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Unit 3, Lesson 6: Estimating Areas

Let's estimate the areas of weird shapes.

6.1: Mental Calculations

Find a strategy to make each calculation mentally:

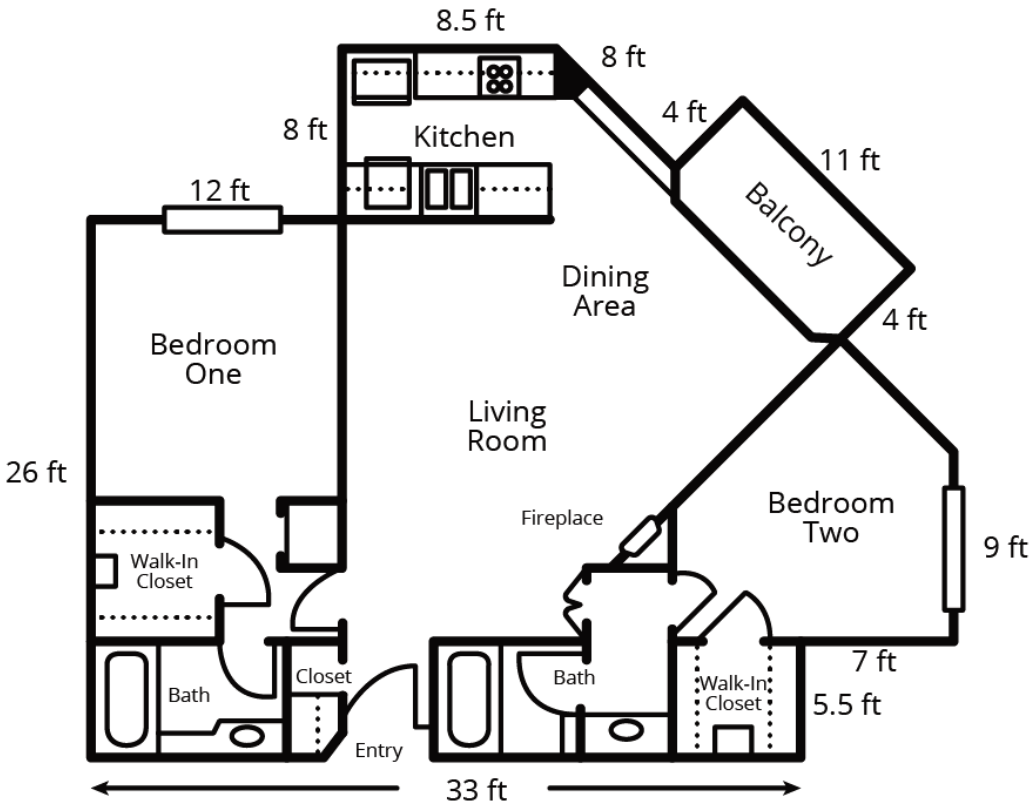
1. $599 + 87$

2. $254 - 88$

3. $99 \cdot 75$

6.2: House Floorplan

Here is a floor plan of a house. Approximate lengths of the walls are given.



What is the approximate area of the home, including the balcony? Explain or show your reasoning.

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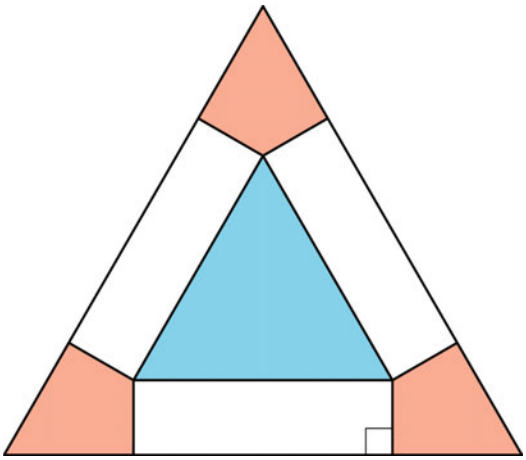
6.3: Area of Nevada

Estimate the area of Nevada in square miles. Explain or show your reasoning.

Are you ready for more?

The two triangles are equilateral, and the three pink regions are identical. The blue equilateral triangle has the same area as the three pink regions taken together. What is the ratio of the sides of the two equilateral triangles?



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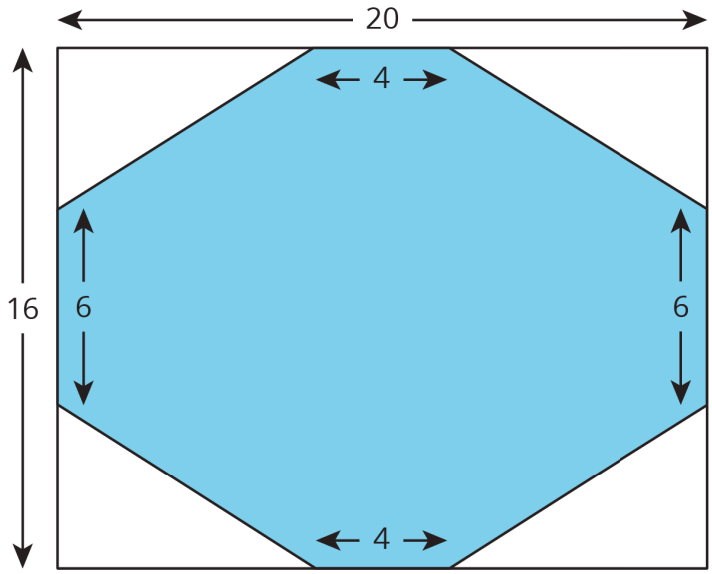
Lesson 6 Summary

We can find the area of some complex polygons by surrounding them with a simple polygon like a rectangle. For example, this octagon is contained in a rectangle.

