Math II

Properties of Dilations

Given the following points:

$Q = (-3, 4)$ $R = (1, 3)$ $S = (2, -2)$ $T = (-2, -3)$

a) Graph $QRST$ at the right.

b) Find the coordinates of the images of these points under a dilation with scale factor 2. from the origin

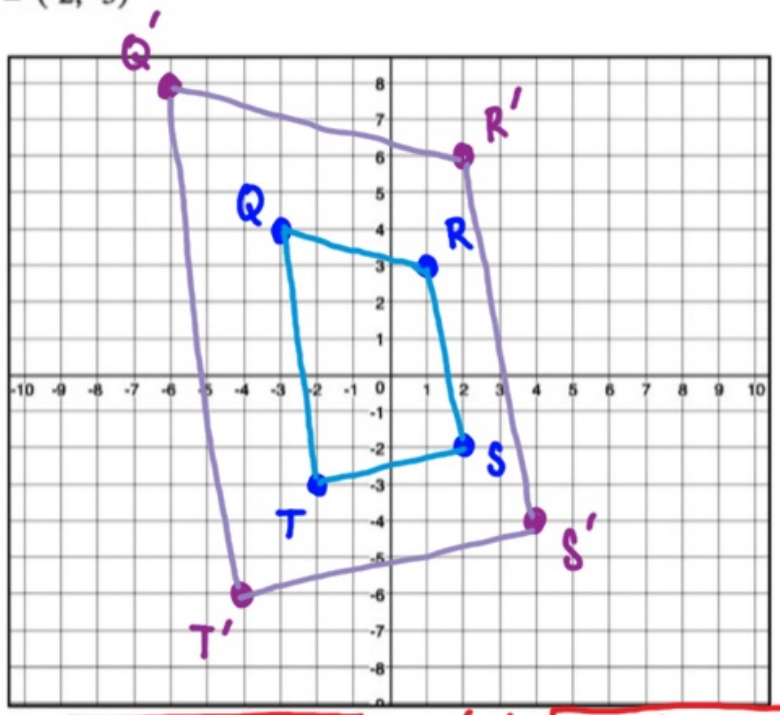
$Q' =$ (-6, 8)

$R' =$ (2, 6)

$S' =$ (4, -4)

$T' =$ (-4, -6)

c) Graph $Q'R'S'T'$ at the right.



d) Use the distance formula to find:

$QR =$ $\sqrt{17}$

$Q'R' =$ $2\sqrt{17}$

$QR = \sqrt{(-3-1)^2 + (4-3)^2}$

$= \sqrt{17}$

$Q'R' = \sqrt{(-6-2)^2 + (8-6)^2}$

$= \sqrt{68} = 2\sqrt{17}$

$4 \cdot 17$

$2 \cdot 2$

e) How are QR and $Q'R'$ related?

Q'R' is 2 times longer than QR

Given the following points:

$A = (8, -2)$ $B = (0, 0)$ $C = (-2, 8)$

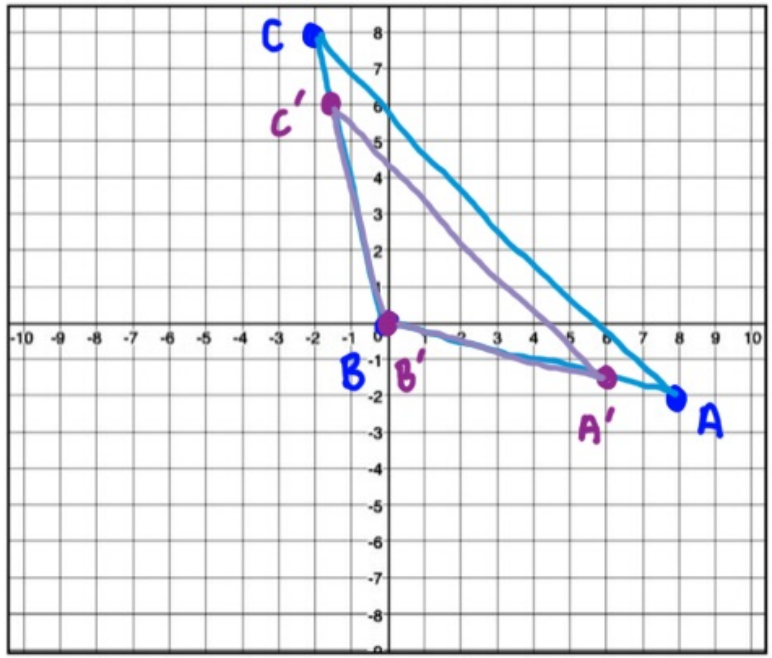
a) Graph ΔABC at the right.

