

Warmup:

Simplify.

1) $2\sqrt{6} + 3\sqrt{6} + 3\sqrt{2}$

2) $-2\sqrt{3} + 2\sqrt{27} + 3\sqrt{12}$

✓ $5\sqrt{6} + 3\sqrt{2}$

$$\begin{aligned}
 & -2\sqrt{3} + 2\sqrt{9 \cdot 3} + 3\sqrt{3 \cdot 4} \\
 & -2\sqrt{3} + 2\sqrt{3 \cdot 3 \cdot 3} + 3\sqrt{3 \cdot 2 \cdot 2} \\
 & -2\sqrt{3} + 2 \cdot 3\sqrt{3} + 3 \cdot 2\sqrt{3} \\
 & -2\sqrt{3} + 6\sqrt{3} + 6\sqrt{3}
 \end{aligned}$$

$10\sqrt{3}$

Simplify.

1) $2\sqrt{20} \cdot -2\sqrt{10}$

2) $-5\sqrt{6} \cdot -3\sqrt{3}$

3) $\sqrt{5a} \cdot -\sqrt{2a^2}$

4) $\sqrt{3x^2} \cdot \sqrt{12x^2}$

$$\begin{aligned} \#1] & -4 \sqrt{20 \cdot 10} \\ & -4 \sqrt{2 \cdot 10 \cdot 10} \\ & -4 \cdot 10 \sqrt{2} \\ & \boxed{-40\sqrt{2}} \end{aligned}$$

$$\begin{aligned} \#2] & 15 \sqrt{6 \cdot 3} \\ & 15 \sqrt{2 \cdot 3 \cdot 3} \\ & 15 \cdot 3 \sqrt{2} \\ & \boxed{45\sqrt{2}} \end{aligned}$$

$$\begin{aligned} \#3] & -\sqrt{5 \cdot 2 \cdot a \cdot a} \\ & \boxed{-a\sqrt{10a}} \\ \#4] & \sqrt{3 \cdot 12 \cdot x^2 \cdot x^2} \\ & \sqrt{3 \cdot 3 \cdot 4 \cdot x^2 \cdot x^2} \\ & \sqrt{\underline{3 \cdot 3} \cdot \underline{2 \cdot 2} \cdot \underline{x^2 \cdot x^2}} \\ & 3 \cdot 2 \cdot x^2 = \boxed{6x^2} \end{aligned}$$

