

Work Sheet - Number System.

class - IX
(2013-14)

- Find 2 rational nos. and 2 irrational nos. between
a) $\frac{1}{3}$ & $\frac{1}{4}$ b) 1.3 & 1.4
c) 0.2 & $0.\overline{2}$ d) 1 & $\sqrt{2}$
- Express the following nos. in the form $\frac{p}{q}$ where p & q are integers and $q \neq 0$.
a) $0.\overline{6}$ b) $1.\overline{307}$
c) $0.02\overline{3}$ d) $3.3\overline{79}$
- Represent on the number line geometrically.
a) $\sqrt{7}$ b) $\sqrt{17}$ c) $\sqrt{6.5}$
- Evaluate
a) $(1^3 + 2^3 + 3^3)^{-1/2}$
b) $(25)^{5/2} \times (729)^{1/2} \times (8)^{-2/3}$
 $(125)^{2/3} \times (27)^{2/3} \times (225)^{3/2}$
c) $\frac{1}{1+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{4}} + \dots + \frac{1}{\sqrt{8}+\sqrt{9}}$
- Simplify by rationalising the denominator.
a) $\frac{30}{5\sqrt{3}-3\sqrt{5}}$ b) $\frac{1}{\sqrt{3}-\sqrt{2}-1}$
c) $\frac{3\sqrt{2}}{\sqrt{6}-\sqrt{3}} - \frac{4\sqrt{3}}{\sqrt{6}-\sqrt{2}} + \frac{2\sqrt{3}}{2+\sqrt{6}}$
d) $\frac{3\sqrt{6}}{5\sqrt{3}-\sqrt{32}+2\sqrt{12}-\sqrt{50}}$
- If $x = 3 + \sqrt{8}$ find the value of $x^2 + \frac{1}{x^2}$ and $x^3 - \frac{1}{x^3}$
- If $x = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ and $y = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$ find the value of $x^3 + y^3$.
- If $a^x = b^y = c^z$ and $b^2 = ac$, then S.T. $y = \frac{2xz}{x+z}$
- S.T. $(x^{a-b})^{(a+b)} \times (x^{b-c})^{(b+c)} \times (x^{c-a})^{(c+a)} = 1$
- S.T. $\frac{\overline{a'}}{\overline{a'+b'}} - \frac{\overline{a'}}{\overline{a'-b'}} = \frac{2ab}{a^2-b^2}$
- If $\frac{7+\sqrt{5}}{7-\sqrt{5}} - \frac{7-\sqrt{5}}{7+\sqrt{5}} = a+b\sqrt{5}$ find the value of a & b .
- Solve for x .
 $2^{3x-6} \times 3^{2x-3} = 216$
- If $x = 9 + 4\sqrt{5}$ find the value of $\sqrt{x} + \frac{1}{\sqrt{x}}$.
- Choose the most suitable option from the bracket and give eg. to support your answer.
"Product of a rational number and an irrational number is _____"
[rational/irrational/not a real number/rational or irrational]
- Find the value of $0.\overline{6} + 0.\overline{7} + 0.4\overline{7}$ in the $\frac{p}{q}$ form where p & q are integers and $q \neq 0$

16. MCQ.

- i) $0.12\bar{3} = \underline{\hspace{2cm}}$
 $\left[\frac{111}{990}, \frac{123}{990}, \frac{120}{900}, \frac{111}{900} \right]$
- ii) which of the following is irrational?
 $\left[\sqrt{4/9}, \sqrt{12}/\sqrt{3}, \sqrt{7} \times \sqrt{2}, \sqrt{2025} \right]$
- iii) when you represent $\sqrt{3}$ on the number line, it lies in between
 $[0 \& 1, 1 \& 2, 2 \& 3, 3 \& 4]$
- iv) If $(27)^x = \frac{9}{3^x}$ then $x = \underline{\hspace{2cm}}$
 $[3, 1/2, 2, 1]$
- v) which of the following is equal to x ?
 $\left[x^{12/7+5/7}, x^{12/7} \times x^{7/12}, (\sqrt{x^3})^{3/2}, \sqrt{12(x^4)^3} \right]$
- vi) If $4^{2y} = 256$ then $4^{-y} = \underline{\hspace{2cm}}$
 $[1/16, -1/16, 1/4, 16]$
- vii) $\sqrt[4]{3^2 \times 2^8} = \underline{\hspace{2cm}}$ $[2^{1/6}, 2^{-6}, 2^{2/3}, 2^6]$
- viii) $(\sqrt{7}-\sqrt{5})^2 \div (6-\sqrt{35}) = \underline{\hspace{2cm}}$
 $[1, -1, 2, -2]$
- ix) An irrational no. between $\sqrt{2}$ & $\sqrt{3}$ is
 $\left[\frac{\sqrt{2}+\sqrt{3}}{2}, \frac{\sqrt{3}-\sqrt{2}}{2}, \frac{\sqrt{2} \times \sqrt{3}}{2}, \frac{\sqrt{3}}{\sqrt{2}} \right]$
- x) A rational no. equivalent to $7/19$ is $\underline{\hspace{2cm}}$
 $\left[\frac{17}{119}, \frac{14}{57}, \frac{21}{57}, \frac{49}{361} \right]$

