Goals

Dilations

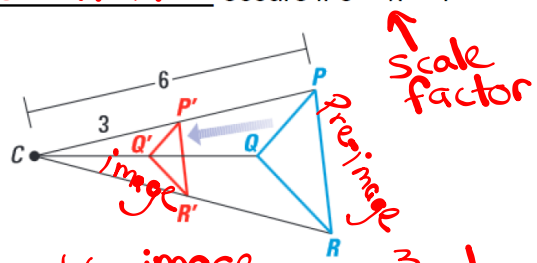
- What is a scale factor and how can it be determined?

- How do you know if it a dilation is a enlargement or a stretch.

Dilations

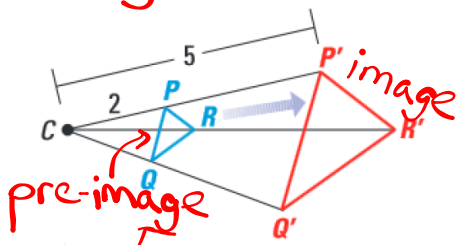
Dilations create similar figures. Similar figures have the same shape (angle) but are different sizes (sides).

a reduction occurs if $0 < k < 1$



$k = \frac{\text{image}}{\text{pre-image}} = \frac{3}{6} = \frac{1}{2}$

an enlargement occurs if $k > 1$



$k = \frac{5}{2}$

Dilations

A scale factor (k) of 3 produces a(n) enlargement.

A scale factor (k) of $\frac{1}{2}$ produces a(n) reduction.

A scale factor (k) of 0.2 produces a(n) reduction.

A scale factor (k) of $\frac{8}{5}$ produces a(n) enlargement.

Dilations

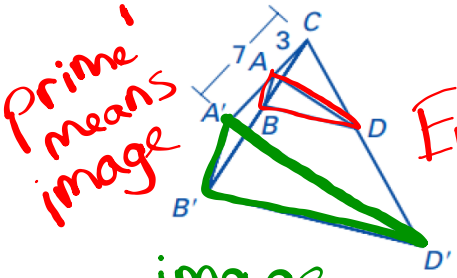
To calculate a scale factor:

Divide the image' by a corresponding side of the pre-image

$$\text{scale factor} = k = \frac{\text{image'}}{\text{pre-image}}$$

Dilations

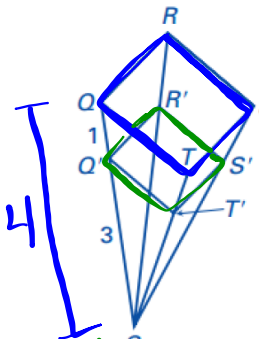
Identify the dilation and find its scale factor.



prime means image

Enlargement

$$k = \frac{\text{image}}{\text{pre-image}} = \frac{7}{3}$$

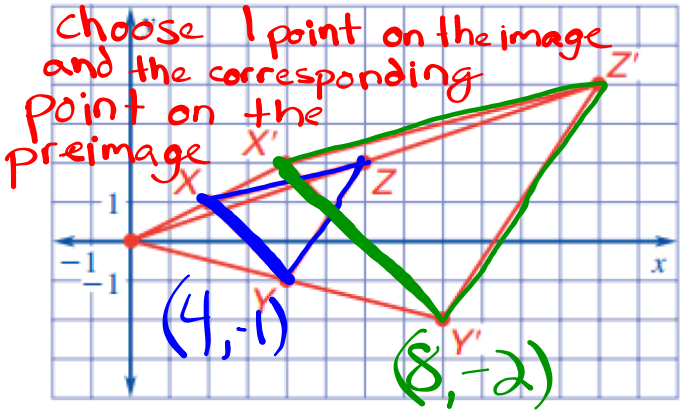


Reduction

$$k = \frac{\text{image}}{\text{pre-image}} = \frac{3}{4}$$

Dilations

Is the dilation shown a reduction or an enlargement?



What is the scale factor?

$k = \frac{8}{4} = 2$

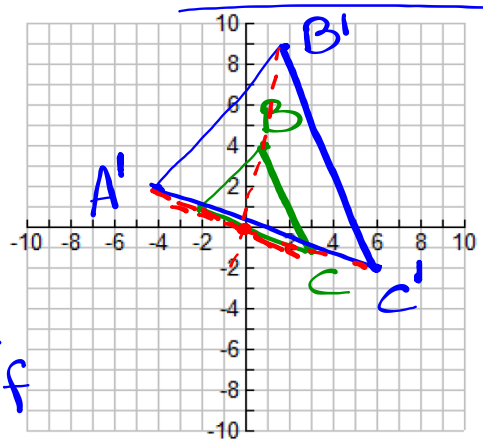
or

$k = \frac{-2}{-1} = 2$

Dilations

Draw a dilation of ΔABC with A(-2, 1), B(1, 4), and C(3, -1).
Used the origin as the center and use a scale factor of 2.