The rectangle is 20 units long and 16 units wide, so its area is 320 square units. To get the area of the octagon, we need to subtract the areas of the four right triangles in the corners. These triangles are each 8 units long and 5 units wide, so they each have an area of 20 square units. The area of the octagon is

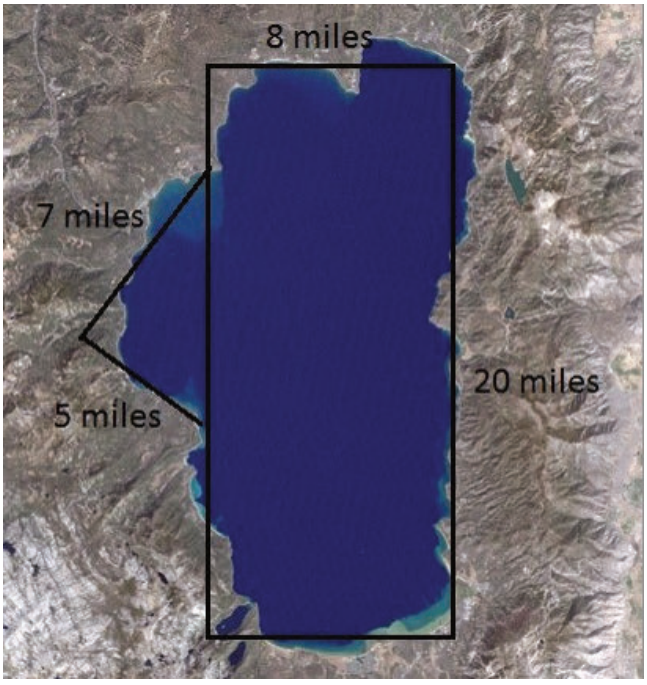
$$320 - (4 \cdot 20)$$

or 240 square units.



We can estimate the area of irregular shapes by approximating them with a polygon and finding the area of the polygon. For example, here is a satellite picture of Lake Tahoe with some one-dimensional measurements around the lake.

The area of the rectangle is 160 square miles, and the area of the triangle is 17.5 square miles for a total of 177.5 square miles. We recognize that this is an approximation, and not likely the exact area of the lake.



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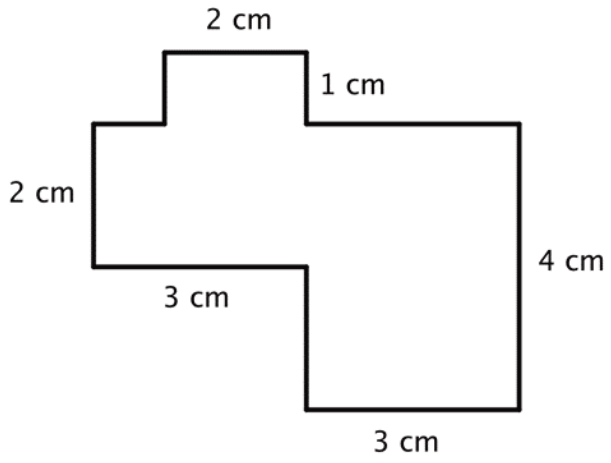
Unit 3, Lesson 6: Estimating Areas

1. Find the area of the polygon.



2. a. Draw polygons on the map that could be used to approximate the area of Virginia.

b. Which measurements would you need to know in order to calculate an approximation of the area of Virginia? Label the sides of the polygons whose measurements you would need. (Note: You aren't being asked to calculate anything.)

3. Jada's bike wheels have a diameter of 20 inches. How far does she travel if the wheels rotate 37 times?

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(from Unit 3, Lesson 5)

4. The radius of the earth is approximately 6400 km. The equator is the circle around the earth dividing it into the northern and southern hemisphere. (The center of the earth is also the center of the equator.) What is the length of the equator?

(from Unit 3, Lesson 4)

5. Here are several recipes for sparkling lemonade. For each recipe describe how many tablespoons of lemonade mix it takes per cup of sparkling water.

   Recipe 1: 4 tablespoons lemonade mix and 12 cups of sparkling water

   Recipe 2: 4 tablespoons of lemonade mix and 6 cups of sparkling water

   Recipe 3: 3 tablespoons of lemonade mix and 5 cups of sparkling water

   Recipe 4: $\frac{1}{2}$ tablespoon os lemonade mix and $\frac{3}{4}$ cups of sparkling water

   (from Unit 2, Lesson 1)