

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Similarity: Dilations

**Similar** objects are objects that have the same shape, but are not necessarily the same size. **Dilations** are an example of two objects that are the same shape, but different sizes. Dilations vary in size by a set **scale factor**. Dilations usually affect the size of an object along one line.

**Example:** Object ABCD is dilated by a scale factor of 2. Use the coordinate plane to predict the coordinates of the new object.

Step 1: Identify the coordinates of ABCD

A (0,0); B (2, 4); C (6, 4); D (4, 0)

Step 2: Multiply each coordinate (x, y) by 2.

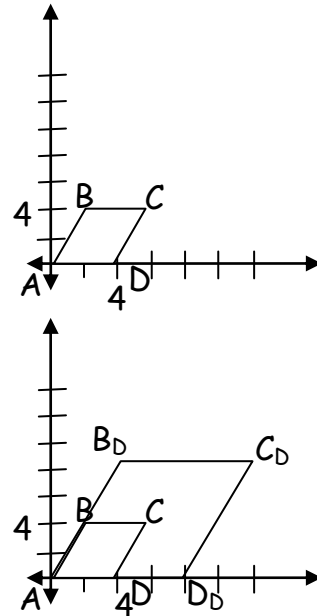
A (0,0) (2)  $\rightarrow$  A<sub>d</sub> = (0,0)

B (2,4) (2)  $\rightarrow$  B<sub>d</sub> = (4,8)

C (6,4) (2)  $\rightarrow$  C<sub>d</sub> = (12,8)

D (4,0) (2)  $\rightarrow$  D<sub>d</sub> = (8,0)

Step 3: Plot the new coordinates on the graph.



Notice that the object retains its shape, but is made larger by applying the scale factor.

We can deduce a few things from the figure above.

ABCD

Base: 4

Height: 4

Area (Bh) = 16

ABCD<sub>d</sub>

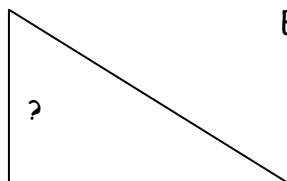
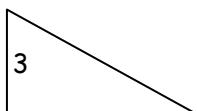
Base: 8

Height: 8

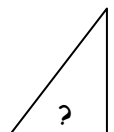
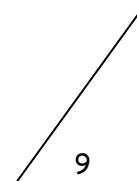
Area (Bh) = 64

Notice that not only have the coordinates (x,y) doubled in size, but so have the side length and height of the object. The area has actually increased four times (twice for vertical and twice for the horizontal). Using this information, predict the side length and area of the following dilations:

Ex A: S.F. 2



Ex B: S.F. 1/2



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**Example Question Answer:**

**Example A:**

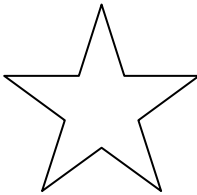
When we multiply by the scale factor, 2, we discover the new side length is 6.

**Example B:**

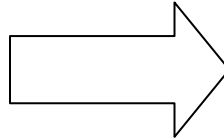
When we multiply by the scale factor,  $\frac{1}{2}$ , we discover the new side length is 4.5.

**Practice.** Apply the scale factor to determine the unknown measurement.

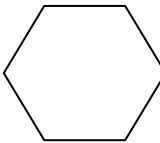
1.  $s_1 = 30$   
 $SF = 1/3$



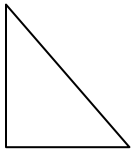
2.  $s_1 = 1$   
 $SF = 4$



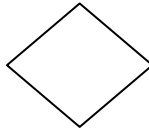
3.  $s_1 = 225$   
 $SF = 1/5$



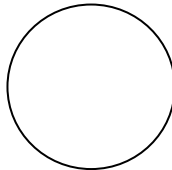
4.  $s_1 = 36$   
 $SF = \frac{1}{2}$



5.  $s_1 = 10$   
 $SF = \frac{5}{2}$

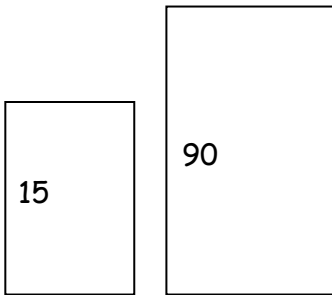


6.  $r_1 = 69$   
 $SF = 1/23$

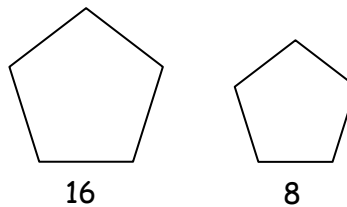


Use the measurements below to determine the scale factor (from left to right). Use formula  $s_1x = s_2$  where  $x =$  the scale factor,  $s_1 =$  the original side and  $s_2 =$  the dilation

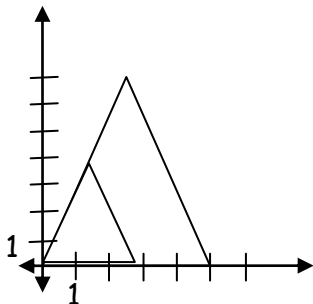
7.



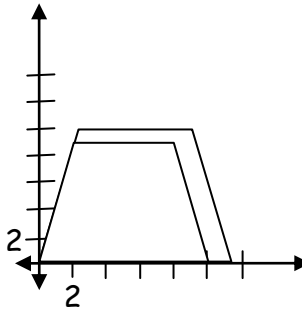
8.



9.



10.



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## Answer Key

### Similarity: Dilations

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1.  $s_2 = 10$

2.  $s_2 = 4$

3.  $s_2 = 25$

4.  $s_2 = 18$

5.  $s_2 = 25$

6.  $r_2 = 3$

7.  $SF = 4$

8.  $SF = \frac{1}{2}$

9.  $SF = \frac{5}{3}$

10.  $SF = \frac{6}{5}$