HW #7 Answer Key

1) $\sqrt{6} + \sqrt{54}$

$$\sqrt{6} + \sqrt{9 \cdot 6}$$

$$\sqrt{6} + 3\sqrt{6}$$

$$4\sqrt{6}$$

2) $\sqrt{3} + \sqrt{12}$

$$\sqrt{3} + \sqrt{4 \cdot 3}$$

$$\sqrt{3} + 2\sqrt{3}$$

$$3\sqrt{3}$$

3) $\sqrt{12} + \sqrt{3}$

$$\sqrt{4 \cdot 3} + \sqrt{3}$$

$$2\sqrt{3} + \sqrt{3}$$

$$3\sqrt{3}$$

4) $\sqrt{6} + \sqrt{6}$

$$2\sqrt{6}$$

$$5) -3\sqrt{27} - 2\sqrt{27}$$

$$-5\sqrt{27}$$

$$-5\sqrt{9 \cdot 3}$$

$$-5 \cdot 3 \sqrt{3}$$

$$\boxed{-15\sqrt{3}}$$

$$7) -2\sqrt{5} - 2\sqrt{45}$$

$$-2\sqrt{5} - 2\sqrt{9 \cdot 5}$$

$$-2\sqrt{5} - 2 \cdot 3 \sqrt{5}$$

$$-2\sqrt{5} - 6\sqrt{5}$$

$$\boxed{-8\sqrt{5}}$$

$$6) 2\sqrt{3} + 3\sqrt{12}$$

$$2\sqrt{3} + 3\sqrt{4 \cdot 3}$$

$$2\sqrt{3} + 3 \cdot 2\sqrt{3}$$

$$2\sqrt{3} + 6\sqrt{3}$$

$$\boxed{8\sqrt{3}}$$

$$8) -2\sqrt{27} + 2\sqrt{3}$$

$$-2\sqrt{9 \cdot 3} + 2\sqrt{3}$$

$$-2 \cdot 3\sqrt{3} + 2\sqrt{3}$$

$$-6\sqrt{3} + 2\sqrt{3}$$

$$\boxed{-4\sqrt{3}}$$

$$9) -2\sqrt{2} + 2\sqrt{27} - 3\sqrt{2}$$

$$-5\sqrt{2} + 2\sqrt{27}$$

$$-5\sqrt{2} + 2\sqrt{9 \cdot 3}$$

$$-5\sqrt{2} + 2 \cdot 3\sqrt{3}$$

$$-5\sqrt{2} + 6\sqrt{3}$$

$$11) \sqrt{6} \cdot \sqrt{10}$$

$$\sqrt{6 \cdot 10}$$

$$\sqrt{2 \cdot 3 \cdot 2 \cdot 5}$$

$$2\sqrt{3 \cdot 5}$$

$$2\sqrt{15}$$

$$10) 3\sqrt{45} - 3\sqrt{12} - \sqrt{27}$$

$$3\sqrt{9 \cdot 5} - 3\sqrt{4 \cdot 3} - \sqrt{9 \cdot 3}$$

$$3 \cdot 3\sqrt{5} - 3 \cdot 2\sqrt{3} - 3\sqrt{3}$$

$$9\sqrt{5} - 6\sqrt{3} - 3\sqrt{3}$$

$$9\sqrt{5} - 9\sqrt{3}$$

$$12) \sqrt{2} \cdot \sqrt{3}$$

$$\sqrt{6}$$

$$13) 2\sqrt{5} \cdot -2\sqrt{5}$$

$$-4\sqrt{5 \cdot 5}$$

$$-4 \cdot 5$$

$$\textcircled{-20}$$

$$15) \sqrt{5x} \cdot \sqrt{20x^2}$$

$$\sqrt{5 \cdot x \cdot 5 \cdot 4 \cdot x^2}$$

$$5 \cdot 2 \cdot x \sqrt{x}$$

$$\textcircled{10x\sqrt{x}}$$

$$14) 3\sqrt{6} \cdot 2\sqrt{15}$$

$$6\sqrt{6 \cdot 15}$$

$$6\sqrt{3 \cdot 2 \cdot 5 \cdot 3}$$

$$6 \cdot 3 \sqrt{2 \cdot 5}$$

$$\textcircled{18\sqrt{10}}$$

$$16) \sqrt{15b} \cdot \sqrt{15b}$$

$$\sqrt{15b \cdot 15b}$$

$$\textcircled{= 15b}$$

$$17) -3\sqrt{10v^3} \cdot 4\sqrt{5v^2}$$

$$-12 \sqrt{10v^3 \cdot 5v^2}$$

$$-12 \sqrt{5 \cdot 2 \cdot v \cdot v^2 \cdot 5 \cdot v^2}$$

$$-12 \cdot 5 \cdot v^2 \sqrt{2v}$$

$$\boxed{-60v^2 \sqrt{2v}}$$

$$18) -\sqrt{2m^3} \cdot -5\sqrt{8m}$$

$$5 \sqrt{2 \cdot m^3 \cdot 8 \cdot m}$$

$$5 \sqrt{2 \cdot m \cdot m^2 \cdot 2 \cdot 4 \cdot m}$$

$$5 \cdot 2 \cdot 2 \cdot m \cdot m$$

$$-2- \quad \boxed{20m^2}$$

Quiz #3

Radical Expressions

Rational vs Irrational Numbers

A **rational number** is a number that can be expressed as a fraction or **ratio**.

The numerator and the denominator of the fraction are both integers.

When the fraction is divided out, it becomes a terminating or repeating decimal.

(The repeating decimal portion may be one number or a billion numbers.)

6 or $\frac{6}{1}$	can also be written as	6.0
-2 or $\frac{-2}{1}$	can also be written as	-2.0
$\frac{1}{2}$	can also be written as	0.5
$\frac{-5}{4}$	can also be written as	-1.25
$\frac{2}{3}$	can also be written as	$0.6666666666\dots$ $0.\overline{6}$
$\frac{21}{55}$	can also be written as	$0.38181818\dots$ $0.3\overline{18}$
$\frac{53}{83}$	can also be written as	$0.62855421687\dots$ the decimals will repeat after 41 digits

*Be careful when using your calculator to determine if a decimal number is irrational. The calculator may not be displaying enough digits to show you the repeating decimals, as was seen in the last example to the left.

An irrational number cannot be expressed as a fraction.

