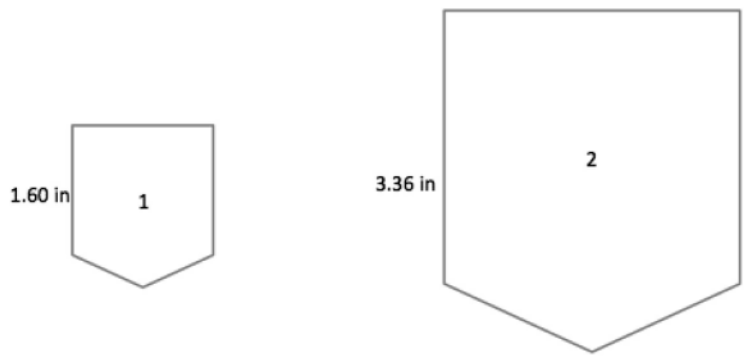
Name _____ Date _____

Changing Scales

1. Compute the scale factor, as a percent, for each given relationship. When necessary, round your answer to the nearest tenth of a percent.

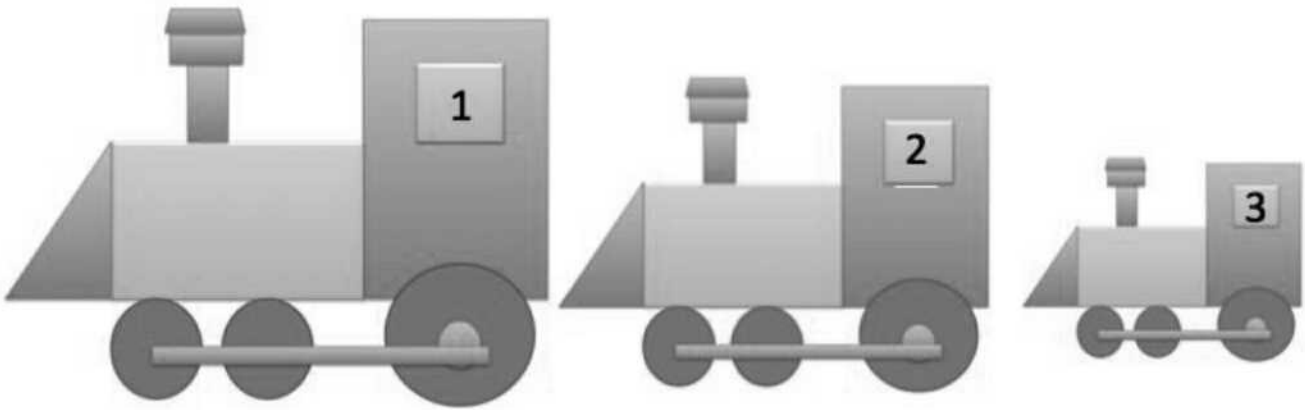


a. Drawing 1 to Drawing 2

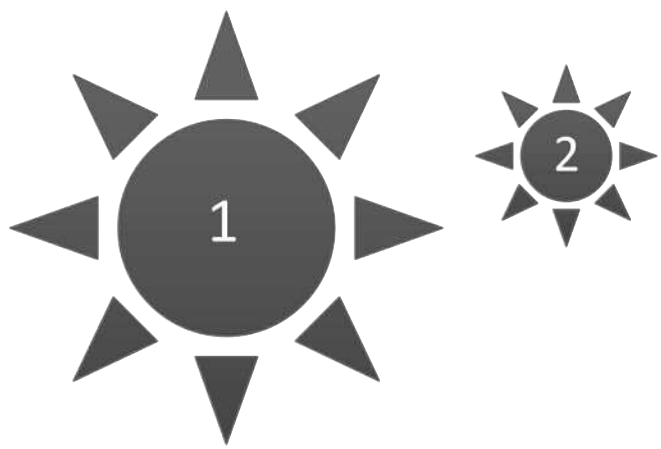
b. Drawing 2 to Drawing 1

c. Write two different equations that illustrate how each scale factor relates to the lengths in the diagram.

