Find Probabilities Using Venn Diagrams

MATHEMATICAL PRACTICES

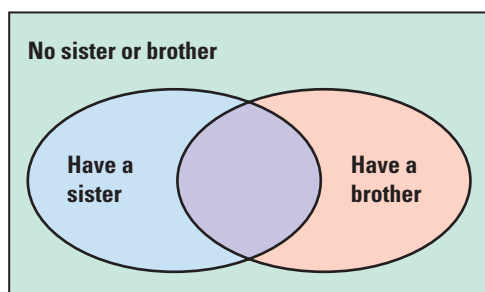**Construct viable arguments and critique the reasoning of others.**

QUESTION How can you use a Venn diagram to find probabilities involving two events?

You have learned how to compute the probability of one event. In some situations, however, you might be interested in the probability that two events will occur simultaneously. You also might be interested in the probability that at least one of two events will occur. This activity demonstrates how a Venn diagram is useful for computing such probabilities.

EXPLORE Use a Venn diagram to collect data

STEP 1 *Complete a Venn diagram*

Copy the Venn diagram shown below. Ask the members of your class if they have a sister, have a brother, have both, or have neither. Write their names in the appropriate part of the Venn diagram.

STEP 2 *Complete a table*

Copy and complete the frequency table. When determining the frequency for a category, be sure to include all the students who are in the category. Note that a student can belong to more than one category.

Category	Number of students
Have a sister	?
Have a brother	?
Have both a sister and brother	?
Do not have a sister or brother	?

DRAW CONCLUSIONS Use your data to complete these exercises

1. A student from your class is selected at random. Find the probability of each event. *Explain* how you found your answers.

   a. The student has a sister.

   b. The student has a brother.

   c. The student has a sister and a brother.

   d. The student does not have a sister or a brother.

2. Find the probability that a randomly selected student from your class has either a sister or a brother. *Explain* how you found your answer.

3. How could you calculate the answer to Exercise 2 using your answers from Exercise 1?