

Eye Opener

Write each set in set builder notation:

$$A = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$$

$$\{ \text{all whole \# 's } < 10 \}$$

$$B = \{1, 3, 5, 7\}$$

$$B = \{ \text{whole \# 's bet. } 1 \text{ \& } 7 \}$$

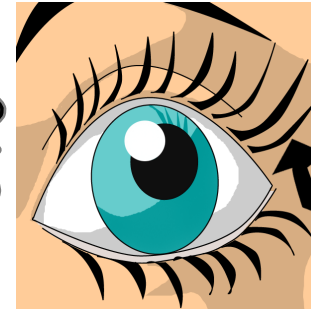
Write each set in roster form:

$$C = \{ x \mid x \text{ is even numbers between } -15 \text{ and } -5 \}$$

$$C = \{ -14, -12, \dots, -6 \}$$

$$D = \{ k \mid k \text{ is a composite number between } 7 \text{ and } 17 \}$$

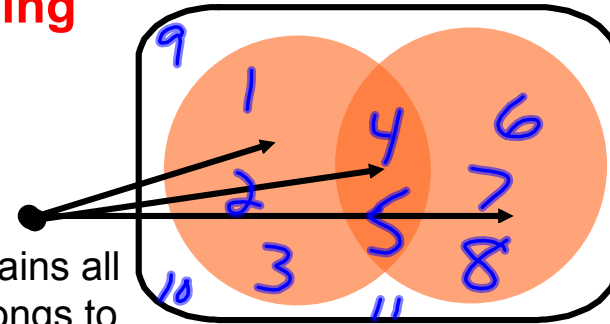
$$D = \{ 8, 10, 12, 14, 16 \}$$



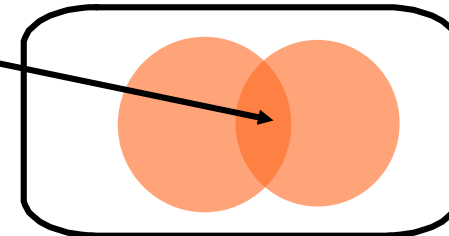


Essential Understanding

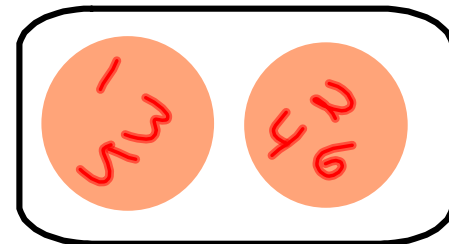
The **union** (\cup) of two or more sets is the set that contains all elements of the sets. An element is in the union if it belongs to at least one of the sets. (In diagram, all the shaded areas are the union). The word "OR" refers to unions.



The **intersection** of two or more sets (\cap) is the set of elements that are common to every set. An element is in the intersection if it belongs to all of the sets. (In diagram, only the dark highlighted area is the intersection.) The word "AND" refers to intersections.



Disjoint sets have no elements in common. The intersection of disjoint sets is the empty set.



Union of Sets

Find each union or intersection. Let $A = \{1, 3, 4\}$, $B = \{x \mid x \text{ is an even whole number less than } 9\}$, $C = \{2, 5, 7, 10\}$, and $D = \{x \mid x \text{ is an odd whole number less than } 10\}$.

$$A \cup C = \{1, 3, 4, 2, 5, 7, 10\}$$

$$C \cup D = \{1, 2, 3, 5, 7, 9, 10\}$$

$$B \cup C = \{0, 2, 4, 5, 6, 7, 10\}$$

$$A = \{1, 3, 4\}$$

$$B = \{0, 2, 4, 6, 8\}$$

$$C = \{2, 5, 7, 10\}$$

$$D = \{1, 3, 5, 7, 9\}$$

Intersection of Sets

Find each union or intersection. Let $A = \{1, 3, 4\}$, $B = \{x \mid x \text{ is an even whole number less than } 9\}$, $C = \{2, 5, 7, 10\}$, and $D = \{x \mid x \text{ is an odd whole number less than } 10\}$.