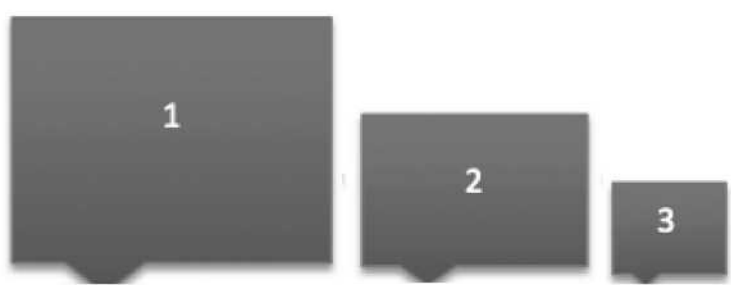
2. Drawings 2 and 3 are scale drawings of Drawing 1. The scale factor from Drawing 1 to Drawing 2 is 75%, and the scale factor from Drawing 2 to Drawing 3 is 50%. Find the scale factor from Drawing 1 to Drawing 3.



1. The scale factor from Drawing 1 to Drawing 2 is $41\frac{2}{3}\%$. Justify why Drawing 1 is a scale drawing of Drawing 2 and why it is an enlargement of Drawing 2. Include the scale factor in your justification.



2. The scale factor from Drawing 1 to Drawing 2 is 40%, and the scale factor from Drawing 2 to Drawing 3 is 37.5%. What is the scale factor from Drawing 1 to Drawing 3? Explain your reasoning, and check your answer using an example.



3. Traci took a photograph and printed it to be a size of 4 units by 4 units as indicated in the diagram. She wanted to enlarge the original photograph to a size of 5 units by 5 units and 10 units by 10 units.

   a. Sketch the different sizes of photographs.

   b. What was the scale factor from the original photo to the photo that is 5 units by 5 units?

   c. What was the scale factor from the original photo to the photo that is 10 units by 10 units?

   d. What was the scale factor from the 5×5 photo to the 10×10 photo?

   e. Write an equation to verify how the scale factor from the original photo to the enlarged 10×10 photo can be calculated using the scale factors from the original to the 5×5, and then from the 5×5 to the 10×10.

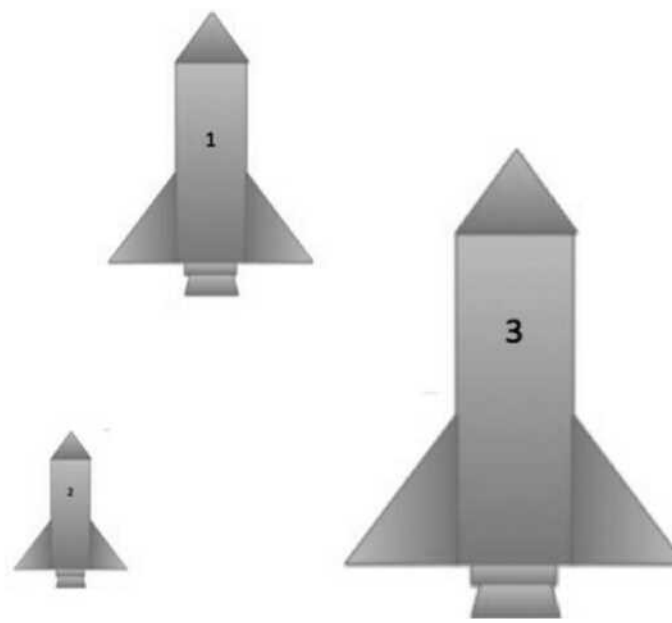
4. The scale factor from Drawing 1 to Drawing 2 is 30%, and the scale factor from Drawing 1 to Drawing 3 is 175%. What are the scale factors of each given relationship? Then, answer the question that follows.

   a. Drawing 2 to Drawing 3

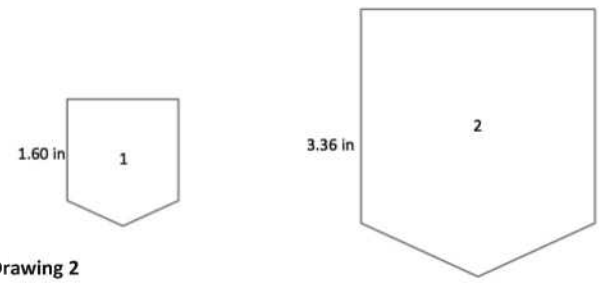
   b. Drawing 3 to Drawing 1

   c. Drawing 3 to Drawing 2

   d. How can you check your answers?



