UNIT 1: SIMPLIFY EXPRESSIONS

Objectives: I can identify types of real numbers and express equivalent or approximate numbers for comparison.

Real Numbers

There are more classifications of numbers beyond rational numbers. Some numbers can't be expressed as the ratio of two integers. If this is the case, they are irrational numbers. Rational and irrational numbers together make up real numbers. Irrational numbers do not terminate or repeat when expressed in decimal form. One well known and frequently used irrational number is π. We are going to explore some other irrational numbers.

Complete the tables.

Perfect Squares		
1^2	1*1	1
2^2	2*2	4
3^2	3·3	9
4^2	4·4	16
5^2	5·5	25
6^2	6·6	36
7^2	7·7	49
8^2	8·8	64
9^2	9·9	81
10^2	10·10	100
11^2	11·11	121
12^2	12·12	144

20

←30

Perfect Cubes		
1^3	1*1*1	1
2^3	2*2*2	8
3^3	3·3·3	27
4^3	4·4·4	64
5^3	5·5·5	125
6^3	6·6·6	216

←24

Note: The square root is used so frequently, the 2 is just left off. So if there isn't a little number to indicate the root, the square root is implied.

You can use the tables from left to right to "undo" the square or cube. This is called taking the square root or cube root of a number.

$\sqrt{16}$

For example: $\sqrt[2]{16} = 4$ $\sqrt{144} = 12$ $\sqrt[3]{27} = 3$ $\sqrt[3]{\frac{8}{125}}$ $\frac{2}{5}$ $\frac{\sqrt[3]{8}}{\sqrt[3]{125}} = \frac{2}{5}$

You try:

1) $\sqrt{49}$ = 7 (7·7)
2) $\sqrt[3]{8}$ = 2 (2·2·2)
3) $\sqrt{100}$ = 10 (10·10)
4) $\sqrt[3]{125}$ = 5 (5·5·5)
5) $\sqrt{\frac{4}{9}}$ = $\frac{2}{3}$ $\frac{\sqrt{4}}{\sqrt{9}} = \frac{2}{3}$

Make a conjecture: What if the number isn't on the list? What if you were asked to find $\sqrt{30}$? What if you were asked to find $\sqrt[3]{24}$? (These are examples of irrational numbers.)

Use what you know... $\sqrt{30}$ is between $\sqrt{25}$ and $\sqrt{36}$, therefore $\sqrt{30}$ is between 5 and 6.
... $\sqrt[3]{24}$ is between $\sqrt[3]{8}$ and $\sqrt[3]{27}$, therefore $\sqrt[3]{24}$ is between 2 and 3.

Consecutive: in a row or one following another. For example 2, 3, 4, 5 are consecutive whole numbers.

State the two consecutive integers that the following irrational numbers are in between:

49 64
1) $\sqrt{61}$ is between 7 and 8

64 125
2) $\sqrt[3]{118}$ is between 4 and 5

64 125
3) $\sqrt[3]{100}$ is between 4 and 5

121 144
4) $\sqrt{135}$ is between 11 and 12

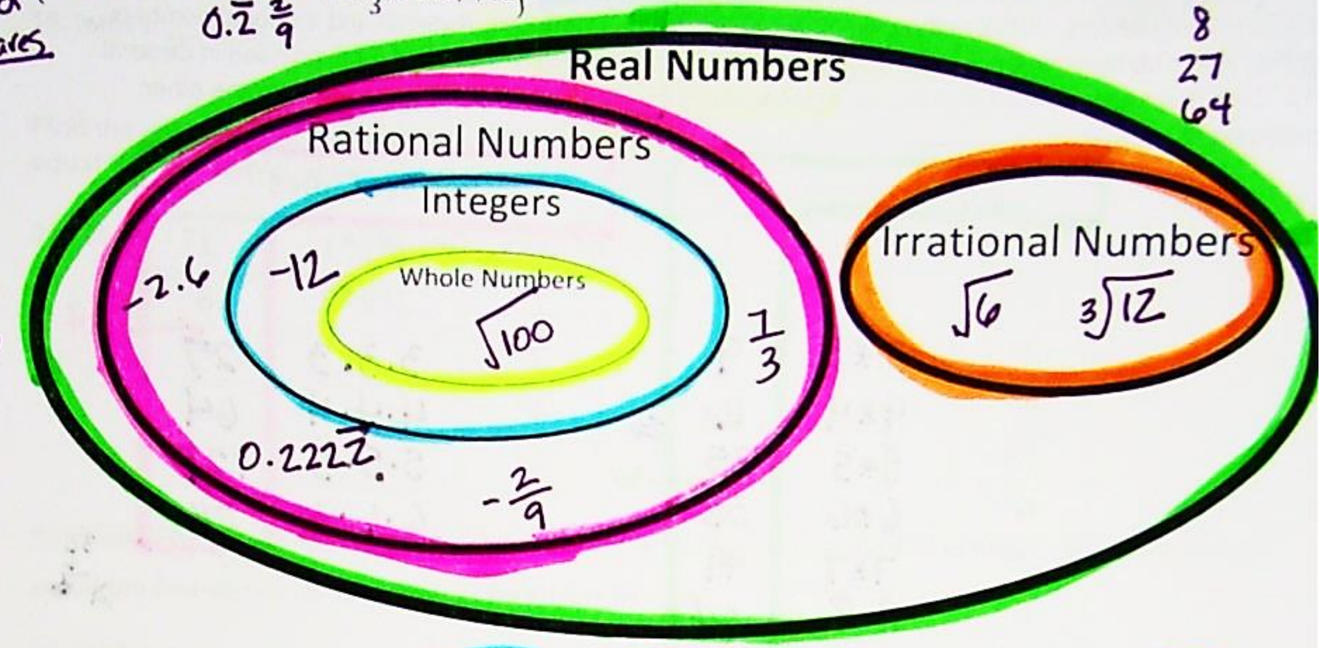
Place the following set of numbers on the Venn diagram to classify the type of number. Then indicate in the table below to which set(s) of numbers it belongs.

$\left\{-12, \sqrt{6}, -2.6, 0.222\bar{2}, -0.\bar{2}, \frac{7}{3}, \sqrt{100}, \sqrt[3]{12}\right\}$

$0.\bar{2}$ $\frac{2}{9}$

Perfect Squares: 1, 4, 9, 16, 25, 36

Cube: 1, 8, 27, 64

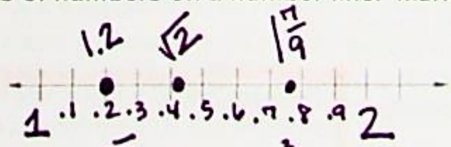


1)	-12	Whole #	Integer	Rational #	Irrational #	Real #
2)	$\sqrt{6}$	Whole #	Integer	Rational #	Irrational #	Real #
3)	-2.6	Whole #	Integer	Rational #	Irrational #	Real #
4)	$0.222\bar{2}$ $\frac{2}{9}$	Whole #	Integer	Rational #	Irrational #	Real #
5)	$-0.\bar{2}$ $-\frac{2}{9}$	Whole #	Integer	Rational #	Irrational #	Real #
6)	$\frac{7}{3}$	Whole #	Integer	Rational #	Irrational #	Real #
7)	$\sqrt{100}$ 10	Whole #	Integer	Rational #	Irrational #	Real #
8)	$\sqrt[3]{12}$	Whole #	Integer	Rational #	Irrational #	Real #

Graph the following sets of numbers on a number line. Mark intervals of $\frac{1}{10}$ on your number lines.

9) $\{1.2, \sqrt{2}, 1\frac{7}{9}\}$

1.4 $1.\bar{7}$



10) $\{4\frac{3}{4}, 4.\bar{2}, \sqrt{24}\}$

$\frac{3}{4} = .75$ 4.75 4.90 4.22