$$B \cap C = \{2\}$$

$$C \cap D = \{5, 7\}$$

$$A \cap C$$

$$\{ \emptyset \}$$

$$A = \{1, 3, 4\}$$

$$B = \{2, 4, 6, 8\}$$

$$C = \{2, 5, 7, 10\}$$

$$D = \{1, 3, 5, 7, 9\}$$

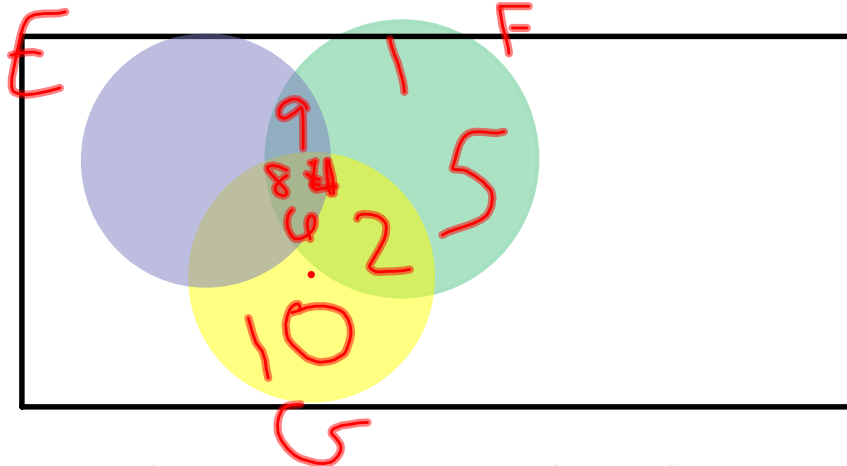
Find each union or intersection. Let $W = \{5, 6, 7, 8\}$, $X = \{3, 6, 9\}$, $Y = \{2, 3, 7, 8\}$, and $Z = \{x \mid x \text{ is an even whole number less than } 10\}$.

$$W \cup Y \cup Z = \{5, 6, 7, 8, 3, 2, 0, 4\}$$

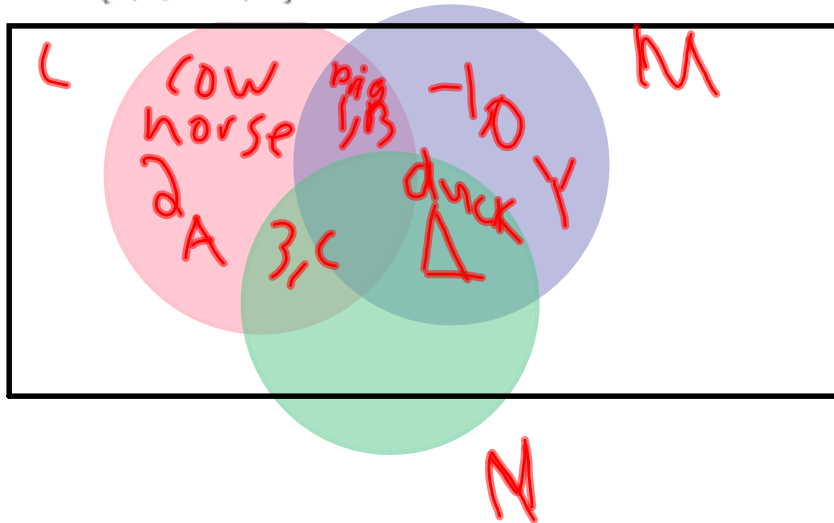
$$\begin{aligned} W \cap X \cap Z &= \{6\} \\ &= \{x : x = 6\} \end{aligned}$$

Making a Venn Diagram

Let $E = \{x \mid x \text{ is a positive, composite number less than } 10\}$, $F = \{1, 2, 4, 5, 6, 8, 9\}$,
and $G = \{x \mid x \text{ is a positive, even number less than or equal to } 10\}$.

