Today's Materials

- device
- calculator
- pencil
- notebook
- glue
- ruler

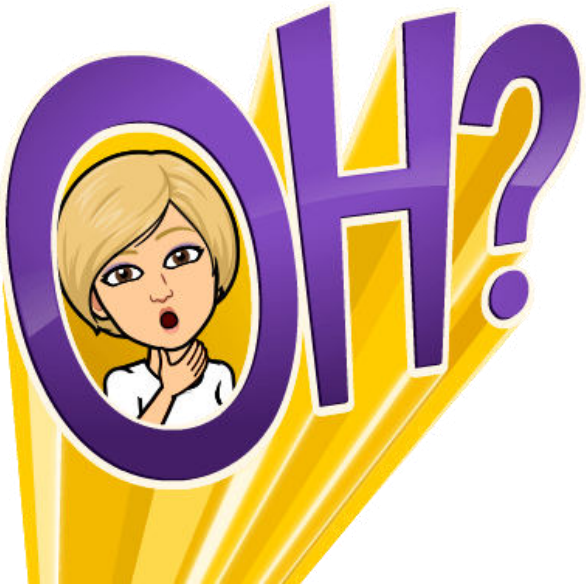
Units in Scale Drawings

Lesson 12

CCSS Standards: Building on	• 6.RP.A.3.d
CCSS Standards: Addressing	• 7.G.A.1

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

Today's Goals



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

Centimeters in a Mile

Warm Up

Measures of Length	
Customary Units	**Metric Units**
1 foot (ft) = 12 inches (in) 1 yard (yd) = 36 inches 1 yard = 3 feet 1 mile (mi) = 5,280 feet 1 mile = 1,760 yards	1 meter (m) = 1,000 millimeters (mm) 1 meter = 100 centimeters (cm) 1 kilometer (km) = 1,000 meters 1 decimeter (dm) = 0.1 meter

Customary to Metric	**Metric to Customary**
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

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.

What does option C represent?

A. $\frac{2.54}{12 \cdot 5{,}280}$

B. $5{,}280 \cdot 12 \cdot (2.54)$

C. $\frac{1}{5{,}280 \cdot 12 \cdot (2.54)}$

D. $5{,}280 + 12 + 2.54$

E. $\frac{5{,}280 \cdot 12}{2.54}$

Scales Card Sort

(optional)

Activity 12.2

- Take Turns Matching or Sorting
- Groups of 4

Each card has a scale printed on it.

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 2 cards.
1. **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.
1. **Next, record one of the sets with 3 equivalent scales in your notebook. Explain why they are equivalent.**

Scales Card Sort

1 centimeter to 1 meter

Scales Card Sort

1 to 100

Scales Card Sort

1 inch to 1 mile

Scales Card Sort

1 to 63,360

Scales Card Sort

1 centimeter to 10 meters

Scales Card Sort

1 inch to 1,000 inches

Scales Card Sort

1 millimeter to 1 meter

Scales Card Sort

1 foot to 1 mile

Scales Card Sort

1 to 5,280

Scales Card Sort

1 centimeter to 1 kilometer

Scales Card Sort

$\frac{1}{2}$ centimeter to 500 meters

Scales Card Sort

1 to 100,000

Scales Card Sort

1 inch to 8 feet

Scales Card Sort

$\frac{1}{8}$ inch to 1 foot

Scales Card Sort

1 to 96

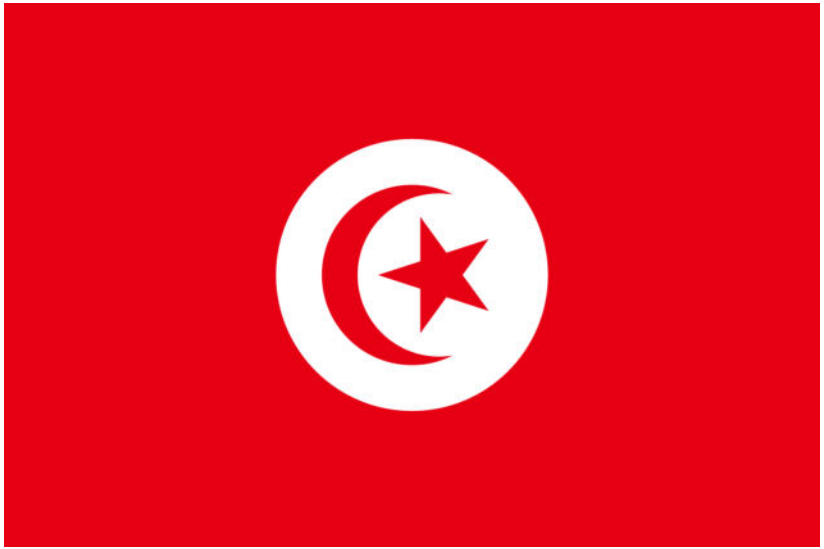
The World's Largest Flag

Think Pair Share

Tunisia holds the world record for the largest version of a country's flag.

