HW 1.2

April 1, 2015 8:36 PM

3 ii) $\sqrt{105}$

$= \sqrt{21 \times 5}$

$= \sqrt{3 \times 5 \times 7}$

$\frac{1}{10} = 0.1$

$\frac{1}{100} = 0.01$

$\frac{1}{1000} = 0.001$

iv) $\sqrt[3]{0.001}$

$= \sqrt[3]{\frac{1}{1000}}$

$= \sqrt[3]{\frac{1}{10} \times \frac{1}{10} \times \frac{1}{10}} = \frac{1}{10} = 0.1$

4) $5\sqrt{18} \times 4\sqrt{8} \times (-3\sqrt{32})$

$5\sqrt{2 \times 3^2} \times 4\sqrt{2^3} \times -3\sqrt{2^5}$

$5 \times (4) \times (-3) \sqrt{2^9 \times 3^2}$

$-60 \sqrt{2^8} \times \sqrt{2} \times \sqrt{3^2}$

$-60 (16)(3) \times \sqrt{2}$

$\boxed{-2880\sqrt{2}}$

4) vi) $5\sqrt{6ab} \times 4\sqrt{12a^2b} \times 3\sqrt{9b}$

$60\sqrt{2 \times 3 \times 2^2 \times 3 \times 3^2 \; a^3 b^3}$

$60\sqrt{2^3 \times 3^4 \times a^3 b^3}$

$60(2\sqrt{2})(3^2)(a\sqrt{a}) b\sqrt{b}$

$1080 ab\sqrt{2ab}$

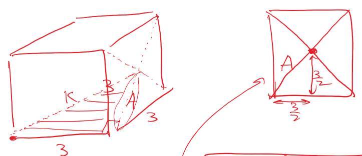
$\sqrt{9} = 3$

$9 = x^2$

$\sqrt{9} = \sqrt{x^2}$

$\pm 3 = x$

#7)

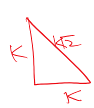


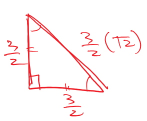
① $K^2 = A^2 + 3^2$

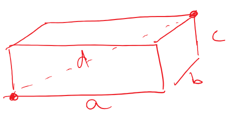
$A^2 = \left(\frac{3}{2}\right)^2 + \left(\frac{3}{2}\right)^2$

② $K^2 = \left(\frac{3}{2}\right)^2 + \left(\frac{3}{2}\right)^2 + 3^2$

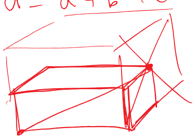
③







$d^2 = a^2 + b^2 + c^2$



8) $\sqrt{x^3 \sqrt{x^2 \sqrt{x^4}}} = (x^3)^2$

By SEAN CHEN

1. Indicate which of the following are Irrational Numbers. If it is not a rational number, please simplify the expression:

I $\sqrt{12}$ $= 2\sqrt{3}$ R $\sqrt{16}$ $= 4$ R $1.1\overline{3}$ $= 1\frac{13}{100}$ R $\sqrt{\sqrt{81}}$ $= 3$ R $5.\overline{32}$ $= 5\frac{32}{99}$ R $1.875132$ $= 1\frac{875132}{1000000}$ I $\sqrt[3]{11}$ R $\sqrt[5]{32}$ $= 2$ R $\sqrt[3]{27}$ $= 3$ R $\sqrt{\frac{25}{16}}$ $= \frac{5}{4}$

I $-8.1313313331...$ R $2\frac{5}{6}$ R $\left(\left(\sqrt{5}\right)\sqrt{20}\right)$ $= \sqrt{100}$ $= 10$ I $\frac{\sqrt{10}}{\sqrt{20}}$ $= \frac{\sqrt{10}}{2\sqrt{5}}$ $= \frac{5\sqrt{2}}{10}$ $= \frac{\sqrt{2}}{2}$ R $\sqrt[3]{125}$ $= 5$ I $\sqrt[3]{31}+1$ I $-85.123456....$