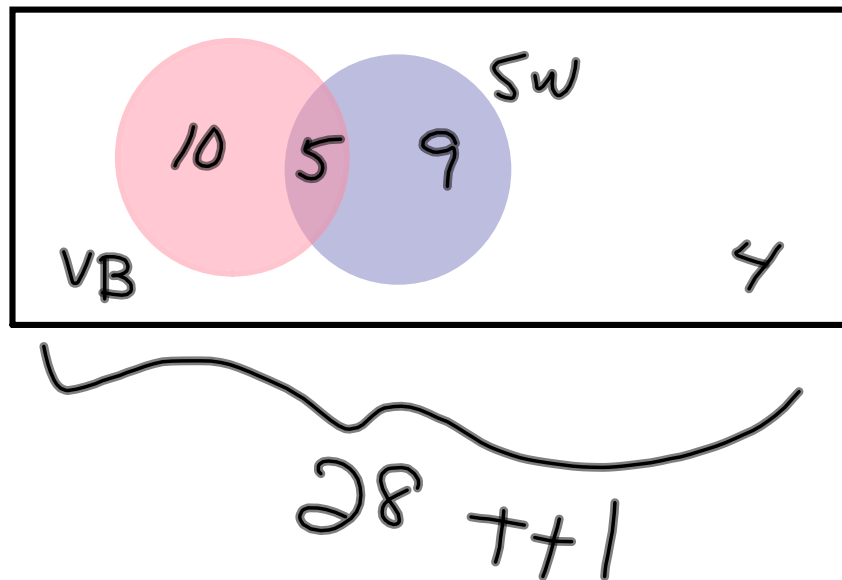


Let $L = \{A, B, C, 1, 2, 3, \text{horse, cow, pig}\}$, $M = \{-1, 0, 1, B, Y, \text{pig, duck, } \Delta\}$, and
 $N = \{C, 3, \text{duck, } \Delta\}$.



Using a Venn Diagram to Show Numbers of Elements

Camping Twenty-eight girls went camping. There were two main activities: volleyball and swimming. Fourteen girls went swimming, 5 participated in both activities, and 4 girls did neither. How many girls only played volleyball?



Writing Solutions of an Inequality

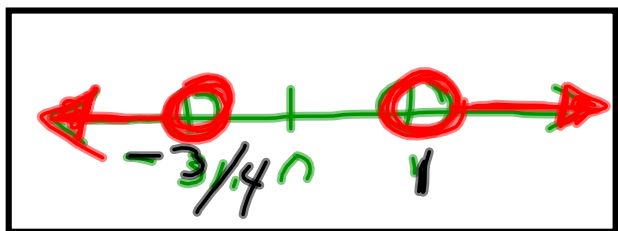
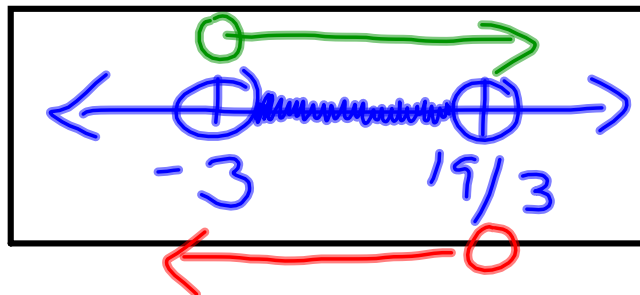
OR = Union "U"
 AND = Intersect "∩"

Solve each inequality. Write the solutions as either the union or intersection of two sets.

$$3x - 5 < 14 \text{ and } 3x - 5 > -14$$

$$\begin{array}{l} +5 \ +5 \\ \hline 3x < 19 \\ x < 19/3 \end{array} \quad \downarrow \quad \begin{array}{l} +5 \ +5 \\ \hline 3x > -9 \\ x > -3 \end{array}$$

∩



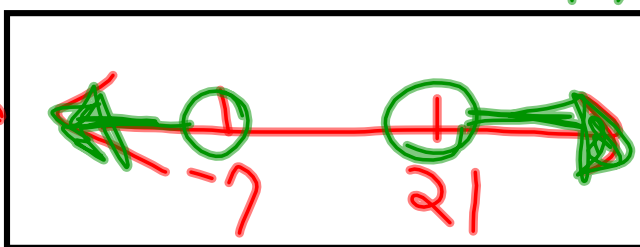
$$8w - 1 > 7 \text{ or } 8w - 1 < -7$$

$$\begin{array}{l} +1 \ +1 \\ \hline 8w > 8 \\ w > 1 \end{array} \quad \begin{array}{l} +1 \ +1 \\ \hline 8w < -6 \\ w < -3/4 \end{array}$$

