IM 6–8 MATH™ v.III

Unit 1
Scale Drawings

7

Lesson 10

Changing Scales in Scale Drawings

Illustrative Mathematics®
Kendall Hunt

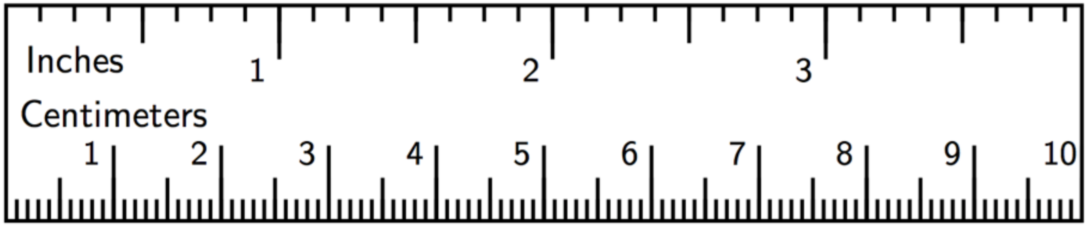
Learning Goal

Let's explore different scale drawings of the same actual thing.

Warm-up

Without measuring, about how long is your foot?

1. If a student uses a ruler like this to measure the length of their foot, which choices would be appropriate measurements? Select **all** that apply. Be prepared to explain your reasoning.



   a. $9\frac{1}{4}$ inches

   b. $9\frac{5}{64}$ inches

   c. 23.47659 centimeters

   d. 23.5 centimeters

   e. 23.48 centimeters

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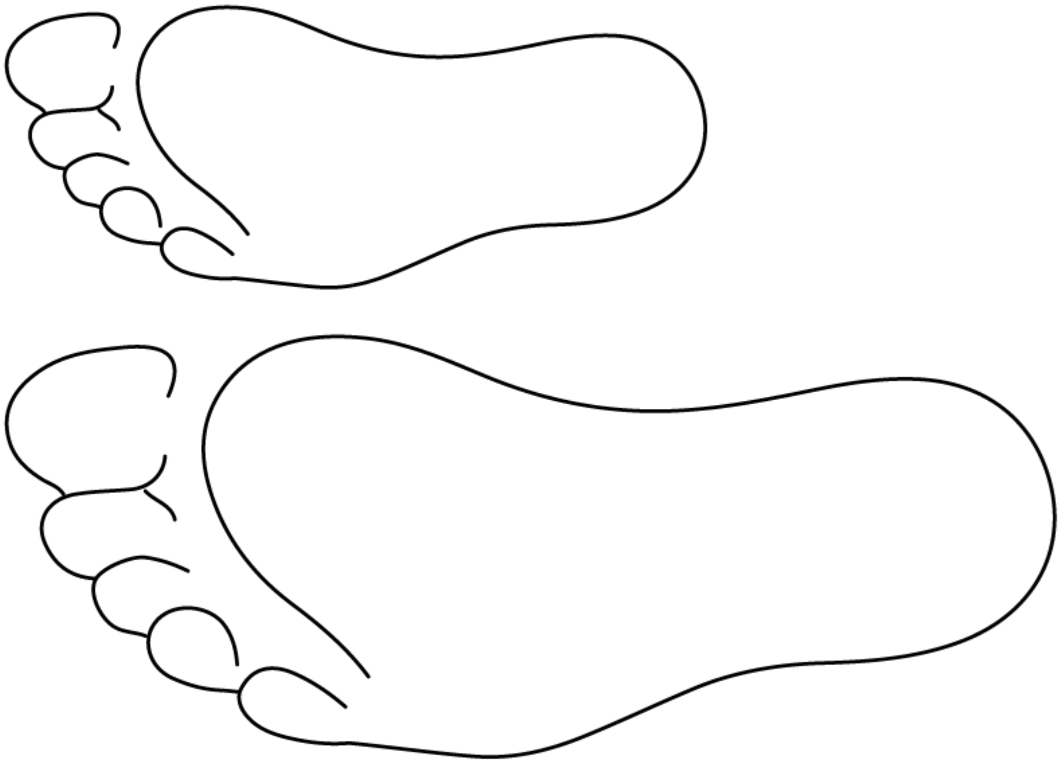
Warm-up

2. Here is a scale drawing of an average seventh-grade student's foot next to a scale drawing of a foot belonging to the person with the largest feet in the world. Estimate the length of the larger foot.



Same Plot, Different Drawings

This is a map of a neighborhood in Philadelphia. You are going to reproduce a map of the triangular piece of land at a different scale.

The actual base of the triangle is 120 m and its actual height is 90 m. What is the area of the plot of land?

