii) Every integer is a whole number. (iii) Every rational number is a whole number. **[3]**

33 Express $0.\overline{6}$ in the form $\frac{P}{q}$, where p and q are integers and $q \neq 0$. **[3]**

34 What can the maximum number of digits be in the repeating block of digits in the decimal expansion of $\frac{1}{17}$? Perform the division to check your answer. **[3]**

35 Locate $\sqrt{13}$ on the number line. **[3]**

SECTION – E(5 x 5 = 25)

36 If $\frac{9^n \times 3^2 \times \left(3^{-n/2}\right)^{-2} - (27)^n}{3^{3m} \times 2^3} = \frac{1}{27}$, prove that m - n = 1. **[5]**

37 If $a = \frac{3+\sqrt{5}}{2}$, then find the value of $a^2 + \frac{1}{a^2}$. **[5]**

38 If $x = \frac{5-\sqrt{3}}{5+\sqrt{3}}$ and $y = \frac{5+\sqrt{3}}{5-\sqrt{3}}$, show that $x - y = -\frac{10\sqrt{3}}{11}$. **[5]**

39 If $x = \frac{5-\sqrt{21}}{2}$, prove that $\left(x^3 + \frac{1}{x^3}\right) - 5\left(x^2 + \frac{1}{x^2}\right) + \left(x + \frac{1}{x}\right) = 0$. **[5]**

40 Represent each of the numbers $\sqrt{5}, \sqrt{6}$ and $\sqrt{7}$ the real line. **[5]**