It is almost 4 soccer fields in length!

What do you think the scale would be to create the scale drawing of the flag on a piece of paper?



Length of the **flag** → 396 meters

Size of **paper** → 8 ½ in by 11 in, or 21.5 cm by 28 cm

Begin working for 4-5 min of **Quiet Work Time**.

Collaborate with your group! (5 min.)

How did you complete this table?

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

Complete each scale with the value that makes it equivalent to the scale of 1 to 2,000. Explain or show your reasoning.

1 cm to 2,000 cm

5 cm to 100 m

1 cm to 20 m

50 cm to 1,000 m

1 cm to 0.02 km

10 mm to 20 m

2 m to 4,000 m

All these scales are equivalent because in each scale, a factor of 2,000 relates scaled distances to actual distances!

A scale does not have to be expressed in terms of 1 scaled unit…

…but 1 is often chosen because it makes the scale factor easier to see and our calculations are more efficient!

What is the area of the large flag?

$396 \cdot 264 = \mathbf{104{,}544\ m^2}$

What is the area of the smaller flag?

$19.8 \cdot 13.2 = \mathbf{261.36\ cm^2}$

The area of the large flag is how many times the area of the smaller flag?

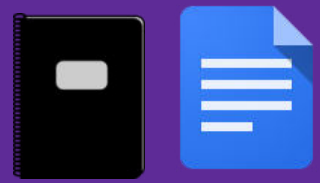
the scale factor for the height is 2,000
the scale factor for the width is 2,000
so the area of the actual flag is 2,000 • 2,000
or **4,000,000** times the area of the scale drawing

Pondering Pools

(optional)