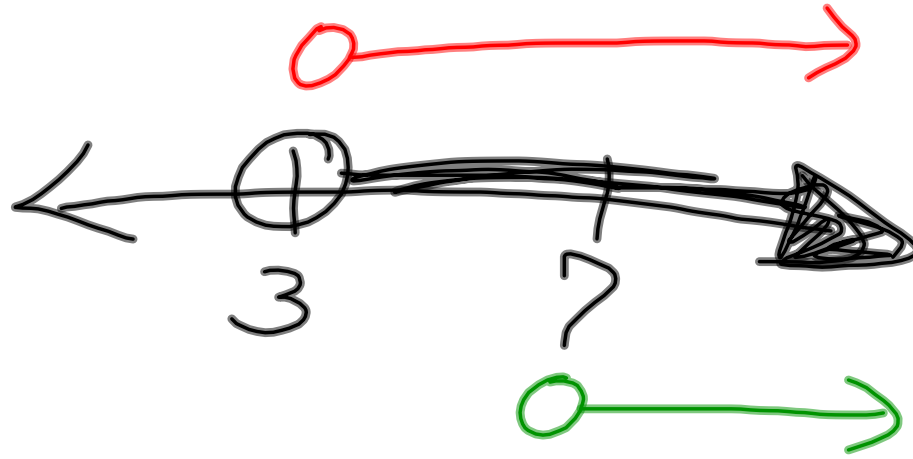
$$2(x - 7) > 28 \text{ or } 2(x - 7) < -28$$

$$\begin{array}{l} 2x - 14 > 28 \\ 2x > 42 \\ x > 21 \end{array} \quad \downarrow \quad \begin{array}{l} 2x - 14 < -28 \\ 2x < -14 \\ x < -7 \end{array}$$

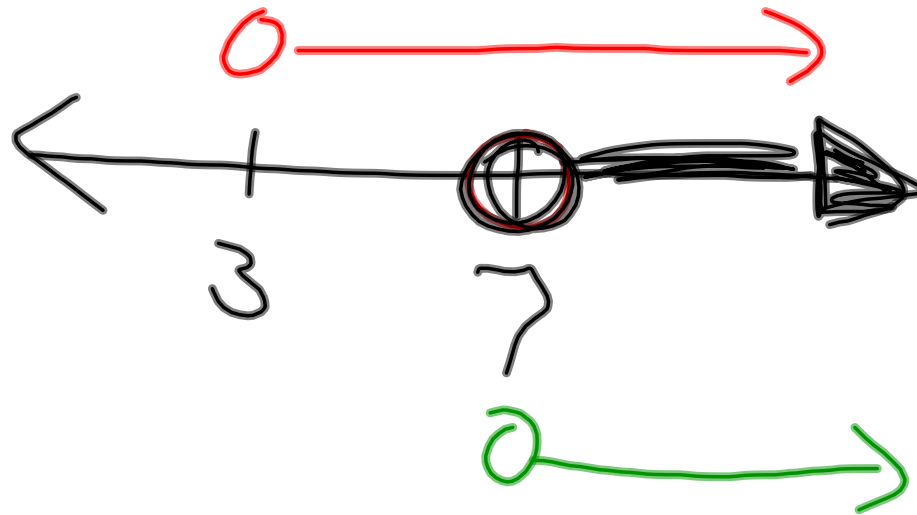
∪



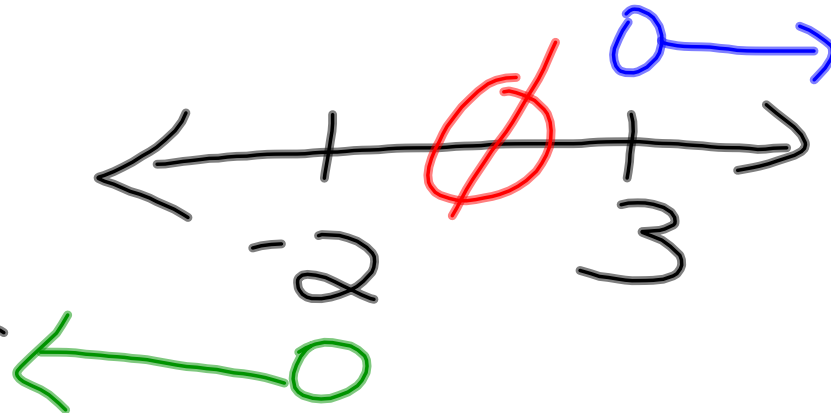
$x > 3$
 "U" or
 $x > 7$



$x > 3$
 "∩" and
 $x > 7$



" \cap " = and
 $x > 3$
 $x < -2$



" \cup " = or
 $x > 3$
 $x < 5$

