IM 6–8 MATH™ v.III

Unit 1
Scale Drawings

7

Lesson 7

Scale Drawings

Illustrative Mathematics®

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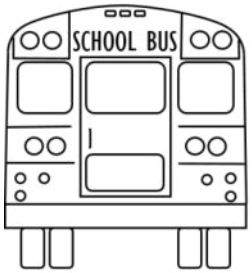
Learning Goal

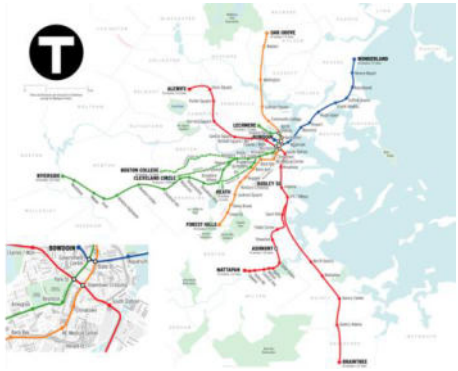
Let's explore scale drawings.

What is a Scale Drawing?

Warm-up

Here are some drawings of a school bus, a quarter, and the subway lines around Boston, Massachusetts. These first three drawings are **scale drawings** of these objects.





These three drawings are *not* scale drawings of these objects.

Discuss with your partner what a scale drawing is.

What is a Scale Drawing?

Warm-up

- What do the examples have or show that the counterexamples do not?
- How are scale drawings like scaled copies you saw in earlier lessons? How are they different than scaled copies?
- What aspects of the bus, coin, and the city of Boston do the scale drawings show? What aspects of the actual objects do scale drawings *not* show?

Sizing Up a Basketball Court

Your teacher will give you a scale drawing of a basketball court. The drawing does not have any measurements labeled, but it says that 1 centimeter represents 2 meters.

1. Measure the distances on the scale drawing that are labeled a–d to the nearest tenth of a centimeter. Record your results in the first row of the table.

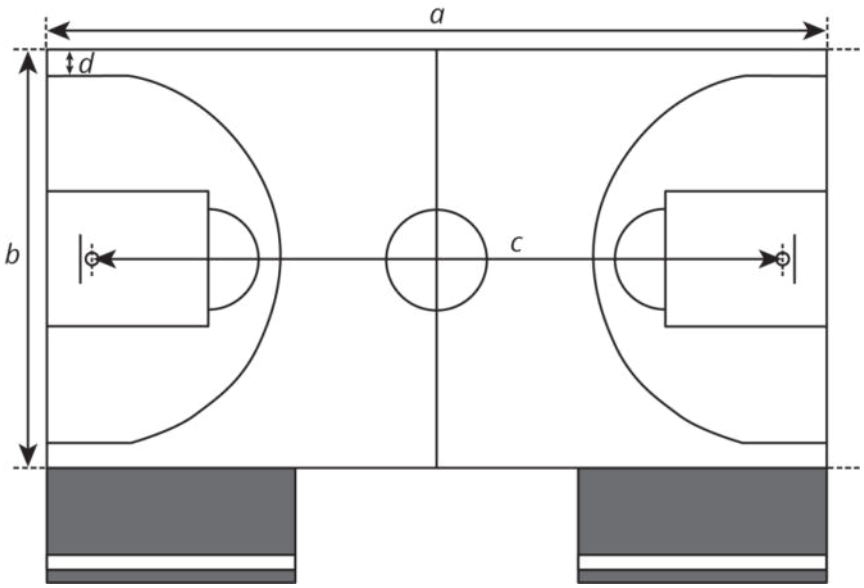
measurement	(a) length of court	(b) width of court	(c) hoop to hoop	(d) 3 point line to sideline
scale drawing				
actual court				

2. The statement "1 cm represents 2 m" is the **scale** of the drawing. It can also be expressed as "1 cm to 2 m," or "1 cm for every 2 m." What do you think the scale tells us?

