

## A.1 Real Numbers and Their Properties

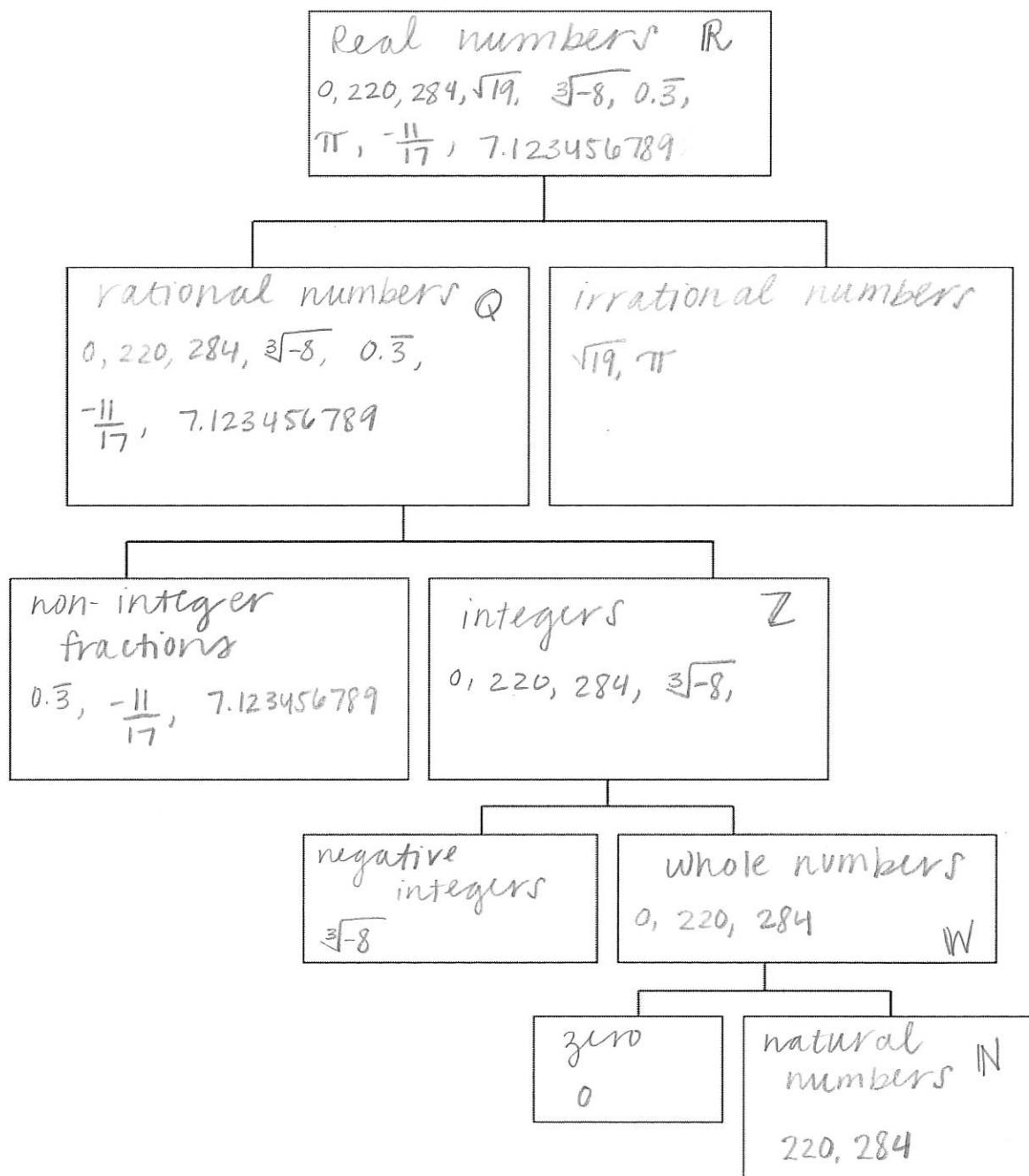
### Quiz 1 Review

Fill in the graphic organizer with the following terms:

Irrational numbers, rational numbers, natural numbers, integers, negative integers,  
whole numbers, zero, non-integer fractions, real numbers

Place the following numbers in each set for which it belongs. (Many of these numbers will belong in multiple sets). *not real*

