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College Algebra
Note Sheet: Section 1-3
Real Numbers and the Number Line

Do Now: Evaluate the following expressions

1. $3x^2 - 4(2x + 1) + 2y^3$; $x = 1, y = 2$

$$3(1)^2 - 4(2(1) + 1) + 2(2)^3$$

$$3 - 4(3) + 2(8)$$

$$3 - 12 + 16$$

7

2. $(4c - d + 0.2)^2 - 10c$; $c = 3.1, d = 4.6$

$$4(3.1) - 4.6 + 0.2)^2 - 10(3.1)$$

$$(12.4 - 4.6 + 0.2)^2 - 31$$

$$(8)^2 - 31$$

$$64 - 31$$

33

Notes:

Rational Number: a number that you can write in the form $\frac{a}{b}$ where a and b are integers $b \neq 0$

terminating decimal: 5.23

repeating decimal: 0.416666 or 1.232323

Irrational Number: Cannot be represented by a quotient irrational numbers do not repeat or terminate

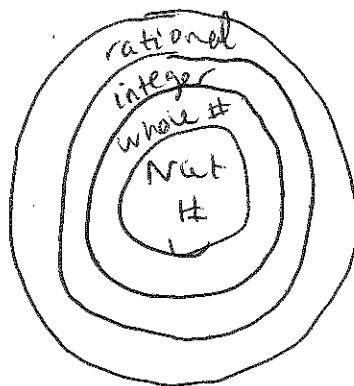
EX: 0.1010010001...

EX: $\pi = 3.14159265...$

Natural Numbers: $\{1, 2, 3, 4, \dots\}$

Whole Numbers: $\{0, 1, 2, 3, 4, \dots\}$

Integers: $\{\dots, -2, -1, 0, 1, 2, 3, \dots\}$



Square Roots

- either rational or irrational

- if it is a whole # that is a perfect square then it is rational

$$\sqrt{4} = 2 \quad \sqrt{25} = 5$$

- If it is not a perfect square, then it is irrational

$$\sqrt{3} = 1.73205...$$

Problem 1: Classifying Real Numbers

To which subset(s) of the real numbers does each number belong?

Ex: 15

- Rational number
- Integer
- Whole number
- Natural number
- Ex: $\sqrt{57}$
- Irrational number

Ex: -1.4583

- rational number

Ex: $\frac{3}{10}$

- rational number

Ex: $\sqrt{9}$

- rational number
- integer
- whole number
- natural number

Ex: $\frac{2}{3}$

- rational number

Ex: -.045

- rational number

Ex: 13

- rational number
- integer
- whole number
- natural number

Ex: $\sqrt{113}$

- irrational number

Ex: -2.38

- rational number

Ex: π

- irrational number

Ex: -1

- rational number
- integer

Problem 2: Simplifying Square Root Expressions
What is the simplified form of each expression?

a. $\sqrt{64}$

8

b. $\sqrt{25}$

5

c. $\sqrt{\frac{1}{36}}$

$\frac{1}{6}$

d. $\sqrt{\frac{81}{121}}$

$\frac{9}{11}$

e. $\sqrt{1.96}$

1.4

f. $\sqrt{0.25}$

.5

Problem 3: Estimating a Square Root

Estimate the square root. Round to the nearest integer.

a. $\sqrt{17}$
 $\sqrt{16}$ $\sqrt{25}$
 4.1

b. $\sqrt{35}$
 $\sqrt{25}$ $\sqrt{36}$
 5.9

c. $\sqrt{242}$
 $\sqrt{225}$ $\sqrt{256}$
 15.6

d. $\sqrt{61}$
 $\sqrt{49}$ $\sqrt{64}$
 7.8

e. $\sqrt{320}$
 17.88

An inequality is

a mathematical sentence that compares the values of two expressions using an inequality symbol

$<$ less than \leq less than or equal to
 $>$ greater than \geq greater than or equal to

Problem 4: Comparing Real Numbers

Compare the numbers in each exercise using an inequality symbol.

a. $5\frac{2}{3} > \sqrt{29}$

b. $-3.1 > -\frac{16}{5}$

c. $9.6 < \sqrt{96}$

5.66 5.385

-3.2

9.79

Problem 5: Ordering Real Numbers

Order the Numbers from Least to Greatest.

a. $\frac{1}{2}, -2, \sqrt{5}, -\frac{7}{4}, 2.4$

2.23 -1.75 2.4

$-2, -\frac{7}{4}, \frac{1}{2}, \sqrt{5}, 2.4$

b. $-6, \sqrt{20}, 4.3, -\frac{59}{9}$

4.47 -6.5

$-\frac{59}{9}, -6, 4.3, \sqrt{20}$

HW
 pg. 20 # 14-22, 24, 25,
 28-34, 37, 38, 45,
 51-57