Activity 12.4

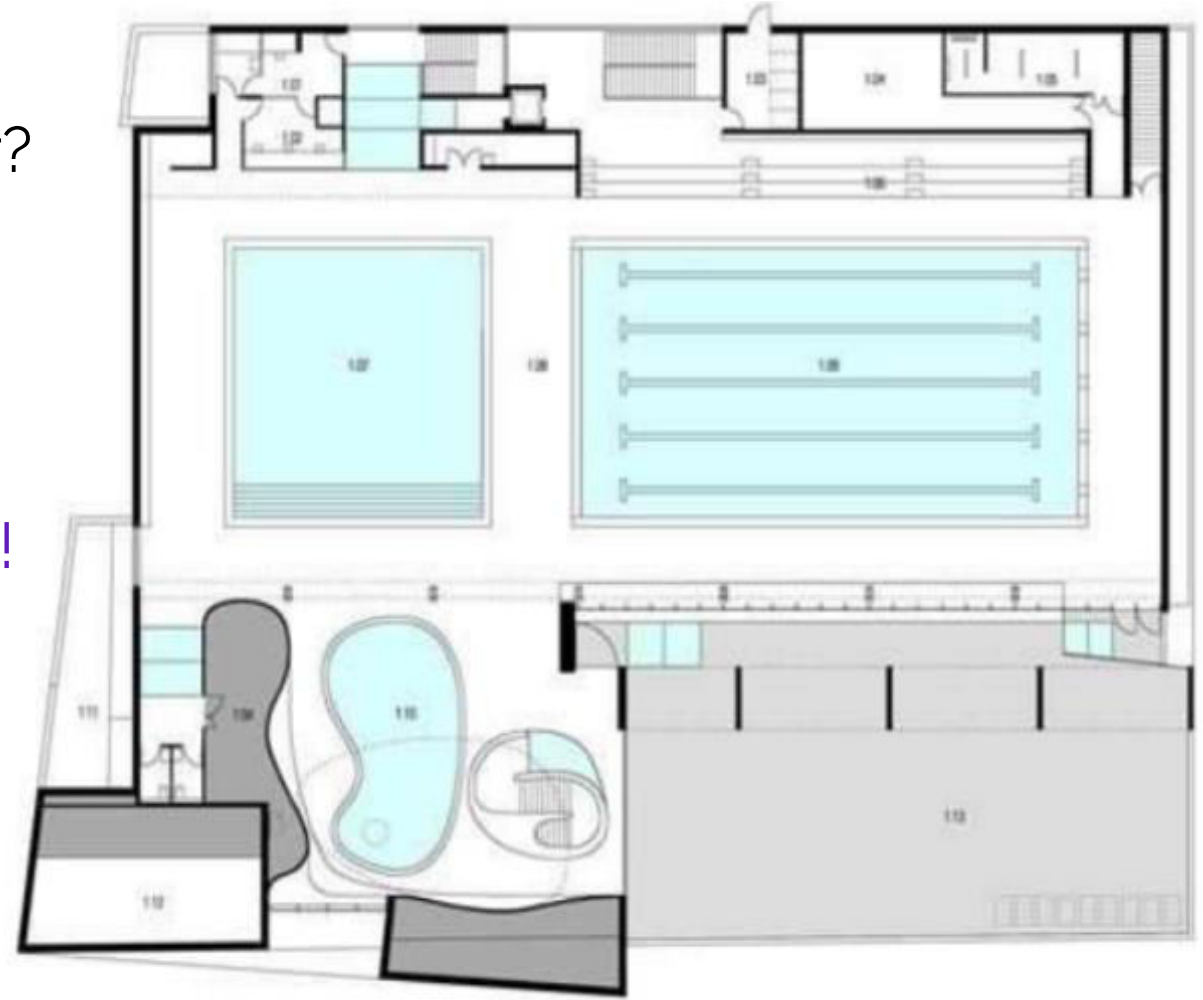
- Notice and Wonder



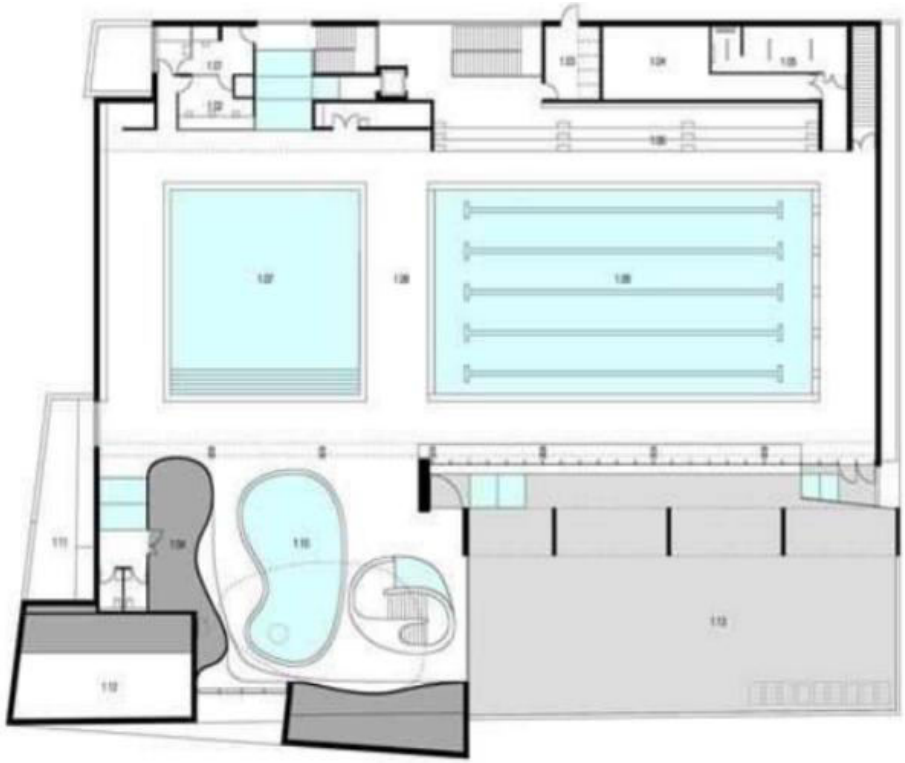
What do you notice?
What do you wonder?

Begin working on your own. (4-5 min.)