b) Find the coordinates of the images of these points under a dilation with scale factor 0.75. from the origin

$A' =$ (6, -1.5)

$B' =$ (0, 0)

$C' =$ (-1.5, 6)



c) Graph $\Delta A'B'C'$ at the right.

d) Find the slopes of:

$\overline{AC} =$ -1

$\overline{A'C'} =$ -1

$\overline{AC} = \left(\frac{8-(-2)}{-2-8}\right) = \frac{10}{-10} = -1$

$\overline{A'C'} = \left(\frac{-1.5-6}{6-(-1.5)}\right) = \frac{-7.5}{7.5} = -1$

e) How are $\overline{AC}$ and $\overline{A'C'}$ related?

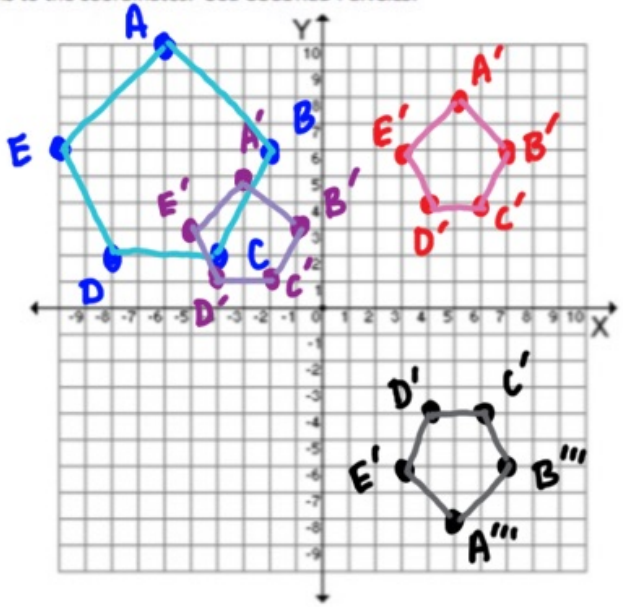
they are the same

Math II — Properties of Dilations

GRAPH the pre-image. Then **perform** the following transformations, **in the order specified**. **Label** each new image, using the appropriate symbols (shown). After each transformation: **list** the new coordinates, **compare** each image to its pre-image (size/shape/orientation), and write the rule for what happens to the coordinates. USE COLORED PENCILS.

a) PRE-IMAGE

A (–6, 10)
B (–2, 6)
C (–4, 2)
D (–8, 2)
E (–10, 6)



b) **DILATE** with magnitude ½. from the origin

A′ (-3,5)
B′ (-1,3)
C′ (-2,1)
D′ (-4,1)
E′ (-5,3)

c) **TRANSLATE** right 8 & up 3.

A″ (5,8)
B″ (7,6)
C″ (6,4)
D″ (4,4)
E″ (3,6)

d) **REFLECT** over x-axis

A‴ (5,-8)
B‴ (7,-6)
C‴ (6,-4)
D‴ (4,-4)
E‴ (3,-6)

c) COMPARE

(½x, ½y)

COMPARE

(x+8, y+3)

COMPARE

(x,-y)

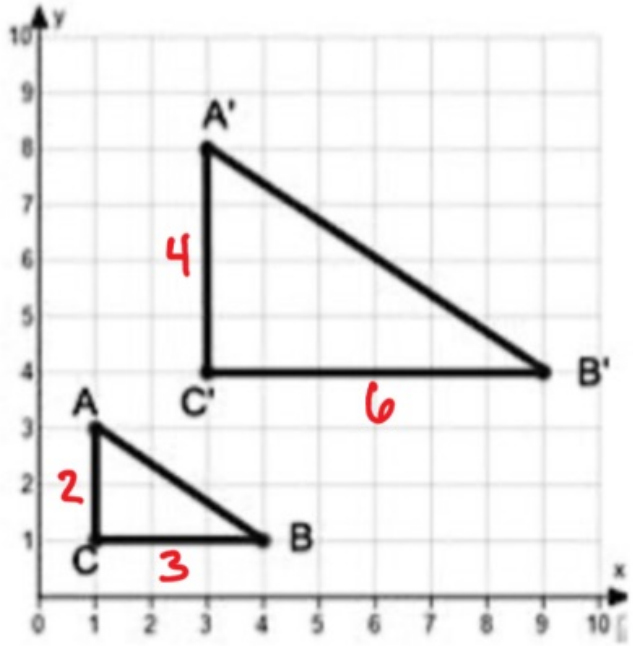
Math II

Properties of Dilations

A dilation is a type of transformation that reduces or enlarges objects.