1. **Compute the scale factor, as a percent, of each given relationship. When necessary, round your answer to the nearest tenth of a percent.**



a. **Drawing 1 to Drawing 2**

$$\text{Drawing 2} = \text{Percent} \times \text{Drawing 1}$$
$$3.36 = \text{Percent} \times 1.60$$
$$\frac{3.36}{1.60} = 2.10 = 210\%$$

b. **Drawing 2 to Drawing 1**

$$\text{Drawing 1} = \text{Percent} \times \text{Drawing 2}$$
$$1.60 = \text{Percent} \times 3.36$$
$$\frac{1.60}{3.36} = \frac{1}{2.10} \approx 0.476190476 \approx 47.6\%$$

c. **Write two different equations that illustrate how each scale factor relates to the lengths in the diagram.**

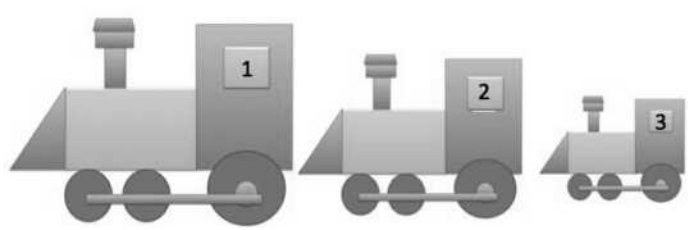
Drawing 1 to Drawing 2:

$$1.60(2.10) = 3.36$$

Drawing 2 to Drawing 1:

$$3.36(0.476) = 1.60$$

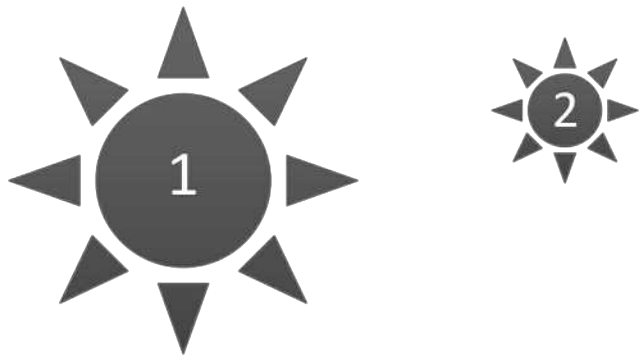
2. **Drawings 2 and 3 are scale drawings of Drawing 1. The scale factor from Drawing 1 to Drawing 2 is 75%, and the scale factor from Drawing 2 to Drawing 3 is 50%. Find the scale factor from Drawing 1 to Drawing 3.**



Drawing 1 to 2 is 75%. Drawing 2 to 3 is 50%. Therefore, Drawing 3 is 50% of 75%, so $(0.50)(0.75) = 0.375$. To determine the scale factor from Drawing 1 to Drawing 3, we went from 100% to 37.5%. Therefore, the scale factor is 37.5%. Using the relationship:

$$\text{Drawing 3} = \text{Percent} \times \text{Drawing 1}$$
$$37.5\% = \text{Percent} \times 100\%$$
$$0.375 = \text{Percent}$$
$$= 37.5\%$$

1. The scale factor from Drawing 1 to Drawing 2 is $41\frac{2}{3}\%$. Justify why Drawing 1 is a scale drawing of Drawing 2 and why it is an enlargement of Drawing 2. Include the scale factor in your justification.



$$\text{Quantity} = \text{Percent} \times \text{Whole}$$

$$\text{Length in Drawing 1} = \text{Percent} \times \text{Length in Drawing 2}$$

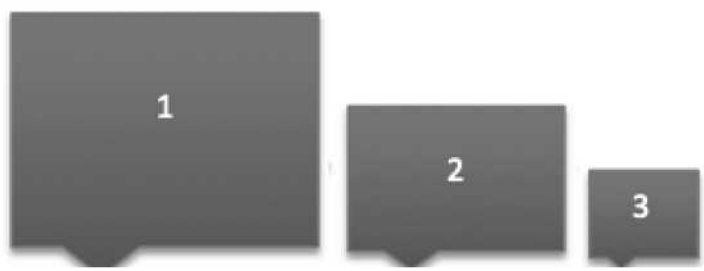
$$100\% = \text{Percent} \times 41\frac{2}{3}\%$$

$$\frac{100\%}{41\frac{2}{3}\%} = \frac{100 \cdot 3}{41\frac{2}{3} \cdot 3} = \frac{300}{125} = \frac{12}{5} = 2.40 = 240\%$$

Drawing 1 is a scale drawing of Drawing 2 because the lengths of Drawing 1 would be larger than the corresponding lengths of Drawing 2.

