IM 6–8 MATH™ v.III

Unit 1
Scale Drawings

7

Lesson 12

Units in Scale Drawings

Illustrative Mathematics®

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Learning Goal

Let's use different scales to describe the same drawing.

Centimeters in a Mile

Warm-up

There are 2.54 cm in an inch, 12 inches in a foot, and 5,280 feet in a mile. Which expression gives the number of centimeters in a mile? Explain your reasoning.

1. $\dfrac{2.54}{12 \cdot 5,280}$

   $5,280 \cdot 12 \cdot (2.54)$

2. $\dfrac{1}{5,280 \cdot 12 \cdot (2.54)}$

3. $5,280 + 12 + 2.54$

   $\dfrac{5,280 \cdot 12}{2.54}$

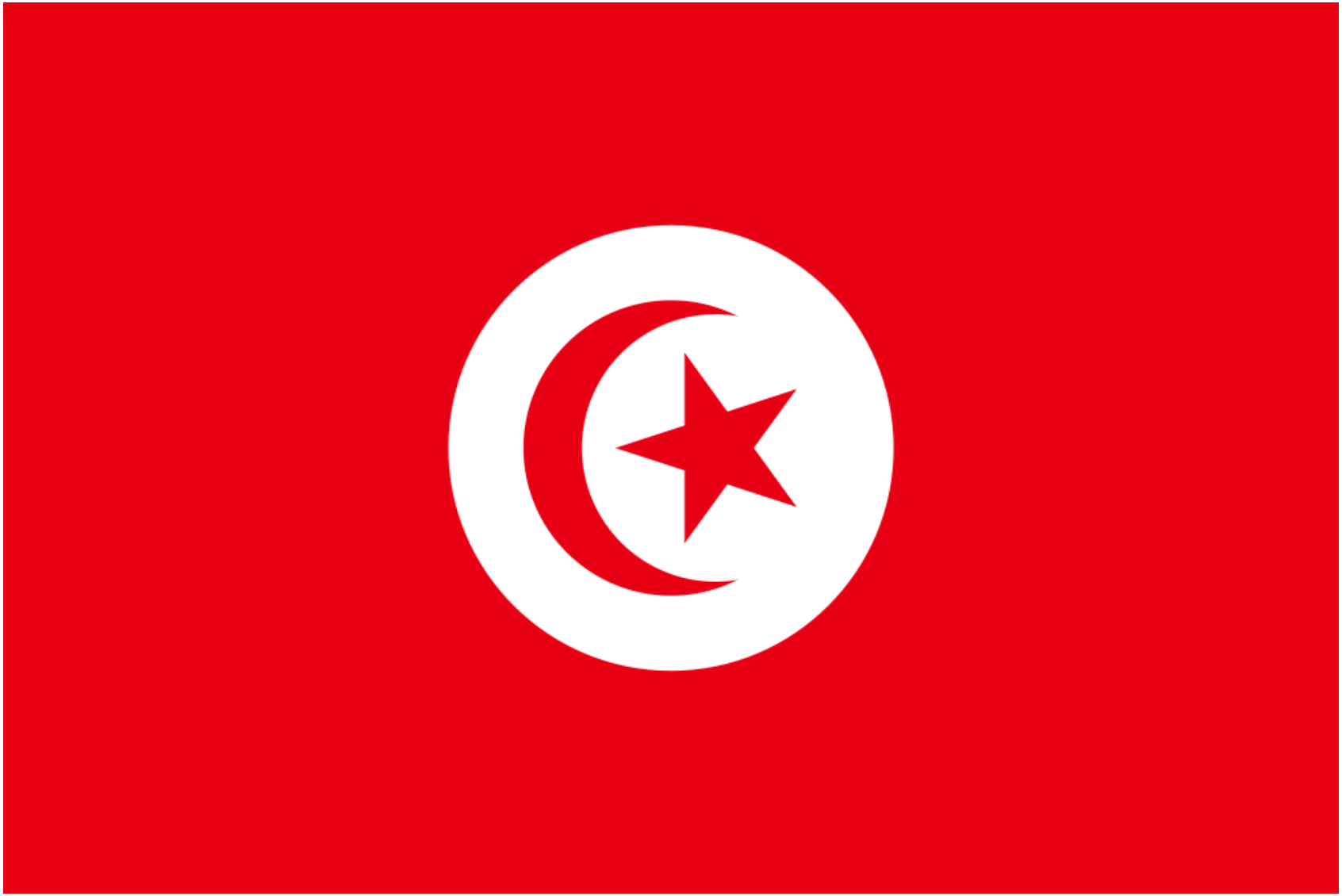
Scales

Your teacher will give you some cards with a scale on each card.

1. Sort the cards into sets of equivalent scales. Be prepared to explain how you know that the scales in each set are equivalent. Each set should have at least two cards.
2. Trade places with another group and check each other's work. If you disagree about how the scales should be sorted, work to reach an agreement.

   Pause here so your teacher can review your work.
3. Next, record one of the sets with three equivalent scales and explain why they are equivalent.