The Scale Factor, k, describes how much the figure is enlarged or reduced.

In the graph below, ΔABC has been dilated to produce ΔA'B'C'.



1. Find the lengths of the following sides of the triangle:

   AC: 2 CB: 3

   A'C': 4 C'B': 6

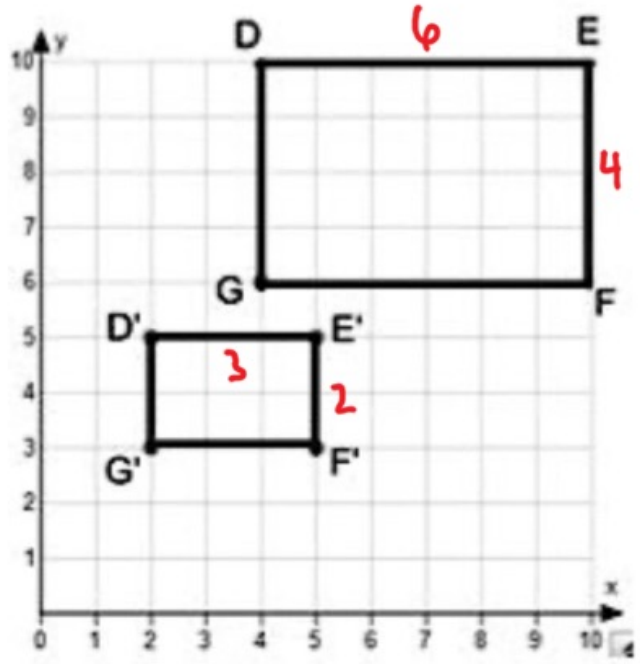
2. Find the ratios of the corresponding sides:

   $\frac{A'C'}{AC} = \frac{4}{2} = 2$ $\frac{C'B'}{CB} = \frac{6}{3} = 2$

3. The scale factor is 2.

4. ΔABC has been enlarged. 1

In the graph below, rectangle DEFG has been dilated to produce D'E'F'G'.



1. Find the lengths of the following sides of the rectangle:

   DE: 6 EF: 4

   D'E': 3 E'F': 2

2. Find the ratios of the corresponding sides:

   $\frac{D'E'}{DE} = \frac{3}{6} = \frac{1}{2}$ $\frac{E'F'}{EF} = \frac{2}{4} = \frac{1}{2}$

3. The scale factor is 1/2.

4. DEFG has been reduced.

The corresponding side lengths in a dilation are **proportional**.

To find a scale factor, **divide** a side length of the dilated figure by the corresponding side length of the original figure.

- If $k > 1$, the original figure has been **enlarged**.
- If $0 < k < 1$ (a **fraction**), the original figure has been **reduced**.
- If $k = 1$, the original figure is **congruent**.

Tell whether one figure is a dilation of the other or not. Explain your reasoning.

(a) Quadrilateral MNPQ has side lengths of 15 mm, 24 mm, 21 mm, and 18 mm. Quadrilateral M'N'P'Q' has side lengths of 5 mm, 8 mm, 7 mm, and 4 mm.

$$\frac{M'N'P'Q'}{MNPQ} = \frac{5}{15} = \frac{8}{24} = \frac{7}{21} = \frac{4}{18}$$

$$\frac{1}{3} = \frac{1}{3} = \frac{1}{3} = \frac{2}{9}$$

not the same ratio as the other sides so M'N'P'Q' is NOT a dilation of MNPQ

(b) Triangle ABC has side lengths of 6 in, 7 in, and 12 in. Triangle A'B'C' has side lengths of 18 in, 21 in, and 36 in.

$$\frac{A'B'C'}{ABC} = \frac{18}{6} = \frac{21}{7} = \frac{36}{12}$$

$$3 = 3 = 3$$

all ratios the same so A'B'C' is a dilation of ABC.

Use Dilations to help POPO increase in size 200%