Answers / Hints

- 2) a) $2/3$ b) $\frac{1306}{999}$ c) $\frac{7}{300}$ d) $\frac{1673}{495}$
- 4) a) $1/6$ b) $1/36$ c) 2. (Hint: Rationalize each term)
- 5) a) $5\sqrt{3} + 3\sqrt{5}$ b) $\frac{1}{4}(\sqrt{6} + \sqrt{2} + 2)$ [Hint: $\frac{1(\sqrt{3}+\sqrt{2}+1)}{(\sqrt{3}-\sqrt{2}+1)(\sqrt{3}+\sqrt{2}+1)} = \frac{(\sqrt{3}+\sqrt{2}+1)\sqrt{2}}{-2\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$ then simplify]
- c) $-2\sqrt{6}$ d) $\sqrt{2} + \frac{2\sqrt{3}}{3}$ [Hint: $\frac{3\sqrt{6}}{5\sqrt{3}-4\sqrt{2}+4\sqrt{3}-5\sqrt{2}} = \frac{3\sqrt{6}}{9(\sqrt{3}-\sqrt{2})}$ rationalize & simplify]
- 6) $140\sqrt{2}$. [Hint: $1/x = 3-\sqrt{8}$
 $x + 1/x = 6, x - 1/x = 2\sqrt{8}$
 $x^2 + 1/x^2 = (x + 1/x)^2 - 2 = 34$
 $x^3 - 1/x^3 = (x - 1/x)(x^2 + 1/x^2 + 1)$
- 7) 970. [Hint: $x = 5 - 2\sqrt{6}, y = 5 + 2\sqrt{6}$
 $x + y = 10, xy = 1$
 $x^3 + y^3 = (x + y)(x^2 + y^2 - 3xy)$
- 8) Let $a^x = b^y = c^z = k \Rightarrow a = k^{1/x}, b = k^{1/y}, c = k^{1/z}$ sub in $b^2 = ac$ & simplify.
- 9) apply laws of exponents.
- 10) $\frac{1/a}{1/a + 1/b} - \frac{1/a}{1/a - 1/b}$ take LCM & simplify
- 11) $a = 0, b = 7/11$ [Hint: $a + \sqrt{5} = \frac{(7+\sqrt{5})^2 - (7-\sqrt{5})^2}{49-5}$ simplify.]
- 12) $2^{3x-6} \times 3^{2x-3} = 2^3 \times 3^3 \Rightarrow 3x-6 = 3$ so $2x-3 = 3 \Rightarrow x = 3$ (ans)
- 13) $x = 4 + 5 + 4\sqrt{5} = 2^2 + (\sqrt{5})^2 + 2 \cdot 2 \cdot \sqrt{5} = (2 + \sqrt{5})^2$
 $\Rightarrow \sqrt{x} = 2 + \sqrt{5}, 1/\sqrt{x} = -2 + \sqrt{5}$
 $\sqrt{x} + 1/\sqrt{x} = 2\sqrt{5}$ (ans)
- 14) rational or irrational (option D.)
eg: $\sqrt{2} \& \sqrt{8}$ eg: $\sqrt{2} \& \sqrt{3}$
- 15) $0.6 = 6/10, 0.\bar{7} = 7/9, 0.4\bar{7} = 43/90$
Ans. $167/90$
- 16) 1. D 2. C 3. B 4. B
5. D 6. A 7. A 8. C
9. A 10. C