


Grade 8 Mathematics

Geometry: Lesson 11

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 () by them.

Purpose of Lesson 11:

- In this lesson, the tutor and the students will
✓ construct or use scale drawings.

Equipment/Materials Needed:

- Copies of Student Sheet 110
- Paper and pencils
- Chalkboard

Preparations before beginning Lesson 11:

- Run one copy of Student Sheet 110 for each student.
- Have paper and pencils available.
- You should cover Lesson 14 of Number Relations before beginning this lesson.

Lesson 11: Geometry

Say:

When a map is drawn, the roads, cities, and countries cannot be drawn their actual sizes. The map would be too large for anyone to use. The sizes of the roads, cities, and countries must be reduced. Because a map needs to be accurate to be of any use, everything on the map needs to be reduced the same way.

A ratio is used to reduce the sizes. This special ratio is called a scale. A *scale* is the ratio of the measurement on a map (or model) to the measurement of the real object.

You have seen scales on maps that say the following:

1 inch = approximately 40 miles

1 cm = 50 miles

1 inch = 80 meters

1 inch = 80 meters means that for every inch measured on the map, the actual distance is 80 meters.

Scales are used to make models, such as model airplanes and model cars, and are also used to draw blueprints of houses and buildings. A scale drawing has the same shape, but not the same size, of the object it represents.

Say:

Suppose you are drawing a map. The distance between two towns is 40 miles. If you use a scale of 1 cm = 10 miles, how long would you draw the line between the two towns? (4 cm) If you draw two cities 45 cm apart on your map, how far apart are the actual two cities? (450 miles)

Say:


When you make a drawing or a model that is smaller than the real thing, it is called a *reduction*. If you drew the map above, you would have used a reduction scale of 1 : 10. What would the reduction scale be if you said the scale was 2 inches = 100 miles? (2 : 100)

When you make a drawing or model that is larger than the real thing, you are making an *enlargement*. Suppose for a sign, you want an object to be twice as large as it is in real life. What enlargement scale would you use? (2 : 1)

 Give students Student Sheet 110.

Answers:

- | | | | |
|---------------|---------------|--------------|-----------|
| 1. 200 km | 2. 20 miles | 3. 300 miles | 4. 15 mi. |
| 5. 5.4 inches | 6. 2.3 inches | 7. 120 cm | 8. 330 cm |
| 9. 187.5 cm | 10. 36 meters | | |

 Have one student summarize today's lesson. Knowing how to read a scale can be very useful in everyday life.

Student Sheet 110 (Geometry: Lesson 11)

Different maps use different scales to represent actual distances. In Problems 1 – 4, use the scales given to determine the actual distances between each pair of towns.

1. Dogpatch measures 25 cm from Dollywood on the map. A scale of 1 cm = 8 km was used. How far apart are the actual towns?
2. Funny Farm measures $\frac{1}{2}$ inch from Rider Ranch on the map. A scale of 1 in. = 40 mi. was used. How far apart are the actual towns?
3. Big City measures 6 in. from Smalltown on the map. A scale of 2 in. = 100 mi. was used. How far apart are the actual towns?
4. Blue Bayou measures 10 cm from Green Gulch on the map. A scale of 2 cm = 3 miles was used. How far apart are the actual towns?

In the movie *Honey, I Shrunk the Kids*, the children in the movie were reduced. Suppose the scale factor used was 1 : 10. Answer questions 5 – 7 using this scale factor.

5. If your height is actually 54 inches, how tall would you have been in the movie?
6. Suppose the circumference of your waist is actually 23 inches. What would be the size of your waist in the movie?
7. If one of the stars measured 12 cm tall in the movie, how tall would she have been in real life?

On a billboard, objects have been enlarged by a scale of 15 : 1. Use this scale to answer questions 8 and 9.

8. If the height of a milk carton is actually 22 centimeters, how tall would it be on the billboard?
9. If the height of a glass is actually 12.5 cm, how tall would it be on the billboard?
10. If a model airplane is 8 cm long, what is the actual length of the airplane if a scale of 2 cm = 9 m was used?