The World's Largest Flag



The World's Largest Flag

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.

   b. 1 cm to _____ cm

   c. 1 cm to _____ m

   d. 1 cm to _____ km

   e. 2 m to _____ m

   f. 5 cm to _____ m

   g. _____ cm to 1,000 m

   h. _____ mm to 20 m

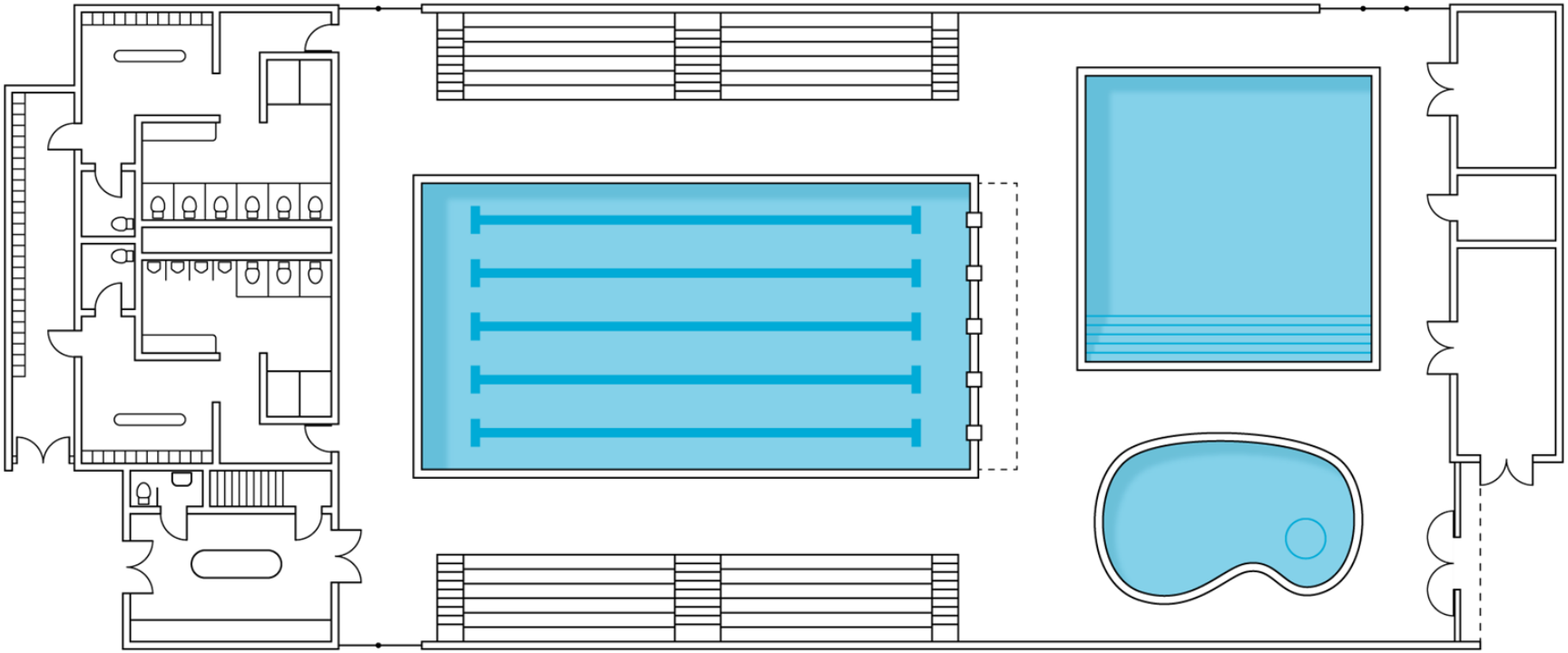
3. a. What is the area of the large flag?

   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?

Pondering Pools

Notice and Wonder



Your teacher will give you a floor plan of a recreation center.

1. What is the scale of the floor plan if the actual side length of the square pool is 15 m? Express your answer both as a scale with units and without units.
2. Find the actual area of the large rectangular pool. Show your reasoning.
3. The kidney-shaped pool has an area of 3.2 cm^2 on the drawing. What is its actual area? Explain or show your reasoning.

Pondering Pools

- Were any of these scales easier to use when finding the actual area? Were any more difficult? Which ones?
- What might be some benefits of using one method over another for finding the actual area?

Units in Scale Drawings

Lesson Synthesis

- How can we express the scale 1 inch to 5 miles without units?

If a map uses the scale 1 inch to 5 miles:

- How can we find the actual area of a region represented on the map?
- How can we find a region's scaled area if we know its actual area?

Learning Targets

- I can tell whether two scales are equivalent.
- I can write scales with units as scales without units.

Drawing the Backyard

Cool-down

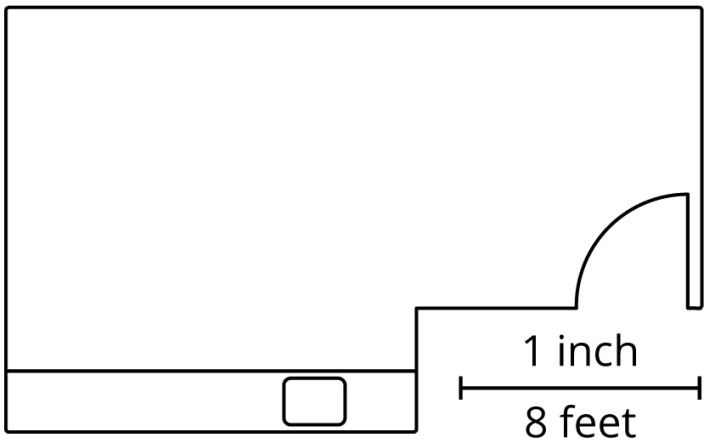
Lin and her brother each created a scale drawing of their backyard, but at different scales. Lin used a scale of 1 inch to 1 foot. Her brother used a scale of 1 inch to 1 yard.

1. Express the scales for the drawings without units.
2. Whose drawing is larger? How many times as large is it? 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.