Venn Diagrams and Logical Reasoning   TEKS *8.6.A, 8.6.B*

A **Venn diagram** uses shapes to show how sets are related.

EXAMPLE   **Draw a Venn diagram of the whole numbers less than 10 where set *A* consists of prime numbers and set *B* consists of even numbers.**
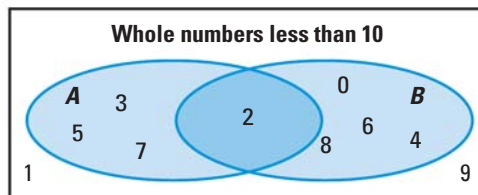
Whole numbers less than 10:
0, 1, 2, 3, 4, 5, 6, 7, 8, 9

Set *A*: 2, 3, 5, 7

Set *B*: 0, 2, 4, 6, 8

Both set *A* and set *B*: 2

Neither set *A* nor set *B*: 1, 9

Whole numbers less than 10

You can use a Venn diagram to answer questions about sets.

EXAMPLE   **Use the Venn diagram above to answer the question.**

a. Is the statement below *true* or *false*? Explain.

No whole number less than 10 is prime.

▶ False. The whole number 2 is less than 10 and is prime.

b. Is the statement below *always*, *sometimes*, or *never* true? Explain.

A whole number less than 10 is either even or prime.

▶ Sometimes. Each of the numbers 0, 2, 3, 4, 5, 6, 7, and 8 are either even or prime, but the numbers 1 and 9 are not even and not prime.

PRACTICE

Draw a Venn diagram of the sets described.

1. Of the whole numbers less than 10, set *A* consists of factors of 10 and set *B* consists of odd numbers.

2. Of the whole numbers less than 10, set *A* consists of factors of 6 and set *B* consists of even numbers.

Use the Venn diagrams you drew in Exercises 1 and 2 to answer the question.

3. Are the following statements *true* or *false*? Explain.

   a. *If a whole number less than 10 is odd, then it must be a factor of 10.*

   b. *A whole number less than 10 that is a factor of 10 must be odd.*

4. Are the following statements *always*, *sometimes*, or *never* true? Explain.

   a. *A whole number that is even and less than 10 is a factor of 6.*

   b. *A factor of 6 that is less than 10 is even.*