

3.4 Notes: Types of Numbers

☺ Real Numbers: {All Rational & Irrational Numbers}

\mathbb{R}

Irrational Numbers: {Any # whose decimal never ends, and never repeats such as π or $\sqrt{2}$ }

5.61259.....

\mathbb{Q}

$-\frac{1}{3} = .\overline{3}$
 $.5 = \frac{1}{2}$

Rational Numbers: { Any number that can be expressed as a fraction. Decimals will end or repeat. }

$5 = \frac{5}{1}$

\mathbb{Q}

Integers: {All positive & negative numbers and zero}

{... -3, -2, -1, 0, 1, 2, 3, ...}

\mathbb{Z}

Whole Numbers: All positive numbers including zero.

{0, 1, 2, 3, 4, 5, ...}

\mathbb{W}

Natural numbers: All positive numbers. {1, 2, 3, 4, ...}

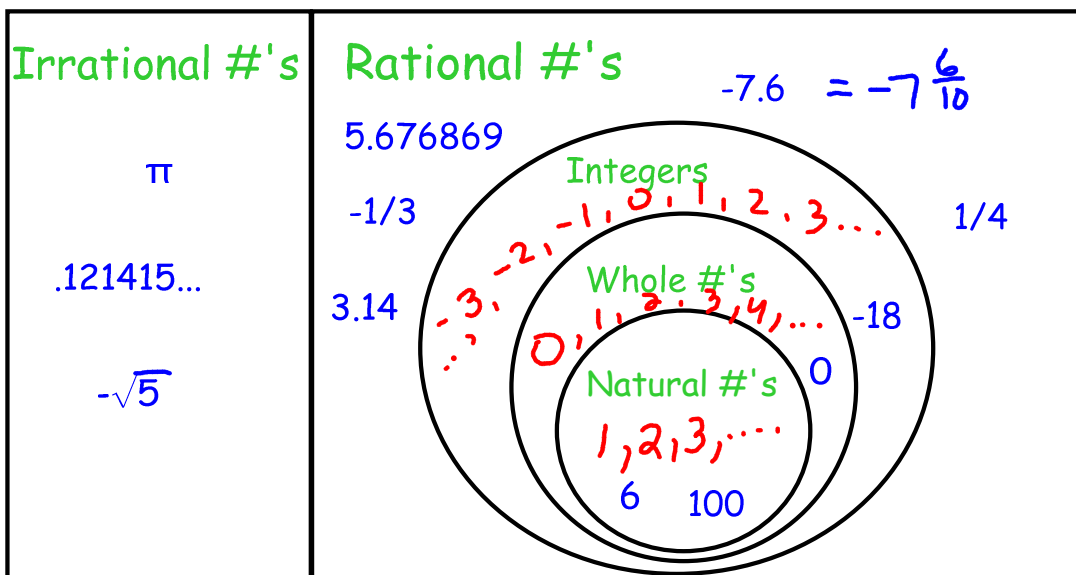
\mathbb{N}

Counting #'s

3.4 Notes:

Real #'s

$\overline{6}$
 $.6666666667$



When an operation (+, -, ÷, x) on a set of numbers always results in a number that is in the same set, the set of numbers is said to be **closed** under that operation.

For example, when you add 2 integers, the sum will always be an integer. So the integers are closed under addition. $6 + 429 = 435$
 $-2 + -5 = -7$

State whether each set is closed under the given operation.

1. natural numbers - division

$$4 \div 8 = .5 = \frac{1}{2}$$

NOT closed

Not Closed

2. rational numbers - subtraction

$$\frac{8}{4} = 2$$

$$-144 + (+212) = 68$$

$$.5 - .2 = .3$$

Closed

Name the property.

① $-4 + 0 = -4$
Identity of "+"

② $9 \times 3 = 3 \times 9$

Commutative of (x)

③ $4 \times \frac{1}{4} = 1$
Inverse of (x)

④ $3 + (4 + 5) = (3 + 4) + 5$

Associative of +

$-3 + 3 = 0$
Inverse (Add)

⑤ $6 \times 0 = 0$
multiplication property of 0

⑥ $7 + 12 = 12 + 7$

Commutative

⑦ $6(8 + 2) = 6 \cdot 8 + 6 \cdot 2$
Distributive

⑧ $-1 \cdot 3 = -3$

multiplication property of -1

Classwork:

p.554 Section 3.4 (1 - 14, 27, 28)

1.	2.
3.	4.
5.	6.
7.	8.
9.	10.
11.	12.
13.	14.
27.	28.

p.554 (3.4)

REAL NUMBER PROPERTIES

Commutative Property The order of addends or factors does not affect the answer.

$$a + b = b + a$$
$$a \cdot b = b \cdot a$$

$$3 + 2 = 5; 2 + 3 = 5$$

$$7 \cdot 4 = 28; 4 \cdot 7 = 28$$

Associative
Property

The grouping
of addends or
factors does
not affect the
answer.

$$a + (b + c) = (a + b) + c$$
$$a \cdot (b \cdot c) = (a \cdot b) \cdot c$$

$$3 + (4 + 5) = (3 + 4) + 5$$

$$4 \cdot (2 \cdot 3) = (4 \cdot 2) \cdot 3$$

Distributive
Property

A factor
outside the
parentheses
can be used
to multiply
each term
within the
parentheses.

$$a(b + c) = (a \cdot b) + (a \cdot c)$$
$$a(b - c) = (a \cdot b) - (a \cdot c)$$

$$6(2 + 3) = (6 \cdot 2) + (6 \cdot 3)$$

$$3(12 - 7) = (3 \cdot 12) - (3 \cdot 7)$$

EXERCISES

Match each equation with the property illustrated.

- | | | |
|---|-------|---|
| 1. $5 \cdot (2 \cdot 2) = 10 \cdot 2$ | _____ | a. commutative property of addition |
| 2. $2 \cdot 7 = 7 \cdot 2$ | _____ | b. commutative property of multiplication |
| 3. $4(2 + 7) = (4 \cdot 2) + (4 \cdot 7)$ | _____ | c. associative property of addition |
| 4. $15 + (21 + 7) = 15 + (7 + 21)$ | _____ | d. associative property of multiplication |
| 5. $(8 + 3) + 17 = 8 + (3 + 17)$ | _____ | e. distributive property |

6. _____ $\cdot 73 = 73 \cdot 10$

8. $837 +$ _____ $= 16 + 837$

$$10. 2(3 + 8) = (\underline{\hspace{2cm}} \cdot 3) + (2 \cdot 8)$$

$$12. 4(18 - 2) = (4 \cdot \underline{\hspace{2cm}}) - (4 \cdot 2)$$

$$7. (5.6 + 8.2) + \underline{\hspace{2cm}} = 5.6 + (8.2 + 1.8)$$

$$9. 6 \cdot (5 \cdot 12) = (6 \cdot \underline{\hspace{2cm}}) \cdot 12$$

$$11. \quad \underline{\hspace{2cm}} (5 - 2) = (3 \cdot 5) - (3 \cdot 2)$$

$$13. \quad 0.3(4 + 9) = (0.3 \cdot 4) + (0.3 \cdot \underline{\hspace{2cm}})$$