Graph the new image.



How does the perimeter of the pre-image compare to the perimeter of the image?

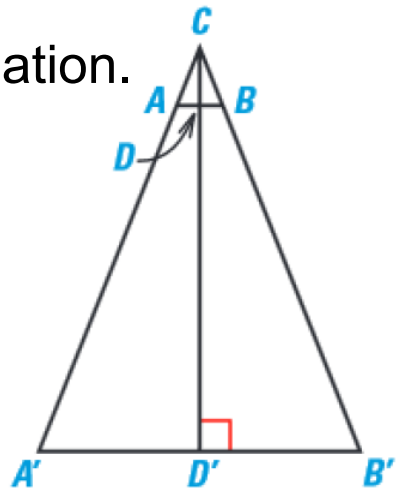
The perimeter of the image is twice that of the pre-image.

Dilations

Use the following diagram to determine the missing information.

$k = \frac{7.2}{1.2} = 6$ $k = \frac{12}{2} = 6$

	inches	cm
CD	1.2 in.	$\frac{14}{6} = 2.\overline{33}$
CD'	7.2 in.	14 cm
AB	0.8 in.	2 cm
A'B'	$6 \cdot 0.8 = 4.8$	12 cm



AB corresponds to A'B'

∠D corresponds to ∠D'

Dilations

Ex A: In a *diation* every image is similar to its preimage.

All sides are proportional

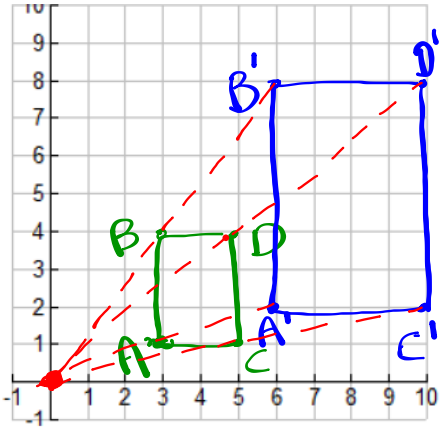
All angles are congruent

Dilations

Draw a dilation of rectangle ABCD on a coordinate plane, with A(3, 1), B(3, 4), C(5, 1) and D(5, 4). Use the origin as the center and a scale factor of 2.

Mult. by scale factor

A(3,1) → A'(6,2)
B(3,4) → B'(6,8)
C(5,1) → C'(10,2)
D(5,4) → D'(10,8)



Dilations

Use the origin as the center of the dilation and the scale factor of $\frac{1}{2}$ to find the coordinates of the vertices of the image of the polygon.

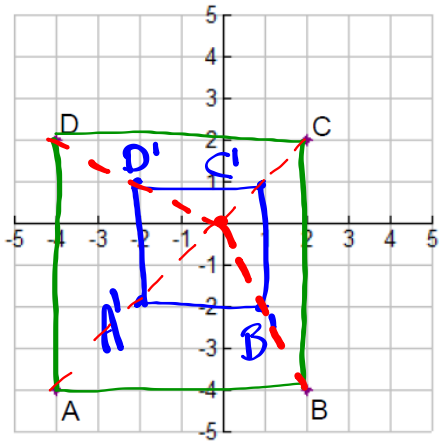
Multiply by scale factor

A(-4, -4) → A'(-2, -2)

B(2, -4) → B'(1, -2)

C(2, 2) → C'(1, 1)

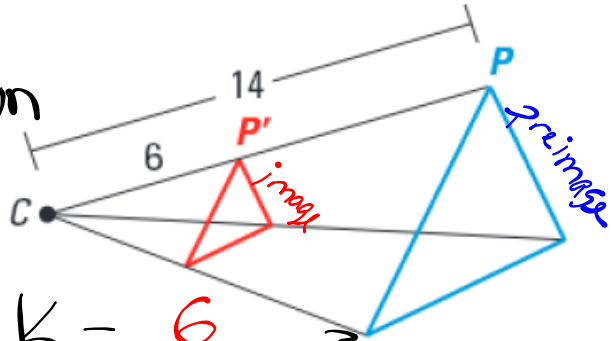
D(-4, 2) → D'(-2, 1)



Dilations

Identify the dilation and find its scale factor.