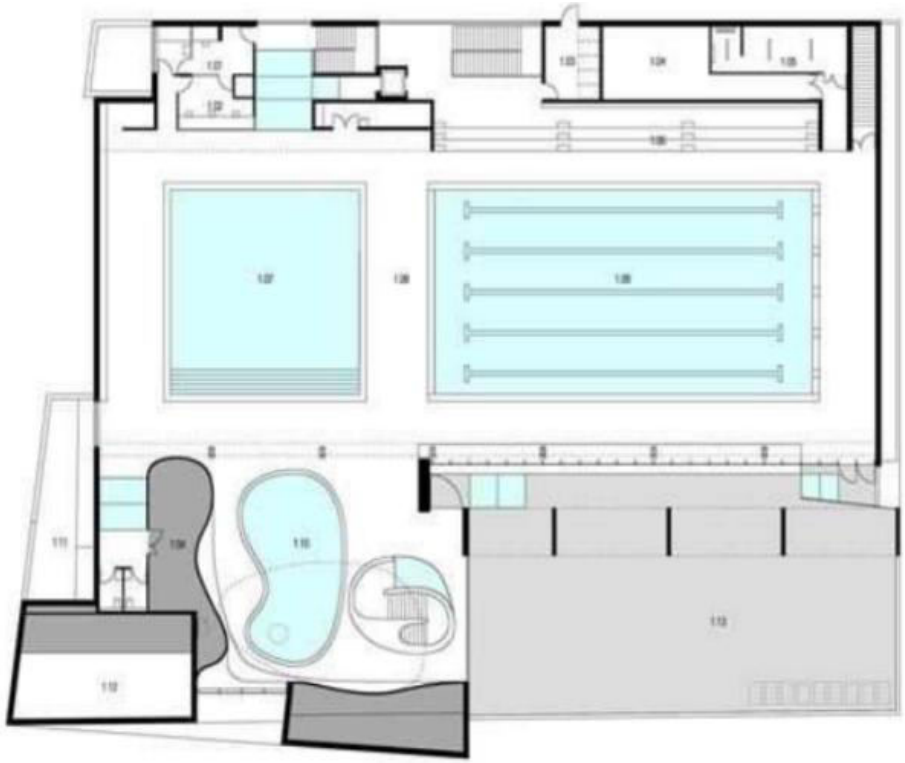
Then, we'll discuss your ideas as a class!



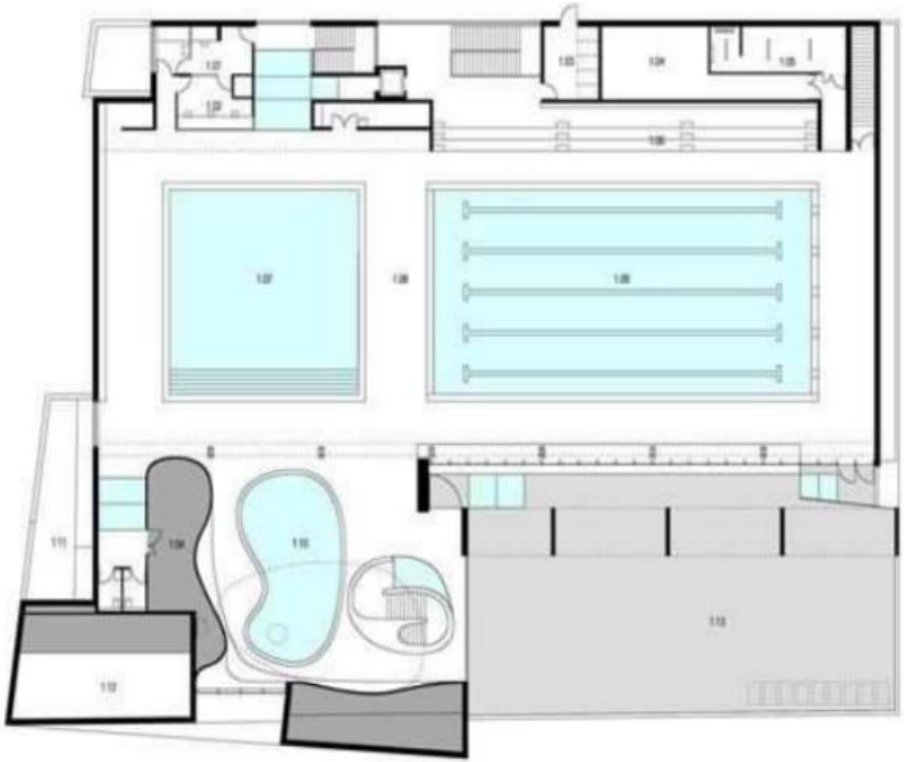
What is the scale of the floor plan if the actual side length of the square pool is 14 m?



What is the actual area of the large rectangular pool?



- 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?



“Are you ready for more?”

1. Square A is a scaled copy of Square B with scale factor 2. If the area of Square A is 10 units^2, what is the area of Square B?
2. Cube A is a scaled copy of Cube B with a scale factor 2. If the volume of Cube A is 10 units^3, what is the volume of Cube B?
3. The 4-dimensional Hypercube A is a scaled copy of Hypercube B with scale factor 2. If the “volume” of Hypercube A is 10 units^4, what do you think the “volume” of Hypercube B is?

Scales can be expressed in many different ways, including using different units or not using any units:

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

There are 12 inches in a foot and 5,280 feet in a mile… **This is the same as 1 inch to 63,360 inches.**

A scale tells us how a distance on a scale drawing corresponds to an actual distance...

and it can also tell us how an area on a drawing corresponds to an actual area.

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?

Find the area on the map in square inches and multiply by 25, because 1 square inch represents 25 square miles.

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

How can we find a region's scaled area if we know its actual area?

Multiply the area of the actual region by 1/25.

Today's Goals

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

Drawing the Backyard

Cool Down