Lesson 1.2 Warm Up (Clickers)

1. What is the next number in the pattern?

   2, 7, 12, 17, ...

2. What is the next number in the pattern?

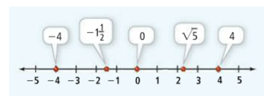
   -1, 2, -2, 3, ...

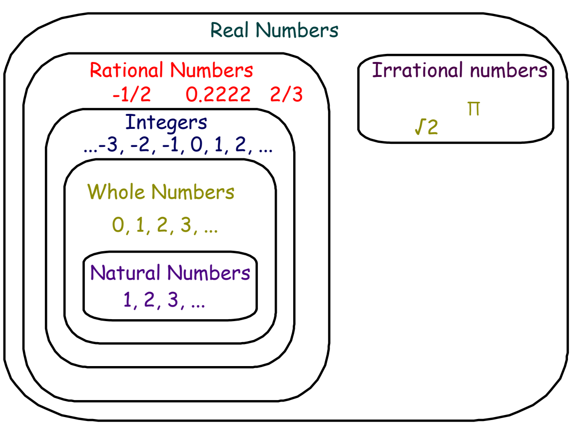
3. What are the different subsets of real numbers?

Lesson 1.2 Properties of Real Numbers

Essential Understanding: The set of real numbers has several special subsets related in particular ways.

Algebra involves operations on and relations among numbers, including real numbers and imaginary numbers. Rational numbers and irrational numbers form the set of real numbers. You can graph every real number as a point on a number line.





Rational numbers:

- are all numbers you can write as a quotient of integers a/b
- include terminating decimals (1/8 = 0.125)
- include repeating decimals (1/3 = 0.3333)

Irrational numbers:

- have decimal representations that neither terminate nor repeat ($\sqrt{2}$ = 1.414213...)
- cannot be written as quotients of integers

Ex. Your school is sponsoring a charity race. Which set of numbers does not contain the number of people p who participate in the race?

A. natural numbers B. Integers

C. Rational numbers D. Irrational numbers

1 From the previous problem, if each participant made a donation d of $15.50 to a local charity, which subset of real numbers best describes the amount of money raised?

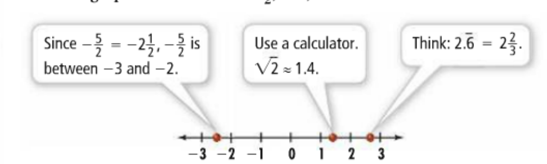
A rational number

B irrational numbers

C integers

D whole numbers

What is the graph of the numbers $-\frac{5}{2}$, $\sqrt{2}$, and $2.\overline{6}$?



A number line is helpful for ordering several real numbers. For two numbers, however, it is easier to show order, or compare, using on of the inequality symbols < or >.

How do $\sqrt{17}$ and 3.8 compare? Use > or <.

2 Compare:

$\sqrt{26}$ __?___ 6.25

A <

B >

3 Let a, b, and c be real numbers such that $a < b$ and $b < c$. How do a and c compare?

Essential Understanding: The properties of real numbers are relationships that are true for all real numbers (except, in one case, zero)

One property of real numbers excludes a single number, zero. Zero is the additive identity for the real numbers, and zero is the one real number that has no multiplicative inverse. Why doesn't it?

The **opposite** or **additive inverse** of any number a is -a. The sum of a number and its opposite is 0, the additive identity.

Ex. $12 + -12 = 0$

The **reciprocal** or **multiplication inverse** of any nonzero number a is 1/a. The product of a number and its reciprocal is 1, the multiplicative identity.

Ex. $8 (1/8) = 1$

Properties Properties of Real Numbers

Let a, b, and c represent real numbers.

Property	Addition	Multiplication
Closure	$a + b$ is a real number.	ab is a real number.
Commutative	$a + b = b + a$	$ab = ba$
Associative	$(a + b) + c = a + (b + c)$	$(ab)c = a(bc)$
Identity	$a + 0 = a, 0 + a = a$ 0 is the additive identity.	$a \cdot 1 = a, 1 \cdot a = a$ 1 is the multiplicative identity.
Inverse	$a + (-a) = 0$	$a \cdot \frac{1}{a} = 1, a \neq 0$
Distributive	$a(b + c) = ab + ac$	

Ex. Which property does the equation illustrate?

a. $\left(-\frac{2}{3}\right)\left(-\frac{3}{2}\right) = 1$

b. $(3 \cdot 4) \cdot 5 = (4 \cdot 3) \cdot 5$

4 Which property does the equation $3(g + h) + 2g = (3g + 3h) + 2g$ illustrate?

A commutative

B associative

C identity

D distributive

5 Write an example from daily life that uses whole numbers.

6 Write an example from daily life that uses rational numbers.

7. There are grouping symbols in the equation $(5 + w) + 8 = (w + 5) + 8$, but it does not illustrate the Associative Property of Addition. Explain.