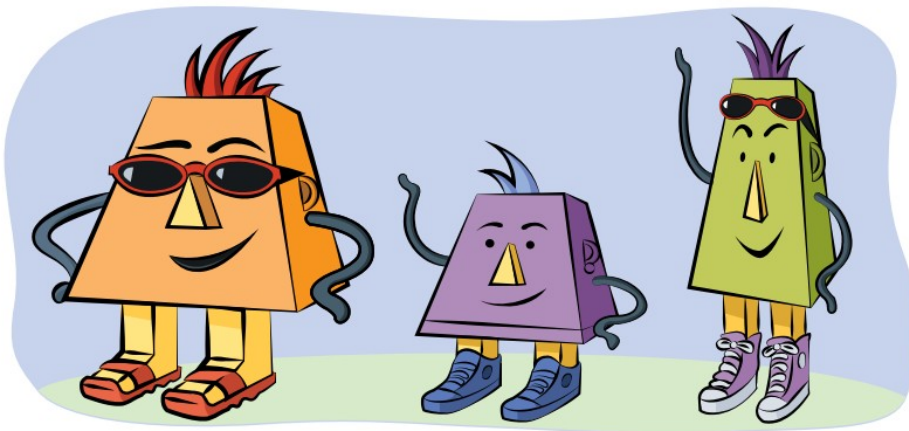


## 2.3 Mouthing Off and Nosing Around

### Scale Factors



How did you decide which of the computer game characters were members of the Wump family? How did you decide which were impostors?



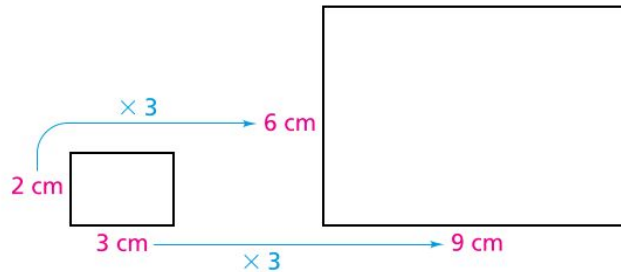
- In general, how can you decide whether or not two shapes are similar?

You have experimented with rubber-band stretchers, copiers, and coordinate plots. Your experiments suggest that for two figures to be **similar**, there must be the following correspondence between the figures.

- The side lengths of one figure are multiplied by the same number to get the corresponding side lengths in the second figure.
- Corresponding angles are the same size.

The **scale factor** is the number that the side lengths of one figure can be multiplied by to give the corresponding side lengths of the other figure.

The rectangles below are similar. The scale factor from the smaller rectangle to the larger rectangle is 3.



- What is the scale factor from the larger rectangle to the smaller rectangle? Explain how you found it.

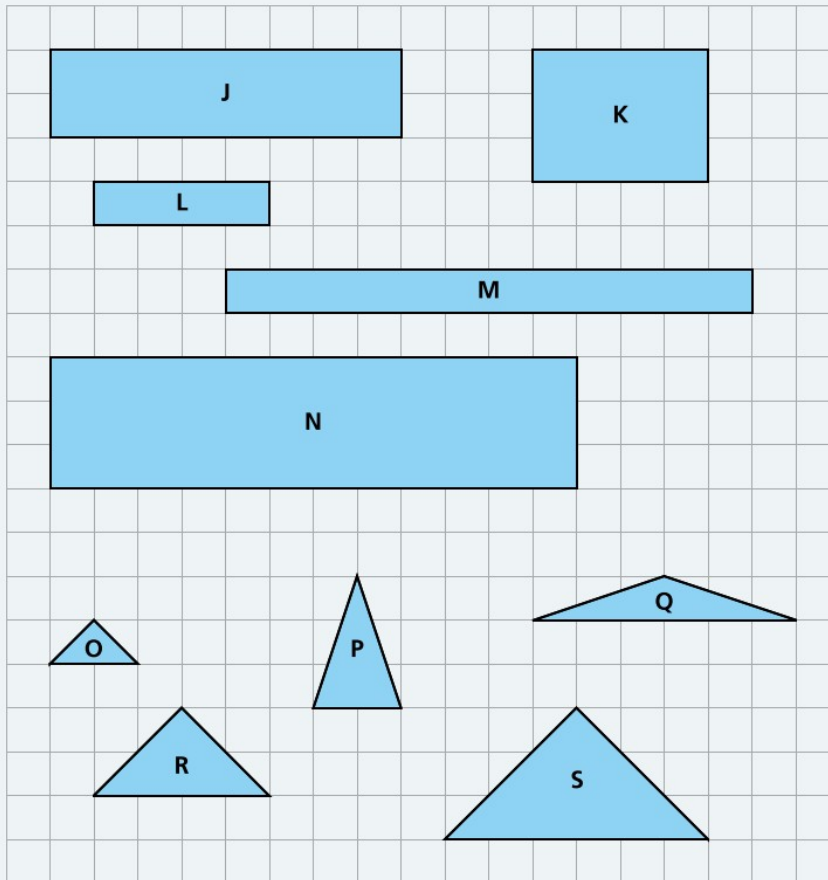


Chicago Model City is a 1 : 600 scale model of the city. The buildings were made using a 3D printer. Each building is made of many thin layers of resin, hardened by a laser and then painted.




### Problem 2.3

The diagram shows a collection of mouths (rectangles) and noses (triangles). Some are from the Wump family. Others are from impostors.



**Problem 2.3** *continued*

Use the rectangles on the previous page.

- 
- A**
1. Which pairs of rectangles are similar? Explain how you know.
  2. For each pair of similar rectangles, find the scale factor and the perimeter and area of each rectangle.
  3. Describe the relationship between the perimeters of two similar rectangles and the scale factor.
  4. Describe the relationship between the areas of two similar rectangles and the scale factor.
- B**
1. Which pairs of triangles are similar? Explain how you know.
  2. For each pair of similar triangles, find the scale factor. Then find the area of each triangle.
  3. Does the same relationship between the scale factor of similar rectangles and their area apply for similar triangles? Explain.
  4. Draw three right triangles such that exactly two of the right triangles are similar. Explain how each triangle is similar or not similar to the other two.
- C**
1. After studying the mouths in the diagram, Marta and Zack agree that Rectangles J and L are similar. Marta says the scale factor is 2. Zack says it is 0.5. Is either of them correct? How would you describe the scale factor so there is no confusion?
  2. Explain how to find the scale factor from a figure to a similar figure.
  3. Does the scale factor change the angle sizes? Explain.
  4. You have used rubber bands and coordinate graphs to make similar figures. How does the scale factor show up in each of these methods?

**A C E** Homework starts on page 36.