Irrational numbers cannot be represented as terminating or repeating decimals.

$$\pi = 3.141592654\dots$$

$$\sqrt{2} = 1.414213562\dots$$

$$\sqrt{2}, \sqrt{3}, \sqrt{5}, \sqrt{6}, \sqrt{7}, \sqrt{8}, \sqrt{10}, \dots$$

$$\sqrt{4} = 2$$

$$\sqrt{9} = 3$$

Name three numbers that are rational and three numbers that are irrational.

$$\cancel{4} \cdot \frac{1}{1} = \cancel{4}$$

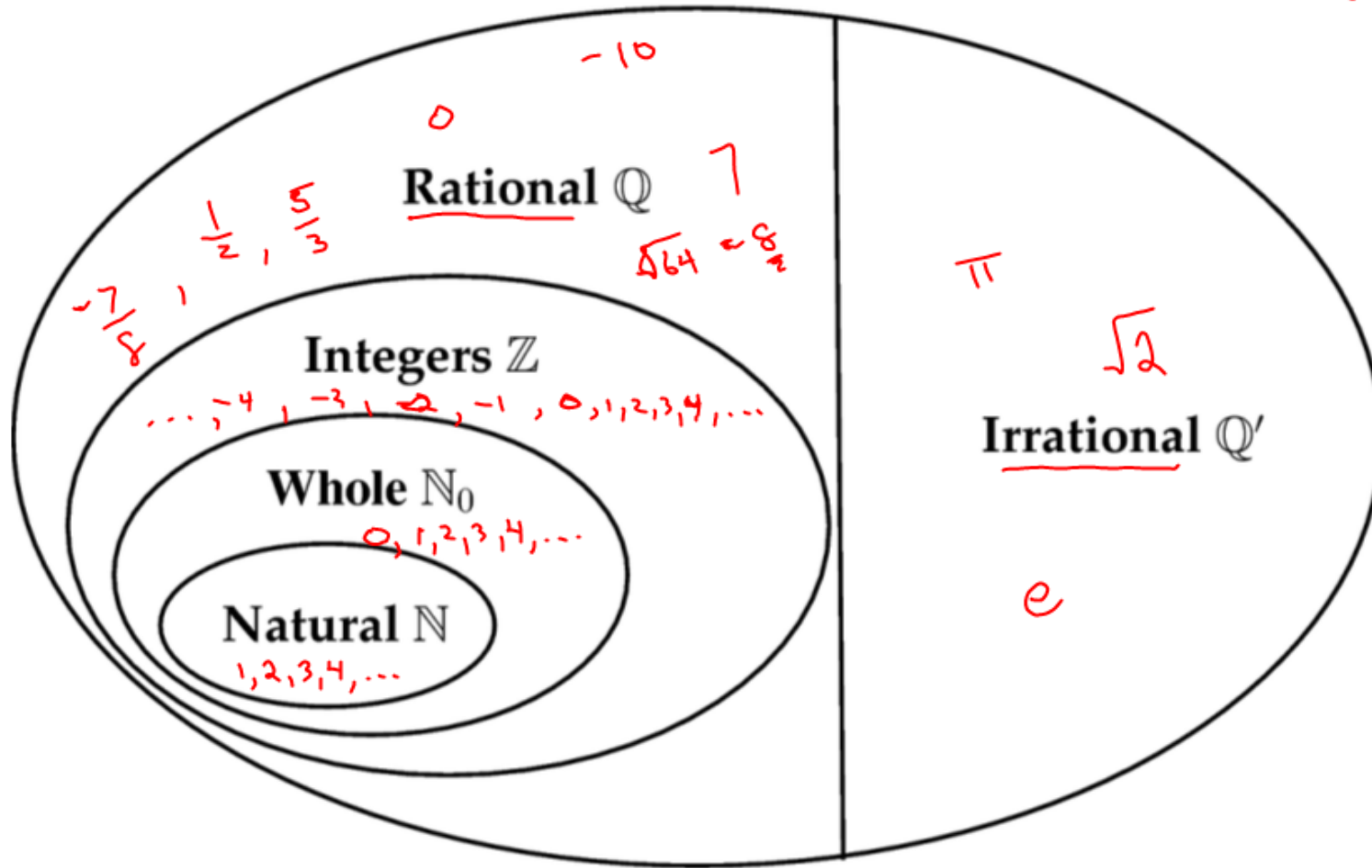
$$\frac{2}{0}$$

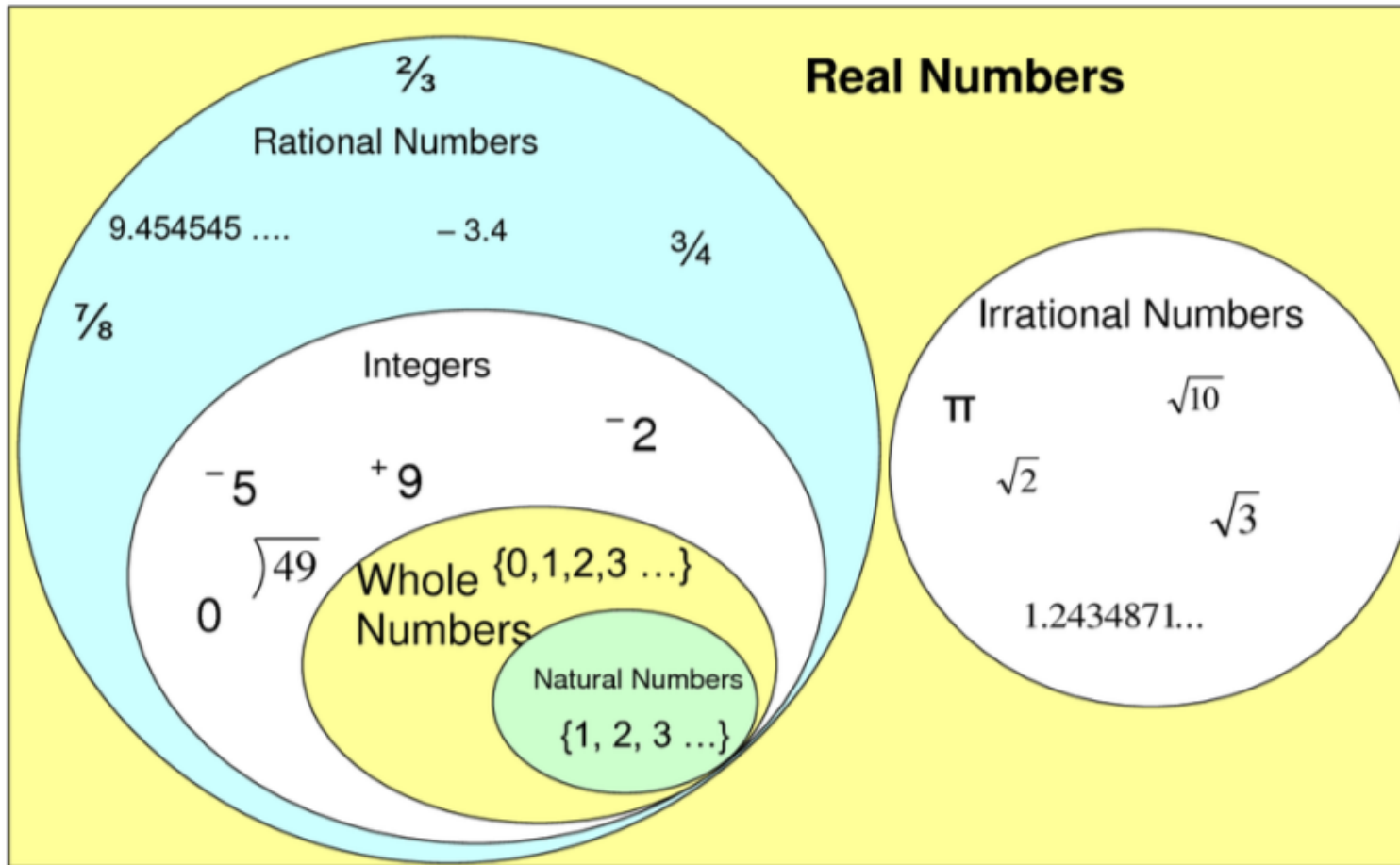
Rational: 37, -7000, $5 = \frac{1}{2}$, $\frac{1}{3} = .\overline{3}$, $\frac{0}{2} = 0$