1. Your teacher will assign you a scale to use. On centimeter graph paper, make a scale drawing of the plot of land. Make sure to write your scale on your drawing.
2. What is the area of the triangle you drew? Explain or show your reasoning.
3. How many square meters are represented by 1 square centimeter in your drawing?
4. After everyone in your group is finished, order the scale drawings from largest to smallest. What do you notice about the scales when your drawings are placed in this order?

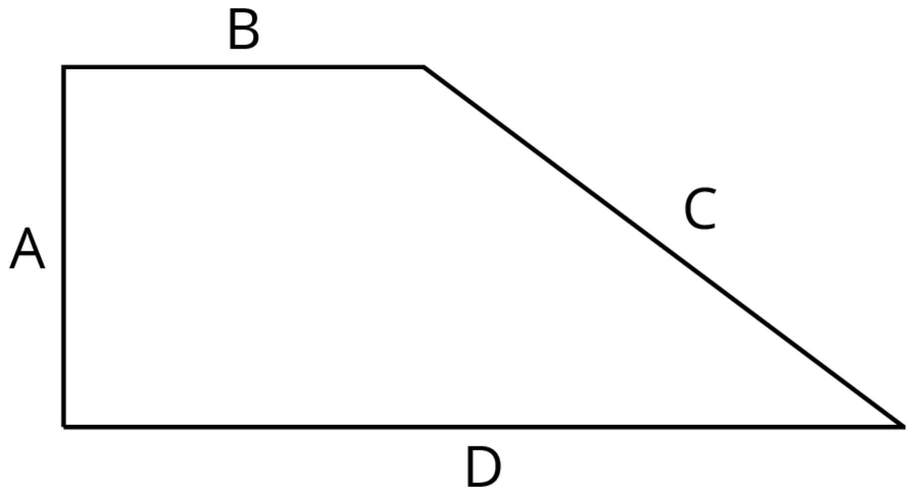
Same Plot, Different Drawings

- How does a change in the scale influence the size of the drawings?
- How do the lengths of the scale drawing where 1 cm represents 5 meters compare to the lengths of the drawing where 1 cm represents 15 meters?
- How do the lengths of the scale drawing where 1 cm represents 5 meters compare to the lengths of the drawing where 1 cm represents 50 meters?
- How does the area of the scale drawing where 1 cm represents 5 meters compare to the area of the drawing where 1 cm represents 15 meters?
- How does the area of the scale drawing where 1 cm represents 5 meters compare to the area of the drawing where 1 cm represents 50 meters?

A New Drawing of the Playground

Here is a scale drawing of a playground.

The scale is 1 centimeter to 30 meters.



1. Make another scale drawing of the same playground at a scale of 1 centimeter to 20 meters.
2. How do the two scale drawings compare?

A New Drawing of the Playground

- On the original map with the scale of 1 cm to 30 m, how much area does one square centimeter represent?
- On the new map with the scale of 1 cm to 20 m, how much area does one square centimeter represent?
- How many times as large as the original map is the new map?

Lesson Synthesis

Suppose you have a map that uses the scale 1 cm to 200 m. You draw a new map of the same place using the scale 1 cm to 20 m.

- How does your new map compare to your original map?
- How much actual area does 1 cm^2 on your new map represent?
- How much actual area did 1 cm^2 on your original map represent?

Learning Targets

- Given a scale drawing, I can create another scale drawing that shows the same thing at a different scale.
- I can use a scale drawing to find actual areas.

Window Frame

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Cool-down

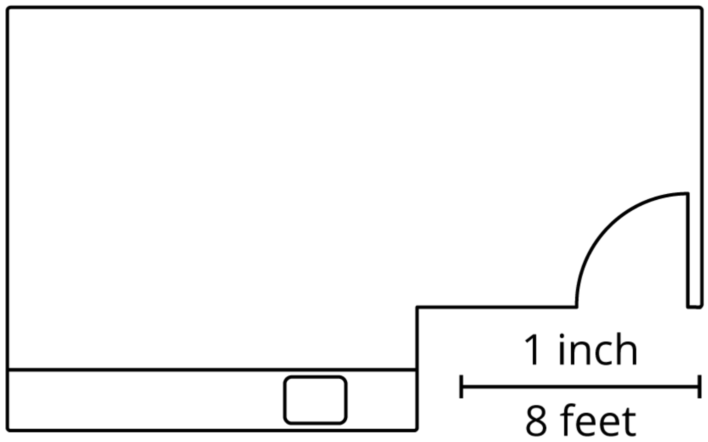
Here is a scale drawing of a window frame that uses a scale of 1 cm to 6 inches.

Create another scale drawing of the window frame that uses a scale of 1 cm to 12 inches.

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.

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