Reduction



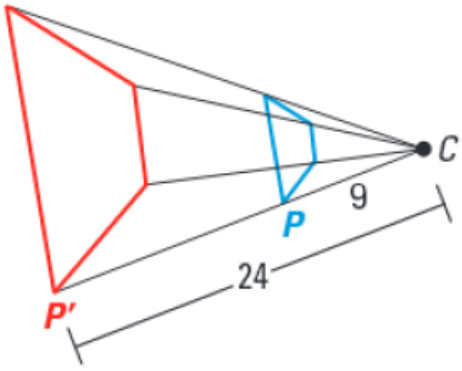
$k = \frac{6}{14} = \frac{3}{7}$

Dilations

Identify the dilation and find its scale factor.

Ex 4:

Enlargement



$k = \frac{24}{9} = \frac{8}{3}$

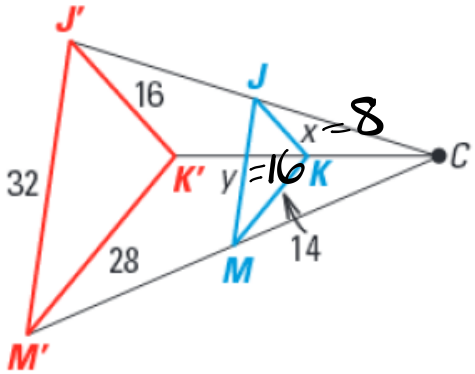
Dilations

Identify the dilation and find its scale factor. Find the value of the variables.

$\frac{28}{14} = \frac{16}{x}$

$\frac{28x}{28} = \frac{224}{28}$

$x = 8$



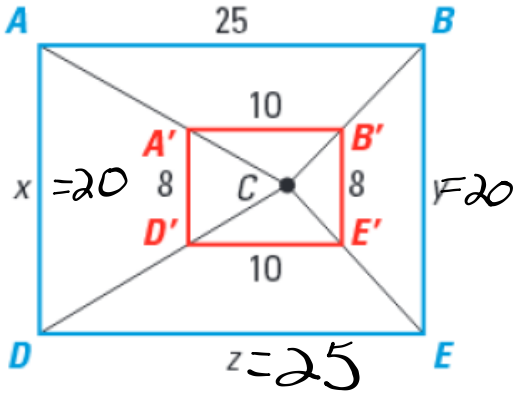
$\frac{28}{14} = \frac{32}{y}$

$\frac{448}{28} = \frac{28y}{28}$

$y = 16$

Dilations

Identify the dilation and find its scale factor. Find the value of the variables.



$\frac{25}{10} = \frac{z}{10}$

$z = 25$

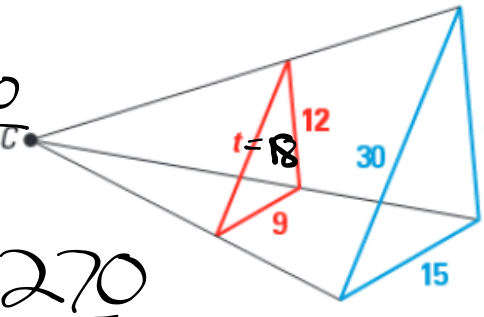
$\frac{25}{10} = \frac{x}{8}$

$\frac{10x}{10} = \frac{200}{10}$

$x = 20$

Dilations

Determine the value of the variables.



$\frac{15}{9} = \frac{30}{t}$

$\frac{15t}{15} = \frac{270}{15}$

$t = 18$

$\frac{15}{9} = \frac{r}{12}$

$\frac{9r}{9} = \frac{180}{9}$

$r = 20$

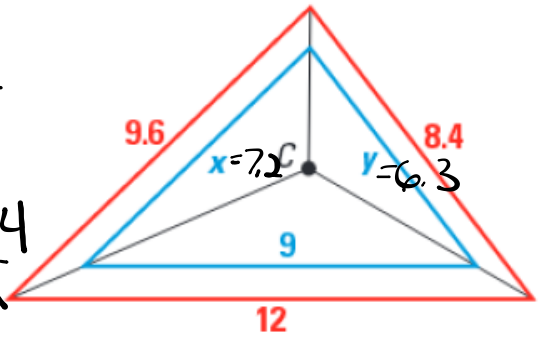
Dilations

Determine the value of the variables.

$\frac{12}{9} = \frac{9.6}{x}$

$\frac{12x}{12} = \frac{86.4}{12}$

$x = 7.2$



$\frac{12}{9} = \frac{8.4}{y}$

$\frac{12y}{12} = \frac{75.6}{12}$

$y = 6.3$

Recap

Dilations

What information is needed to make a dilation?

Center + scale factor

How do dilated figures relate to each other?

They are similar → Sides proportional
Angles congruent

What is the image coordinate of the pre-image coordinate (-2,5) dilated with a center at the origin and a scale factor of 3?

$(-2,5)$ times scale factor $\rightarrow (-6,15)'$