3. How long would each measurement from the first question be on an actual basketball court? Explain or show your reasoning.

4. On an actual basketball court, the bench area is typically 9 meters long.
   a. Without measuring, determine how long the bench area should be on the scale drawing.
   b. Check your answer by measuring the bench area on the scale drawing. Did your prediction match your measurement?

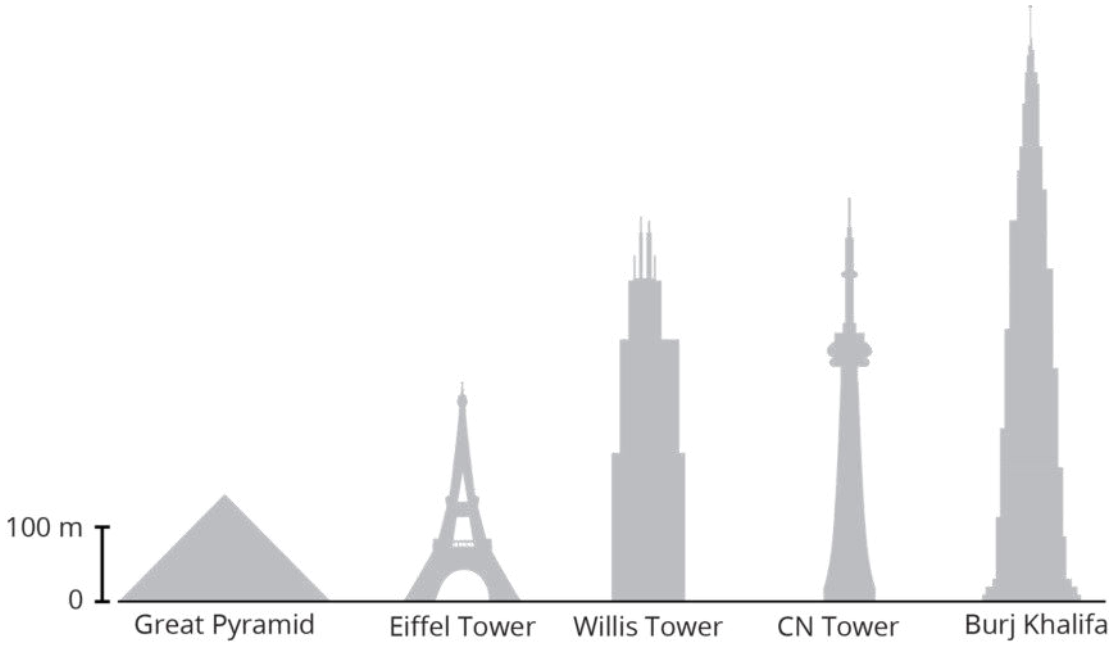
Sizing Up a Basketball Court



- Does “1 cm for every 2 m” mean that the actual distance is twice that on the drawing? Why or why not?
- Which parts of the court should be drawn by using “1 cm for every 2 m” rule?
- Can we reverse the order in which we list the scaled and actual distances? For example, can we say “2 m of actual distance to 1 cm on the drawing” or “2 m to 1 cm”?

