UNIT 7: TRANSFORMATIONS

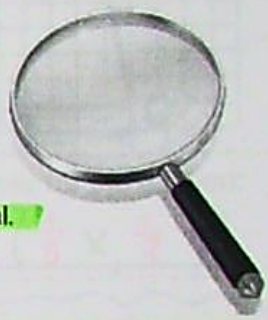
Dilations

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

enlargement!

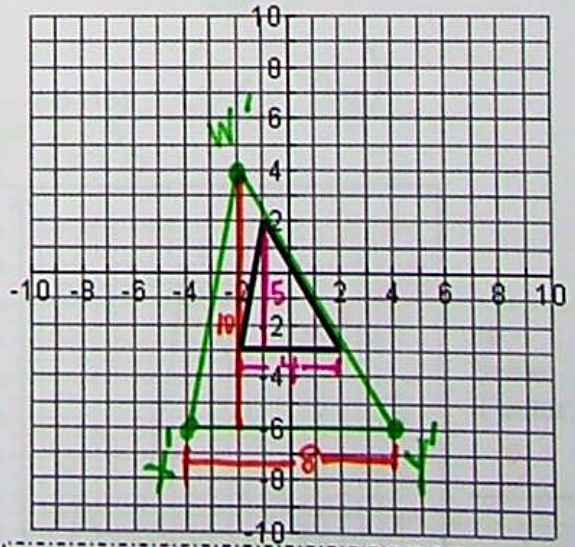
1. Dilate figure WXY by a **scale factor of 2.**

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: $10u^2$

$b=4$ $h=5$ $A=\frac{1}{2}(4)(5)=\frac{1}{2}(20)$

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

$b=8$ $h=10$ $A=\frac{1}{2}(8)(10)=\frac{1}{2}(80)$

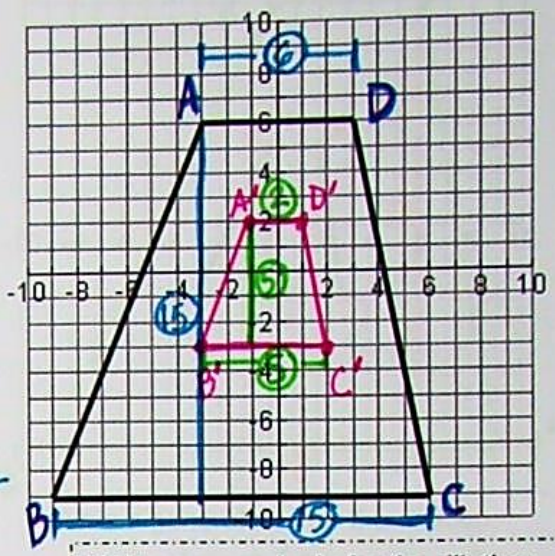
Write a general rule for the dilation:

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

NOTES for Dilations

reduction

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



A $(\frac{-3}{3}, \frac{6}{3})$ → A' $(-1, 2)$

B $(\frac{-9}{3}, \frac{-9}{3})$ → B' $(-3, -3)$

C $(\frac{6}{3}, \frac{-9}{3})$ → C' $(2, -3)$

D $(\frac{3}{3}, \frac{6}{3})$ → D' $(1, 2)$

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

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

$= \frac{1}{2}(21)(15) = \frac{1}{2}(315)$

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

$A = \frac{1}{2}(2+5)(5) = \frac{1}{2}(7)(5) = \frac{1}{2}(35)$

Write a general rule for the dilation:

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

Finding the scale factor:

$SF = \frac{\text{new } x}{\text{old } x} = \frac{\text{new } y}{\text{old } y}$

State the scale factor of the following dilations:

3. (2, 4) → (10, 20) $\frac{10}{2}, \frac{20}{2}$ larger — 5

4. (-15, 27) → (-5, 9) $\frac{-5}{-15}, \frac{9}{27}$ smaller — $\frac{1}{3}$

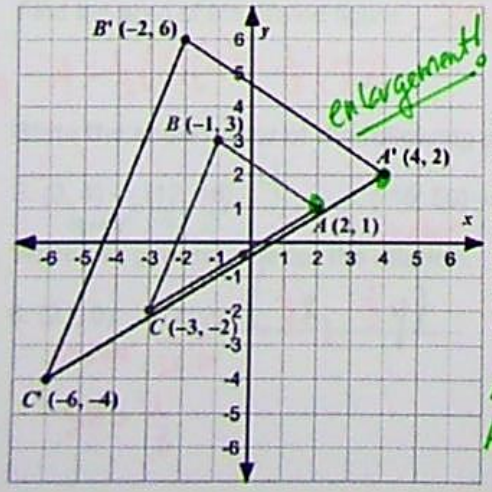
5. (3, 7) → (12, 28) $\frac{12}{3}, \frac{28}{7}$ larger — 4

Write the general rule for the transformation.

6. (14, 6) → (7, 3) $\frac{7}{14}, \frac{3}{6}$ smaller — $(\frac{1}{2}x, \frac{1}{2}y)$, SF = $\frac{1}{2}$

7. (-1, 3) → (-5, 15) $\frac{-5}{-1}, \frac{15}{3}$ larger — $(5x, 5y)$, SF = 5

Name the scale factor for the folowing dilations.

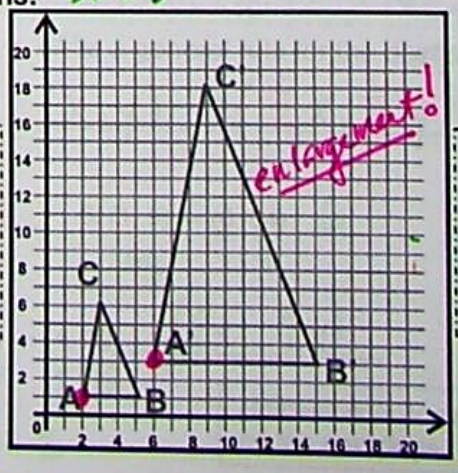


#8. Scale Factor: 2

A' (4, 2)

A (2, 1)

SF = 2



#9 Scale Factor: 3

A' (6, 3)

A (2, 1)