

Modeling Activity

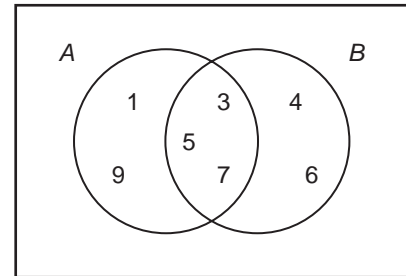
(Use with Lesson 7-4)

Intersections and Unions

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

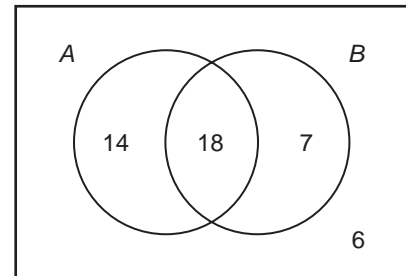
Activity 1: Use a Venn diagram to represent the two sets $A = \{1, 3, 5, 7, 9\}$ and $B = \{3, 4, 5, 6, 7\}$. Use the diagram to name the intersection (written $A \cap B$) and union (written $A \cup B$) of these sets.

- ▶ 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. $A = \{-1, 0, 5, 6, 8, 9\}$, $B = \{-3, 0, 2, 3, 5, 7, 10\}$ **$\{0, 5\}$; $\{-3, -1, 0, 2, 3, 5, 6, 7, 8, 9, 10\}$**
2. $A = \{10, 20, 30, 40, 50, 60\}$, $B = \{5, 10, 15, 20, 25\}$ **$\{10, 20\}$; $\{5, 10, 15, 20, 25, 30, 40, 50, 60\}$**
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. **5; 20**
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. **23; 97**

WRITE

5. Explain the difference between a union and an intersection of two sets.
See students' work.