Grade 4 Mathematics
Data Analysis, Probability, and Discrete Mathematics: Lesson 5

Read aloud to the students the material that is printed in **boldface type** inside the boxes. Information in regular type inside the boxes and all information outside the boxes should **not** be read to students. Possible student responses are included in parentheses after the questions.

NOTE: The directions read to students may depend on the available materials. Read only those parts of the lesson that apply to the materials you are using.

Any directions that ask you to do something, such as to turn to a page or to hand out materials to students, will have an arrow symbol (ﻉ) by them.

Purpose of Lesson 5:
- In this lesson, the tutor and the students will
  - ✓ use Venn diagrams involving two overlapping categories to solve elementary logic problems.

Equipment/Materials Needed:
- Copies of Student Sheet 116
- Paper and pencils
- Chalkboard
- Small pieces of paper about one square inch (one for each student)

Preparations before beginning Lesson 5:
- Run one copy of Student Sheet 116 for each student.
- Have paper and pencils available.
- Cut out small pieces of paper.

Lesson 5: Data Analysis

ٮ   Draw two large circles on a sheet of paper. Write *sisters* in one and *brothers* in the other. Give each student the small piece of paper. Have each student write his/her name on the paper.
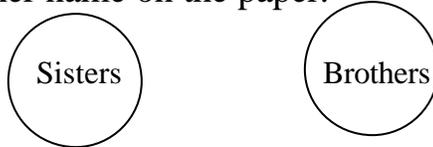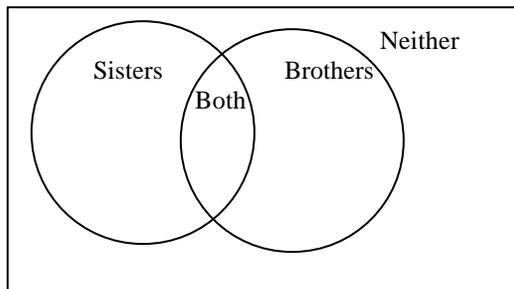
Sisters   Brothers

Say:

If you have a sister, put your name in the circle labeled *sisters*. **If you have a brother, put your name in the circle labeled** *brothers*. **Did anyone have a problem?** (Some students have both brothers and sisters; some have neither.) **Does anyone have an idea of what we could do to take care of these problems?** Hopefully, someone will give these answers. If not lead the students through the process. (We could overlap the circles and have a place where we could write something like "both.")

ٮ   Draw two large circles on another sheet of paper. This time overlap the circles, and write *sisters*, *brothers*, and *both* in the circles.

Sisters   Brothers
Both
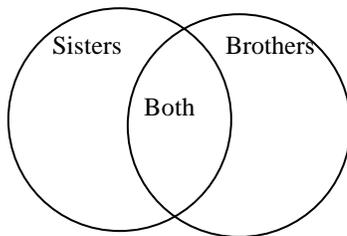
Have each student place his/her name in the correct place in the circles. **Now we have taken care of those who have both brothers and sisters, what could we do for those who have neither?** (We could draw a rectangle around the circles and put the names of those with neither in the rectangle.)

Neither
Sisters   Brothers
Both

˽ Write these names in the circles.
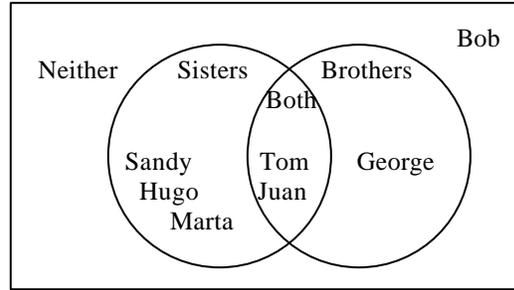
Say:

