Unit 2, Lesson 7

Units in Scale Drawings

Let's explore a different way to express scales.

7.1 One to One Hundred

A map of a park says its scale is 1 to 100.

1. What do you think that means?

2. Give an example of how this scale could tell us about measurements in the park.

7.2 Apollo Lunar Module

Your teacher will give you a scale drawing of the Apollo Lunar Module. It is drawn at a scale of 1 to 50.

1. Estimate the actual length of one leg of the spacecraft to the nearest 10 centimeters. Explain or show your reasoning.

2. Estimate the actual height of the spacecraft to the nearest meter. Explain or show your reasoning.

3. Neil Armstrong was 71 inches tall when he went to the Moon. How tall would he be in this scale drawing? Show your reasoning.

4. Sketch a stick figure to represent yourself standing next to the Apollo Lunar Module. Make sure the height of your stick figure is to scale. Show how you determined your height on the drawing.

Are you ready for more?

The table shows the distance between the Sun and 8 planets in our solar system.

1. If you wanted to create a scale model of the solar system that could fit somewhere in your school, what scale would you use?

2. The diameter of Earth is approximately 8,000 mi. What would the diameter of Earth be in your scale model?

planet	average distance (millions of miles)
Mercury	35
Venus	67
Earth	93
Mars	142
Jupiter	484
Saturn	887
Uranus	1,784
Neptune	2,795

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7.3 The World's Largest Flag

As of 2016, Tunisia holds the world record for the largest version of a national flag. It was almost as long as four soccer fields. The flag has a circle in the center, a crescent moon inside the circle, and a star inside the crescent moon.

1. Complete the table. Explain or show your reasoning.

	flag length	flag height	height of crescent moon
actual	396 m		99 m
at 1 to 2,000 scale		13.2 cm	

2. Complete each scale with the value that makes it equivalent to the scale of 1 to 2,000. Explain or show your reasoning.
   a. 1 cm to _____ cm
   b. 1 cm to _____ m
   c. 1 cm to _____ km
   d. 2 m to _____ m
   e. 5 cm to _____ m
   f. _____ cm to 1,000 m
   g. _____ mm to 20 m

3. a. What is the area of the large flag?
   b. What is the area of the smaller flag?
   c. The area of the large flag is how many times the area of the smaller flag?

Lesson 7 Summary

Sometimes scales come with units, and sometimes they don't. For example, a map of Nebraska may have a scale of 1 mm to 1 km. This means that each millimeter of distance on the map represents 1 kilometer of distance in Nebraska. Notice that there are 1,000 millimeters in 1 meter and 1,000 meters in 1 kilometer. This means there are $1{,}000 \cdot 1{,}000$ or 1,000,000 millimeters in 1 kilometer. So, the same scale without units is 1 to 1,000,000, which means that each unit of distance on the map represents 1,000,000 units of distance in Nebraska. This is true for *any* choice of unit to express the scale of this map.

Here is some information about equal lengths that you may find useful.

Customary Units

1 foot (ft) = 12 inches (in)
1 yard (yd) = 36 inches
1 yard = 3 feet
1 mile = 5,280 feet

Metric Units

1 centimeter (cm) = 10 millimeters (mm)
1 meter (m) = 1,000 millimeters (mm)
1 meter = 100 centimeters
1 kilometer (km) = 1,000 meters

Equal Lengths in Different Systems

1 inch = 2.54 centimeters
1 foot ≈ 0.30 meter
1 mile ≈ 1.61 kilometers

1 centimeter ≈ 0.39 inch
1 meter ≈ 39.37 inches
1 kilometer ≈ 0.62 mile