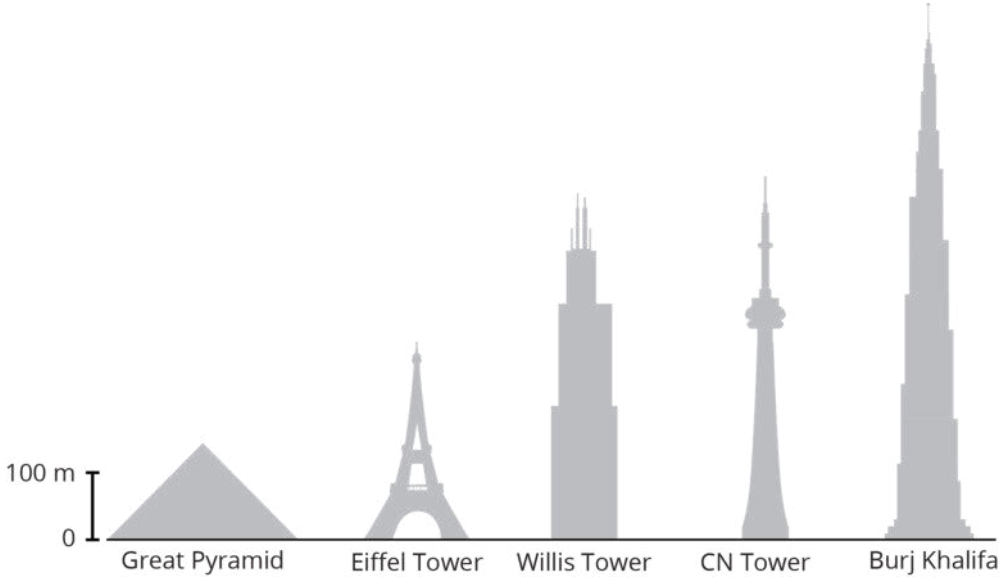
Tall Structures

Here is a scale drawing of some of the world's tallest structures.



1. About how tall is the actual Willis Tower? About how tall is the actual Great Pyramid? Be prepared to explain your reasoning.
2. About how much taller is the Burj Khalifa than the Eiffel Tower? Explain or show your reasoning.
3. Measure the line segment that shows the scale to the nearest tenth of a centimeter. Express the scale of the drawing using numbers and words.

- Besides height information, what other information about the towers does the drawing show?
- What information does it not show?
- How is this scale drawing the same as that of the basketball court? How are they different?



Scale Drawings

Lesson Synthesis

- What is a **scale drawing**?
- How can we describe the scale for a scale drawing?
- How do we find distances using a scale drawing?

Learning Targets

- I can explain what a scale drawing is, and I can explain what its scale means.
- I can use actual distances and a scale to find scaled distances.
- I can use a scale drawing and its scale to find actual distances.

Length of a Bus and Width of a Lake

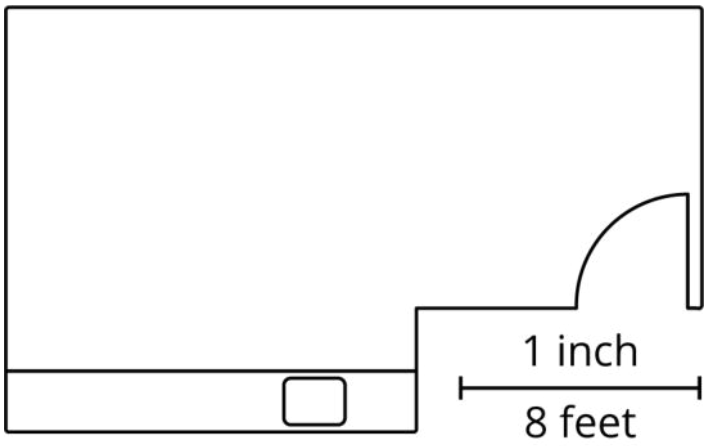
Cool-down

1. A scale drawing of a school bus has a scale of $\frac{1}{2}$ inch to 5 feet. If the length of the school bus is $4\frac{1}{2}$ inches on the scale drawing, what is the actual length of the bus? Explain or show your reasoning.
2. A scale drawing of a lake has a scale of 1 cm to 80 m. If the actual width of the lake is 1,000 m, what is the width of the lake on the scale drawing? Explain or show your reasoning.

scale

A scale tells how the measurements in a scale drawing represent the actual measurements of the object.

For example, the scale on this floor plan tells us that 1 inch on the drawing represents 8 feet in the actual room. This means that 2 inches would represent 16 feet, and $\frac{1}{2}$ inch would represent 4 feet.



scale drawing

A scale drawing represents an actual place or object. All the measurements in the drawing correspond to the measurements of the actual object by the same scale.