> **How many people have both brothers and sisters?** (2) **How many people have only sisters?** (3) **How many people have sisters?** (5. Three people have only sisters and two people have sisters and brothers.) **How many have only brothers?** (1) **How many have neither?** (1) The way these questions are stated is very important. If you simply say "How many have sisters?", you must include those who have only sisters and those who have both brothers and sisters. Think of the entire "sister" circle.
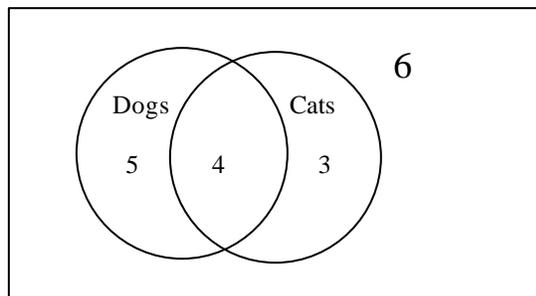
Say:

> **What we have drawn is a Venn diagram. A** *Venn diagram* **is a drawing that shows relationships among sets of data. Venn diagrams are also called** *logic rings* **in some books.**

˽ Give Student Sheet 116 to the students.

Say:

> **Look at the Venn diagram in Part A. Put a number on each line to fit the facts.**

Say:

> **Look at the Venn diagram in Part B. As I call out numbers, write them in the correct part of the Venn diagram. 2, 6, 8, 5, 29, 45, 100, 105, 96. Why was the number *6* placed in the overlapping part of the two circles?** (It is an even number, and it is a multiple of 3.) **Why was the number *5* placed outside the circles?** (It is neither even, nor a multiple of 3.) **What kind of numbers would be in the overlapping part of the two circles?** (Multiples of 3 that are also even numbers.) **What kind of numbers would be outside of the circles, but inside the rectangle?** (Odd numbers that are not multiples of 3.)
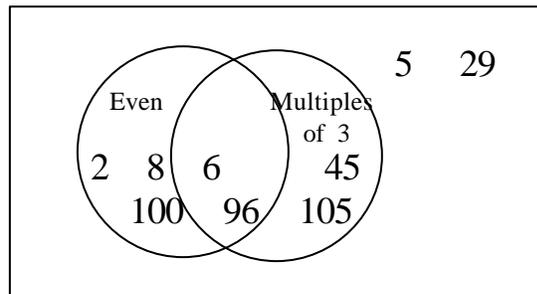
ℓ   Have one student summarize today's lesson. Emphasize that Venn diagrams can help students see relationships.

Student Sheet 116 (Data Analysis: Lesson 5)

Part A
What pets do you own?

Dogs   Cats
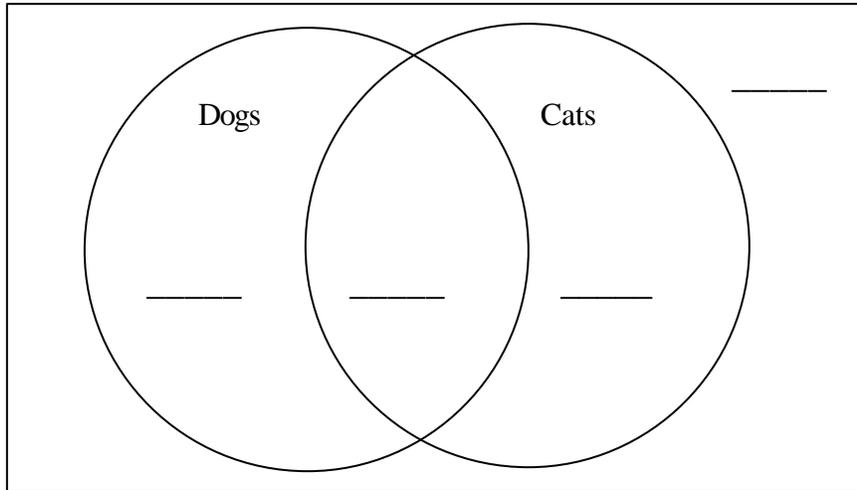
Put a number on each line to fit the following facts.
1. Five students own dogs, but not cats.
2. Six students own neither dogs nor cats.
3. Four students have both dogs and cats.
4. Three students own cats, but not dogs.

Part B

Even numbers   Multiples of 3