

Modeling Activity

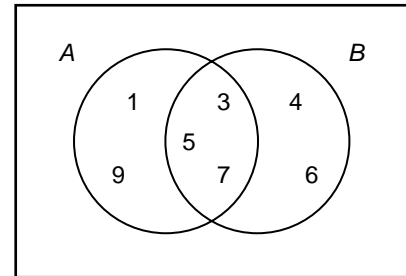
(Use with Lesson 7-4)

Intersections and Unions

You can use Venn diagrams to model the intersection and union of sets.

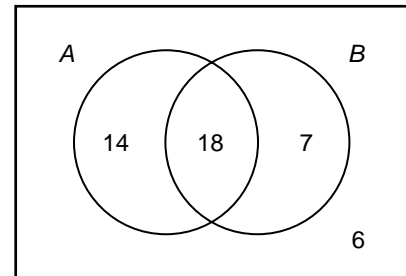
Activity 1: Use a Venn diagram to represent the two sets $A = \{1, 3, 5, 7, 9\}$ and $B = \{3, 4, 5, 6, 7\}$. Use the diagram to name the intersection (written $A \cap B$) and union (written $A \cup B$) of these sets.

- ▶ Notice that the sets have several items in common. Draw a circle for set A that overlaps the circle drawn for set B .
- ▶ Write the numbers that the sets have in common inside the overlapping portion. Write the other numbers of each set outside of the overlapping portion.
- ▶ The intersection of the two sets is the set of numbers that are in A and B . This is represented by the numbers where the two circles overlap. The intersection is $A \cap B = \{3, 5, 7\}$. The union of the two sets is the set of numbers that are in A or B . The union is $A \cup B = \{1, 3, 4, 5, 6, 7, 9\}$.



Activity 2: Forty-five students were surveyed. Thirty-two said that their families have a VCR, 25 said that their families have cable TV, and 18 said their families have both. Make a Venn diagram to represent the results of the survey.

- ▶ Let A represent families that own a VCR and let B represent families that subscribe to cable. Then $A \cap B$ represents the families that have both, so $A \cap B = 18$.
- ▶ Because 32 have a VCR and 18 have both a VCR and cable, 14 have *only* a VCR. Likewise, because 25 have cable and 18 have both a VCR and cable, 7 have *only* cable. Note that $A \cup B = 39$. Because 45 students were surveyed, 6 students responded that their families have neither a VCR or cable. (The Venn diagram shows that 6 students are outside of A and B .)



MODEL

Use a Venn diagram to represent each situation. Find the intersection and union of each set.

1. $A = \{-1, 0, 5, 6, 8, 9\}$, $B = \{-3, 0, 2, 3, 5, 7, 10\}$
2. $A = \{10, 20, 30, 40, 50, 60\}$, $B = \{5, 10, 15, 20, 25\}$
3. A pet store has 20 puppies. Eight puppies have brown spots, 17 puppies have black spots, and five puppies have both black and brown spots.
4. The school newspaper surveyed 100 students on modes of transportation. Ninety students said they own a bicycle, 30 students said they own a car, and 23 said they own both a car and a bicycle.

WRITE

5. Explain the difference between a union and an intersection of two sets.