{0, 220, 284,  $\sqrt{19}$ ,  $\sqrt[3]{-8}$ , 0.3,  $\pi$ ,  $-\frac{11}{17}$ ,  $\frac{15}{0}$ , 7.12345678900}



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endpoints  
 ↓ are #'s      ↓ is ±∞

Determine whether the following intervals are bounded or unbounded:

- a.)  $[-4, 100]$     b.)  $(-1000, 9999]$     c.)  $(-\infty, -100)$     d.)  $[31.5, 90.7)$     e.)  $[87, \infty)$

Bounded Interval(s): (a) (b) (d)

Unbounded Interval(s): (c) (e)

Determine whether the above intervals are closed or open:

Closed Interval(s): (a)

Open Interval(s): (c)

Rewrite the following sets using inequality notation and interval notation. And graph the interval on a number line.

Verbal Description	Inequality Notation	Interval Notation	Graph
$y$ is no more than 13.	$y \leq 13$	$(-\infty, 13]$	
$k$ is less than 5 but no less than -3.	$-3 \leq k < 5$	$[-3, 5)$	
$a$ is nonnegative.	$a \geq 0$	$[0, \infty)$	

Write a verbal description of the subset of real numbers represented by the following inequalities and intervals.

$$-8 < x \leq 8$$

all real numbers <sup>that are</sup> greater than -8 and less than or equal to 8

$$(-\infty, 51]$$

all real numbers that are less than or equal to 51

$$[-1, -0.5]$$

all real numbers greater than or equal to -1 and less than or equal to -0.5.

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Find the distance between the following pairs of numbers (two ways).

$$-114, 71 \quad |-114 - 71| = |-185| = 185$$

$$|71 - (-114)| = |185| = 185$$

-59, -17

$$|-59 - (-17)| = |-59 + 17| = |-42| = 42$$

$$|-17 - (-59)| = |-17 + 59| = |42| = 42$$

Next to each statement, write a reason that justifies it.

$$\begin{aligned} 3 + 4(x+1) &= 3 + (4x + 4 \cdot 1) && \text{distributive} \\ &= 3 + (4x + 4) && \text{mult. id} \\ &= (4x + 4) + 3 && \text{commutative} \\ &= 4x + (4 + 3) && \text{associative} \\ &= 4x + 7 && \text{substitution} \end{aligned}$$

$$\begin{aligned} x(y+1) + (-1)x &= x(y+1) + x(-1) && \text{commutative} \\ &= x[(y+1) + (-1)] && \text{distributive (reverse)} \\ &= x[y + (1 + (-1))] && \text{associative} \\ &= x[y + 0] && \text{additive inverse} \\ &= xy && \text{additive id.} \end{aligned}$$

Reflexive
Symmetric
Transitive
Addition
Multiplication
Commutative
Associative
Distributive
Additive Identity
Multiplicative Identity
Additive Inverse
Multiplicative Inverse

Simplify the following expressions:

$$2^2 \cdot 3^2 - (5^2 - 4^2) \quad -\frac{1}{10}[2(3+4) - 3^2] + [(-1)^{81} + (-1)^{5002}]$$

$$(4 \cdot 9) - (25 - 16)$$

$$36 - (9)$$

(27)

$$-\frac{1}{10} \left[ \underbrace{2(7) - 9}_{14-9} \right] + (-1) + 1$$

$$-\frac{1}{10}(5) + 0$$

$$-\frac{5}{10} = \left( \frac{-1}{2} \right)$$

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Simplify the following expressions.

$$(6x - 5y + 4) - 2(-2x + 3y - 2)$$

$$\cancel{6x} - \cancel{5y} + 4 + \cancel{4x} - \cancel{6y} + \cancel{4}$$

$$10x - 11y + 8$$

$$-c(d + 5) + 6(2 - cd)$$

$$\cancel{-cd} - 5c + 12 + \cancel{6cd}$$

$$-7cd - 5c + 12$$

Evaluate each expression for the given value of the variable.

$$2b^3 + 3b^2 - b + 3 \quad b = -2$$

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

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

$$\begin{aligned} -16 + 12 + 5 \\ -4 + 5 = 1 \end{aligned}$$

$$x(x - 5)(x + 701^2) \quad x = 0$$

$$0(0 - 5)(0 + 701^2) = 0$$