Irrational: π , $\sqrt{2}$, -4π , $-3\sqrt{2}$, e

REAL \mathbb{R}

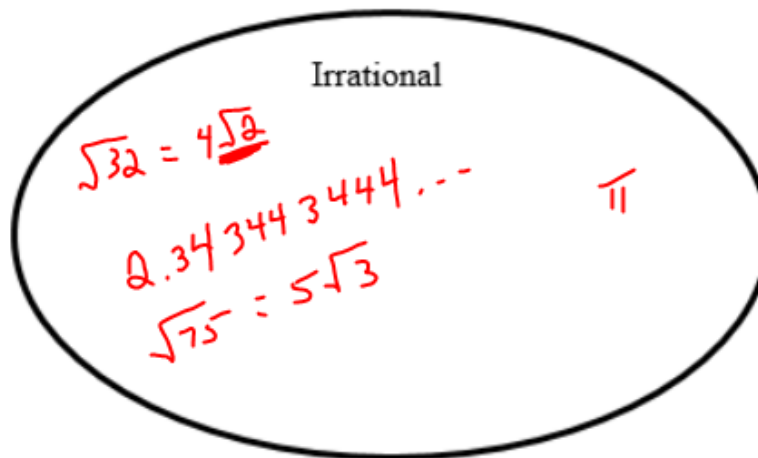
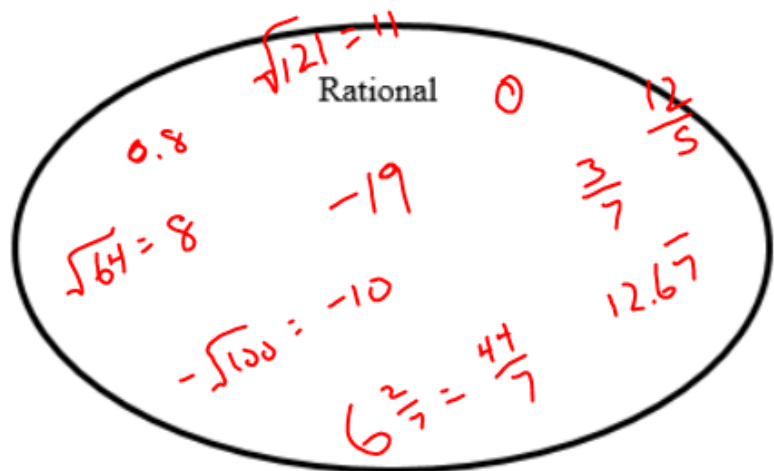
or Imaginary #'s





1. Sort the numbers into 2 groups, rational or irrational. Write the numbers in the appropriate bubble.

~~0.8~~ ~~$\sqrt{64}$~~ ~~0~~ ~~$\sqrt{32}$~~ ~~-19~~ ~~$-\sqrt{100}$~~ ~~2.343443444...~~
 ~~$\frac{3}{7}$~~ ~~$\sqrt{75}$~~ ~~$6\frac{2}{7}$~~ ~~12. $\overline{67}$~~ ~~$\sqrt{121}$~~ ~~$\frac{12}{5}$~~ ~~π~~



2. Graph and label each number on the number line below. You may label the number with the letter.

A 0.75

B $\sqrt{3}$

C $\sqrt{9}$

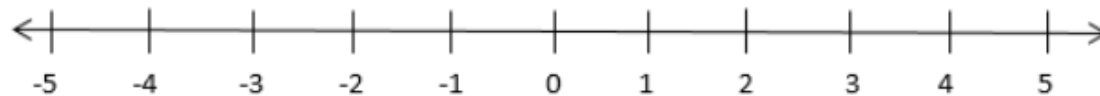
D $-2\frac{1}{2}$

E $-\frac{15}{10}$

F $2.\bar{6}$

G $-\sqrt{2}$

H π



0.25		1.76	$\frac{1}{5}$	$\sqrt{-36}$	$\frac{5}{8}$	2.75			
	$2\frac{5}{6}$	0.125	$\frac{8}{0}$	$\sqrt{17}$	$\sqrt{-4}$	$\frac{9}{11}$	0.45		$8\frac{1}{7}$
$0.\bar{3}$	5.9	$\sqrt{-83}$	.23924...	$\sqrt{6}$	$\sqrt{56}$	$\frac{15}{0}$	$\frac{1}{3}$	$0.\bar{6}$	$4.\bar{13}$
$\frac{3}{4}$	$\frac{25}{0}$	$\sqrt{84}$	$8\frac{5}{12}$	.78321...	$7.\bar{81}$	$\sqrt{21}$	$\sqrt{-49}$	$\sqrt{-23}$	$\frac{3}{0}$
$0.\bar{9}$	$5\frac{3}{7}$	.3295...	.9857...	$\sqrt{41}$	$\sqrt{37}$	.4837...	$\sqrt{26}$	$\sqrt{50}$	$\sqrt{67}$
$\sqrt{9}$	28	$\sqrt{145}$	$9.\bar{5}$	$\sqrt{5}$	127	$\sqrt{3}$	$\frac{5}{0}$	$\sqrt{-16}$	$\sqrt{-25}$
$\frac{12}{3}$	-6	.93823...	$\sqrt{15}$	$\sqrt{101}$	$\sqrt{16}$	.3825...	$\sqrt{-100}$	$\frac{9}{0}$	$\frac{1}{0}$

HW #8 Rational vs Irrational Numbers