Unit 1, Lesson 8: Scale Drawings and Maps

Lesson Goals
- Use scale and scale drawings to determine actual distances and solve problems.

Required Materials
- geometry toolkits

8.1: A Train and a Car (5 minutes)

Setup: 3 minutes of quiet think time, followed by whole-class discussion.

Student task statement
Two cities are 243 miles apart.

- It takes a train 4 hours to travel between the two cities at a constant speed.
- A car travels between the two cities at a constant speed of 65 miles per hour.

Which is traveling faster, the car or the train? Be prepared to explain your reasoning.

Possible responses
The car is traveling faster than the train.
8.2: Driving on I-90 (Optional, 15 minutes)

Setup: Brief overview of speed limits, if needed. Students in groups of 2. Access to geometry toolkits. 5 minutes of work time.
Student task statement

1. A driver is traveling at a constant speed on Interstate 90 outside Chicago. If she traveled from Point A to Point B in 8 minutes, did she obey the speed limit of 55 miles per hour? Explain your reasoning.

2. A traffic helicopter flew directly from Point A to Point B in 8 minutes. Did the helicopter travel faster or slower than the driver? Explain or show your reasoning.

Possible responses

1. No, she did not.

2. Slower

Anticipated misconceptions

Students might not realize that they need to compare two quantities (either two speeds, two distances traveled in the same amount of time, or two durations of travel) in order to answer the question about speeding. Remind them that there are two potential scenarios here: the driver is obeying the speed limit or the driver is not obeying it.

Once students have found the distance between A and B to be about 8.5 miles, they might be inclined to divide 55 by 8.5 simply because 55 is a larger number. Using double number lines or a table to show the relationship between miles traveled and number of hours might be helpful, as might using
friendlier examples of distances (e.g., “How long would it take to travel 110 miles? 11 miles?”).
8.3: Biking through Kansas (Optional, 10 minutes)

**Setup:**
Share biking experience. Students in same groups. 4–5 minutes of quiet work time, followed by partner and whole-class discussion.

**Student task statement**
A cyclist rides at a constant speed of 15 miles per hour. At this speed, about how long would it take the cyclist to ride from Garden City to Dodge City, Kansas?

**Possible responses**
Answers vary. Sample response: About 3 hours and 20 minutes.

**Anticipated misconceptions**
The road from Garden City to Dodge City has many twists and bends. Students may not be sure how to treat these. Tell them to make their best estimate. Measuring many small segments of the road will have the advantage that those short segments are straight but it is time consuming. A good estimate will be sufficient here.
Are you ready for more?

Jada finds a map that says, “Note: This map is not to scale.” What do you think this means? Why is this information important?

Possible Responses

Answers vary. Sample response: it means that there is no one scale factor that relates distances on the map to distances in the place represented by the map. Some distances are distorted. If Jada were using her map to calculate how long it would take her to travel from one point to another on the map, her prediction may be inaccurate.

Lesson Synthesis (5 minutes)

How can we use a map to estimate how long a trip will take? How can we use a map to estimate the speed a person traveled?

8.4: Walking Around the Botanical Garden (Cool-down, 5 minutes)

Setup: Access to geometry toolkits.
Student task statement

Here is a map of the Missouri Botanical Garden. Clare walked all the way around the garden.

1. What is the actual distance around the garden? Show your reasoning.

2. It took Clare 30 minutes to walk around the garden at a constant speed. At what speed was she walking? Show your reasoning.

Possible responses

1. About 8,400 feet. It takes about 14 segments to measure the perimeter of the garden and $14 \times 600 = 8,400$.

2. About 280 feet per minute, or 16,800 feet per hour.