2. Use a number line to order these numbers from the least to the greatest, then place them on a number line

a) $\sqrt{50}, \sqrt[3]{100}, \sqrt[3]{500}, \sqrt[4]{1000}$ $\sqrt{50} \doteq 7$ $\sqrt{100} = 10$ $\sqrt[3]{500} \doteq 8$ $\sqrt[4]{1000} \doteq 6$

$\sqrt[4]{1000}$ $\sqrt[3]{500}$ 0 $\sqrt{50}$ $\sqrt{100}$

b) $\sqrt[4]{250}, \sqrt[3]{300}, \sqrt[3]{-180}, \sqrt{89}$ $\sqrt[4]{250} \doteq 4$ $\sqrt{300} \doteq 17$ $\sqrt[3]{180} \doteq -6$ $\sqrt{89} \doteq 9$

$\sqrt{300}$ $\sqrt[3]{180}$ 0 $\sqrt[4]{250}$ $\sqrt{89}$

c) $\sqrt{499}, 5\sqrt{23}, \left(\sqrt[3]{88}\right)^2, \left(12\sqrt[4]{20}\right)$ $\sqrt{499} \doteq 22$ $5\sqrt{23} \doteq 24$ $\left(\sqrt[3]{88}\right)^2 \doteq 20$ $\left(12\sqrt[4]{20}\right) \doteq 25$

$\sqrt{499}$ $5\sqrt{23}$ 0 $\left(\sqrt[3]{88}\right)^2$ $\left(12\sqrt[4]{20}\right)$

3. Find the decimal representation for following. Indicate any patterns that you see:

$\frac{1}{7} = 0.\overline{142857}$ $\frac{2}{7} = 0.\overline{285714}$ $\frac{3}{7} = 0.\overline{428571}$ $\frac{4}{7} = 0.\overline{571428}$

$\frac{5}{7} = 0.\overline{714285}$ $\frac{6}{7} = 0.\overline{857142}$

$\frac{1}{11} = 0.\overline{09}$ $\frac{2}{11} = 0.\overline{18}$ $\frac{3}{11} = 0.\overline{27}$ $\frac{4}{11} = 0.\overline{36}$

$\frac{1}{13} = 0.\overline{076923}$ $\frac{2}{13} = 0.\overline{153846}$ $\frac{3}{13} = 0.\overline{230769}$ $\frac{4}{13} = 0.\overline{307692}$

$\frac{5}{13} = 0.\overline{384615}$ $\frac{6}{13} = 0.\overline{461538}$ $\frac{7}{13} = 0.\overline{538461}$ $\frac{8}{13} = 0.\overline{615384}$

$\frac{9}{13} = 0.\overline{692307}$ $\frac{10}{13} = 0.\overline{769230}$ $\frac{11}{13} = 0.\overline{846153}$ $\frac{12}{13} = 0.\overline{923076}$

b) What patterns do you notice about fractions with a denominator of 13? How many repeating digits are there?

There are only 6 repeating digits

4. Which of the following statements are true?

i) All natural numbers are integers.

ii) All integers are rational numbers.

iii) All whole numbers are natural numbers

iv) All irrational numbers are roots

v) Some rational numbers are natural numbers

vi) The sum a rational number and an irrational number will be rational

vii) The product of a rational number and an irrational number will be irrational