Since the scale factor is greater than 100%, the scale drawing is an enlargement of the original drawing.

2. The scale factor from Drawing 1 to Drawing 2 is 40%, and the scale factor from Drawing 2 to Drawing 3 is 37.5%. What is the scale factor from Drawing 1 to Drawing 3? Explain your reasoning, and check your answer using an example.



To find the scale factor from Drawing 1 to 3, I needed to find 37.5% of 40%, so $(0.375)(0.40) = 0.15$. The scale factor from Drawing 1 to Drawing 3 would be 15%.

Check: Assume the length of Drawing 1 is 10. Then, using the scale factor for Drawing 2, Drawing 2 would be 4. Then, applying the scale factor to Drawing 3, Drawing 3 would be $4(0.375) = 1.5$. To go directly from Drawing 1 to Drawing 3, which was found to have a scale factor of 15%, then $10(0.15) = 1.5$.

3. Traci took a photograph and printed it to be a size of 4 units by 4 units as indicated in the diagram. She wanted to enlarge the original photograph to a size of 5 units by 5 units and 10 units by 10 units.

   a. Sketch the different sizes of photographs.

   b. What was the scale factor from the original photo to the photo that is 5 units by 5 units?

   The scale factor from the original to the 5 by 5 enlargement is $\frac{5}{4} = 1.25 = 125\%$.

   c. What was the scale factor from the original photo to the photo that is 10 units by 10 units?

   The scale factor from the original to the 10 by 10 photo is $\frac{10}{4} = 2.5 = 250\%$.

   d. What was the scale factor from the 5×5 photo to the 10×10 photo?

   The scale factor from the 5×5 photo to the 10×10 photo is $\frac{10}{5} = 2 = 200\%$.

   e. Write an equation to verify how the scale factor from the original photo to the enlarged 10×10 photo can be calculated using the scale factors from the original to the 5×5 and then from the 5×5 to the 10×10.

   Scale factor original to 5×5: (125%)

   Scale factor 5×5 to 10×10: (200%)

   $4(1.25) = 5$

   $5(2.00) = 10$

   Original to 10×10, scale factor $= 250\%$

   $4(2.50) = 10$

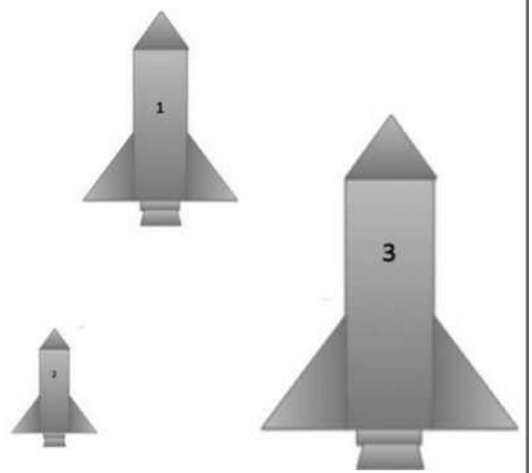
   The true equation $4(1.25)(2.00) = 4(2.50)$ verifies that a single scale factor of 250% is equivalent to a scale factor of 125% followed by a scale factor of 200%.

4. **The scale factor from Drawing 1 to Drawing 2 is 30%, and the scale factor from Drawing 1 to Drawing 3 is 175%. What are the scale factors of each given relationship? Then, answer the question that follows.**

a. **Drawing 2 to Drawing 3**

The scale factor from Drawing 2 to Drawing 3 is

$$\frac{175\%}{30\%} = \frac{1.75}{0.30} = \frac{175}{30} = \frac{35}{6} = 5\frac{5}{6} = 583\frac{1}{3}\%.$$



b. **Drawing 3 to Drawing 1**

The scale factor from Drawing 3 to Drawing 1 is

$$\frac{1}{1.75} = \frac{100}{175} = \frac{4}{7} \approx 57.14\%.$$

c. **Drawing 3 to Drawing 2**

The scale factor from Drawing 3 to Drawing 2 is

$$\frac{0.3}{1.75} = \frac{30}{175} = \frac{6}{35} \approx 17.14\%.$$

d. **How can you check your answers?**

To check my answers I can work backwards and multiply the scale factor from Drawing 1 to Drawing 3 of 175% to the scale factor from Drawing 3 to Drawing 2, and I should get the scale factor from Drawing 1 to Drawing 2.

$$(1.75)(0.1714) \approx 0.29995 \approx 0.30 = 30\%$$