



# Dilations

## Dilations



A transformation in which a polygon is enlarged or reduced by a given factor around a given center point.

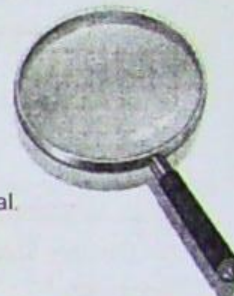
Dilation is where the polygon grows or shrinks but keeps the same overall shape. It's a little like zooming in or out on a camera.

The transformed figure is called the dilated image of the original

### Scale factor

The amount by which the image grows or shrinks is called the "Scale Factor"

- If the scale factor is say 2, the image is enlarged to twice the size of the original.
- If it is 0.5, the image is reduced to half the size.
- When the scale factor is 1, the image is the exact same size as the original



Remember: In dilation, **multiply** the dimensions of the original by the scale factor to get the dimensions of the image.

### Original and image are similar

In dilation, the image and the original are similar, in that they are the same shape but not necessarily the same size. They are **not congruent** because that requires them to be the same shape **and** the same size, which they are not (unless the scale factor happens to be 1.0).

### NOTES for Dilations

1. Dilate figure WXY by a scale factor of 2.

Plot and label the original and the dilated figure.

W (-1, 2) → W' (-2, 4)

X (-2, -3) → X' (-4, -6)

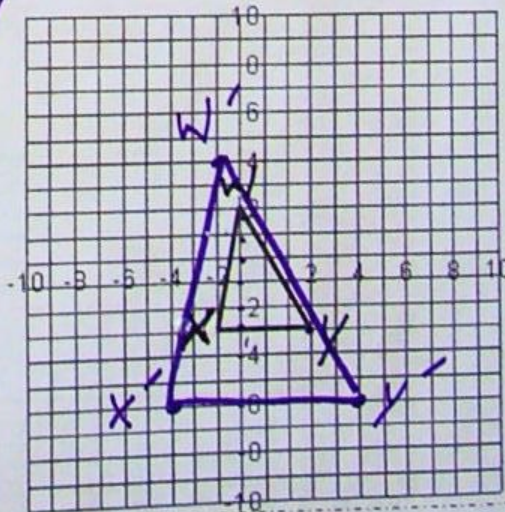
Y (2, -3) → Y' (4, -6)

Find the area of the original figure:  $10u^2$

Find the area of the dilated figure:  $40u^2$

$A = \frac{1}{2}bh$   
 $A = \frac{1}{2} \cdot 4 \cdot 5$   
 $A = 10$

$A = \frac{1}{2} \cdot 8 \cdot 10$   
 $A = 40$



Write a general rule for the dilation:

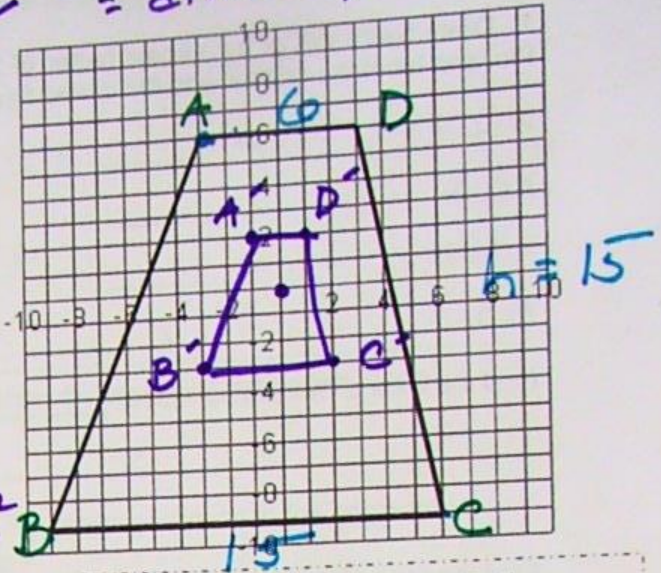
$(x, y) \rightarrow (2x, 2y)$

multiply by  $\frac{1}{3}$   
= divide by 3

NOTES for Dilations

2. Dilate figure ABCD by a scale factor of  $\frac{1}{3}$ .  
Plot and label the original and the dilated figure.

- A (-3, 6) → A' (-1, 2)
- B (-9, -9) → B' (-3, -3)
- C (6, -9) → C' (2, -3)
- D (3, 6) → D' (1, 2)



Find the area of the original figure:  $157.5u^2$

$$A = \frac{1}{2}(b_1 + b_2)h$$

$$A = \frac{1}{2}(6 + 15)15$$

$$A = \frac{1}{2}(21)15$$

Write a general rule for the dilation:

$$(x, y) \rightarrow (\frac{1}{3}x, \frac{1}{3}y)$$

Find the area of the dilated figure:  $17.5u^2$

$$A = \frac{1}{2}(2 + 5)5$$

$$A = \frac{1}{2}(7)5$$

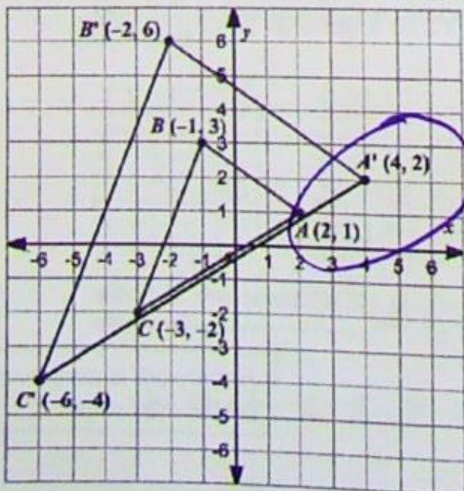
State the scale factor of the following dilations:

- 3. (2, 4) → (10, 20) 5
- 4. (-15, 27) → (-5, 9)  $\frac{1}{3}$
- 5. (3, 7) → (12, 28) 4

Write the general rule for the transformation.

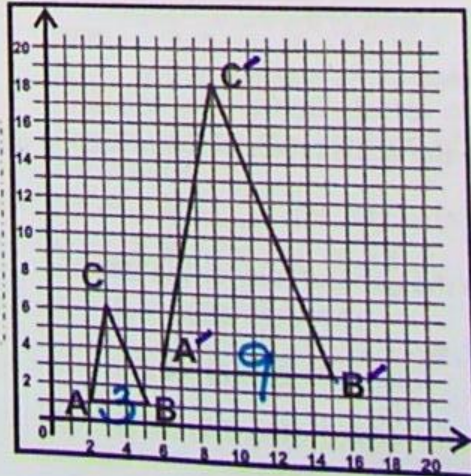
- 6. (14, 6) → (7, 3)  $(x, y) \rightarrow (\frac{1}{2}x, \frac{1}{2}y)$
- 7. (-1, 3) → (-5, 15)  $(x, y) \rightarrow (5x, 5y)$

Name the scale factor for the following dilations.



#8. Scale Factor:

2



#9. Scale Factor:

3