viii) Zero is a whole number but not a natural number

8) $\sqrt{x\sqrt{x\sqrt{x\sqrt{x}}}} = (x^3)^2$

$x^5$, $x^{10}$, $x^9$, $x^{18}$, $x^{17}$, $x^{34}$ $a=34$

$\left(\sqrt{5-2\sqrt{6}}\right)^2 = \left(\sqrt{a}-\sqrt{b}\right)^2$

$5-2\sqrt{6} = (\sqrt{a}-\sqrt{b})(\sqrt{a}-\sqrt{b})$

$= a - \sqrt{ab} - \sqrt{ab} + b$

$5 - 2\sqrt{6} = a+b - 2\sqrt{ab}$

$a+b=5$ $6 = a\times b$

$\boxed{a=3,\ b=2}$

$\sqrt{5-2\sqrt{6}} = \sqrt{a}-\sqrt{b}$

$\cancel{\sqrt{2}-\sqrt{3}}$

$\cancel{a=2,\ b=3}$

$(\sqrt{a}-\sqrt{b})^2$

$\cancel{\neq (\sqrt{a})^2 - (\sqrt{b})^2}$

$(\sqrt{a}-\sqrt{b})^2 \neq (\sqrt{a})^2 - (\sqrt{b})^2$

$(\sqrt{121}-\sqrt{100})^2 \neq 121-100$

$(11-10)^2 \neq 21$

14) $i^2=-1$ $i^{253}$ $i^{252}$ $i^{253}=i$

$i^1=i$ $i^5=i$ $i^{249}$

$i^2=-1$ $i^6=-1$ $i^{250}$

$i^3=-i$ $i^7=-i$ $i^{251}$

$\boxed{i^4=1 \quad i^8=1 \quad i^{252}}$

16) $\sqrt[3]{x^{\frac{25}{9}}}$

$= x^{25/27}$

P358 #16

10 SONNET

14 14 14

$14\times14\times14\times14\times\cdots\cdots\times14 = 14^{10}$

17) FINAL A B 5 − 2

A: 0 1 2 3 4 5 B: 0 1 2

$6\times3=18$

$4\times3\times5$

3 SHIRTS 2 PANTS 4 SHOES

18a) 0 − 59

a) $60\times59\times59 = $ ______

b) ~~0 1 2 3 4~~ 5 6 7 ……… 52 53 54 55 56 57 58 59

1st NUMBER OPTIONS 2nd

0 3−59 (57)

59 0−56 (57)

1 4−59 (56)

58 0−55 (56)

vi) The sum a rational number and an irrational number will be rational

vii) The product of a rational number and an irrational number will be irrational

viii) Zero is a whole number but not a natural number

ix) $\sqrt{23}$ is a real number but not a rational number

5. Write a number that is

a) a rational number but not an integer $\frac{1}{17}$

b) a whole number but not a natural number 0

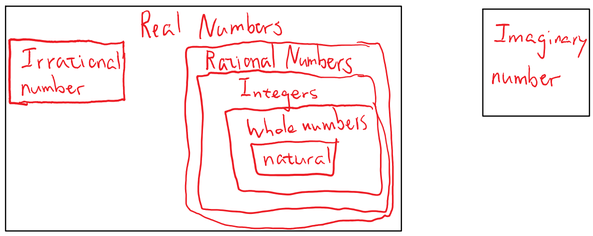
c) write a number that is not a real number $i$

6. The first 9 digits in the decimal representation of $\frac{5}{17}$ is: 0.294117647. Use this information to find the remaining digits in the repeating pattern. $0.\overline{2941176470588235}$

b) Without using a calculator, use the information previously to find the decimal representation of $\frac{9}{17}$

$0.\overline{5294117647058823}$

7. Create your own venn diagram to show how the following numbers are related: Real Numbers, Imaginary Numbers, Rational Numbers, Irrational Numbers, Whole Numbers, Integers, Natural Numbers. You may use the internet for reference.




8. Evaluate each of the following without a calculator: Show all your work and justify your solution:

i) $\sqrt[3]{5}\times\sqrt[3]{5}\times\sqrt[3]{5}$

$=5$

ii) $\sqrt[6]{25}\times\sqrt[6]{25}\times\sqrt[6]{25}\times\sqrt[6]{25}\times\sqrt[6]{25}\times\sqrt[6]{25}$

$=25$

iii) $\sqrt{2}\left(\sqrt{2}+\sqrt{2}+\sqrt{2}\right)$

$=2+2+2$

$=6$

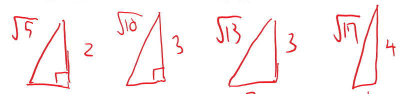
iv) $\sqrt{6\times5}\times\sqrt{45}\times\sqrt{24}$

$=\sqrt{30}\times3\sqrt{5}\times2\sqrt{6}$

$=6\sqrt{900}=6\times30$

$=180$

9. Lengths that are Irrational numbers can be created using right triangles with legs that are integers lengths with the Pythagorean Theorem: ($a^2+b^2=c^2$). For instance, the irrational number $\sqrt{2}$ can be made from a right triangle with legs of unit length 1 and 1. Create right triangles with legs of unit lengths to generate each of the following lengths: $\sqrt{5}, \sqrt{10}, \sqrt{13}, and \sqrt{17}$.




$2^2+1$ $=5$ $3^2+1$ $=10$ $3^2+2^2$ $=13$ $4^2+1^2$ $=17$

10. Suppose you know that $\sqrt{\frac{a}{b}}$ is a rational number and that '$a$' and '$b$' have no common factors. What can you say about the prime factorizations of '$a$' and '$b$'?

a and b don't have common factor and have to be power of "n"

11. The value of $0.\overline{1}+0.\overline{12}+0.\overline{123}$ is:

(A) $0.\overline{343}$ (B) $0.\overline{355}$ (C) $0.\overline{35}$ (D) $0.\overline{355446}$ (E) $0.\overline{355445}$

$0.\overline{12}$
$+\ 0.\overline{11}$
$0.\overline{23}$

$0.\overline{123123}$
$0.\overline{232323}$

$= 0.\overline{355446}$

1 4 – 59 56

58 0 – 55 56

2 5 – 59 55

57 0 – 54 55

3 0, 6 – 59 55

56 55

0.25 0.355446

12. In the sequence of fractions $\frac{1}{1}, \frac{2}{1}, \frac{1}{2}, \frac{3}{1}, \frac{2}{2}, \frac{1}{3}, \frac{4}{1}, \frac{3}{2}, \frac{2}{3}, \frac{1}{4}, \frac{5}{1}$,......fractions equivalent to any given fraction occur many times. For example, fractions equivalent to $\frac{1}{2}$ occur for the first two times in positions 3 and 14. In which position is the fifth occurrence of a fraction equivalent to $\frac{3}{7}$?

(A) 1207 (B) 1208 (C) 1209 (D) 1210 (E) 1211

CASE 1 0,59

$\underline{2} \times \underline{57} \times \underline{60} = \underline{\qquad}$

CASE 2

$\underline{2} \times \underline{56} \times \underline{60} = \underline{\qquad}$

CASE

$\underline{56} \times \underline{55} \times \underline{60} = \underline{\qquad}$

$$\frac{21!}{19!} - \frac{20!}{19!}$$

$$\frac{\cancel{20!}^{\,20}\,(21 - 1)^{\,20}}{\cancel{19!}}$$

$\underline{a \times b \times c} \times \frac{1}{d} \times e \times \frac{1}{f}$

$$\frac{a \times b \times c \times e}{d \times f}$$

1 × 48

48 × 1

7) 1 : NOT PRIME

13 : PRIME ←

51 : 3 × 17

91 : 7 × 13

101 : PRIME ←

12) $\underline{-3 \times -3 \times -3}$ $\underline{4 \times 4 \times 4}$

$-$'ve × +'ve

15) $25 \times 16 \times 11 \times 27 \times 4 \times 15.$

$\cancel{5} \times \cancel{5} \times \cancel{2} \times \cancel{2} \times 4 \times 11 \times 3 \times 3 \times 3 \times 2 \times \cancel{4} \times 3 \times \cancel{5}$

$10 \times 10 \times 10 \times 81 \times 8 \times 11$

$$\begin{array}{r} 648 \\ 648 \\ \hline 7,128,000 \end{array}$$

15) b) $35^2 \times 999$

$1225 \times (1000 - 1)$

$1225000 - 1225$

$$\begin{array}{r} 1225000 \\ -\ 1225 \\ \hline 1,223,775 \end{array}$$

16)

$$\frac{A+B+C+D+E+F}{6} = 68$$

$A+B+C+D+E+10 = 408$

$$\frac{A+B+C+D+E}{5} = \frac{398}{5}$$

$MEAN_{NEW} = 79.6$

17)

$100 \longrightarrow 1000$

4. $4(25) \cdots\cdots 4(250)$ : $D: 250-25+1$
$= 226$

$7(15) \cdots\cdots 7(142)$ $D = 142-15+1$
$= 128$

$28(4) \cdots\cdots 28(35)$ $D = 35-4+1$
$= 32$

# of The 4 But NOT BOTH $= 226 + 128 - 2(32)$

$2475 \times 3 = 7425$