6.2 Transformations and Similarity

Before You identified rigid motions in the plane.

Now You will identify similarity transformations called dilations.

Why? So you can find the dimensions of a scale drawing.

G.SRT.1 Verify experimentally the properties of dilations given by a center and a scale factor.

G.SRT.2 Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity corresponding pairs of angles and the proportionality of all corresponding pairs of sides.

Dilation - * Non-Rigid (size changes) transformation.

A dilation of a point in a coordinate plane can be found by multiplying the x and y coordinates of a point by the same number, k. aka: "n"

$$D(x, y) = (kx, ky)$$

Scale Factor

prime symbol's

new image

Ex. What is the image of the point (2, 3) transformed by the dilation D(x, y) = (4x, 4y)? What is the scale factor?

$D(2, 3) = D'(4\cdot 2, 4\cdot 3) = D'(8, 12)$

Scale factor = 4

Scale Factors:

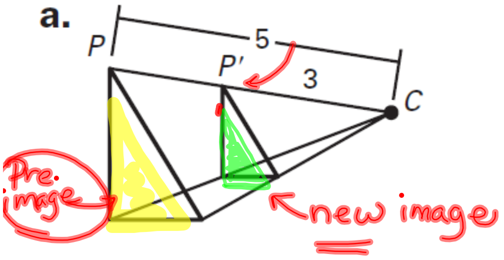
If |n| k < 1 then the *dilation* is a

If |n| k = 1 then the *dilation* stays the

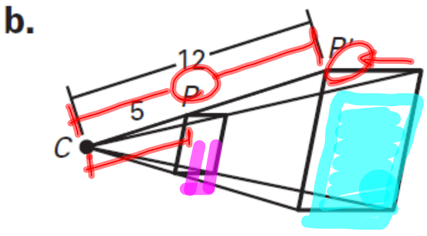
If |n| k > 1 then the *dilation* is an

Identify the dilation and find its scale factor.

a.



b.



Solution

a. Because $\frac{CP'}{CP}$ = $\frac{3}{5}$, the scale factor is k = $\frac{3}{5}$. This is a Reduction.

new image

pre image

<1 :)

b. Because $\frac{CP'}{CP}$ = $\frac{12}{5}$, the scale factor is k = $\frac{12}{5}$. This is an Enlargment.

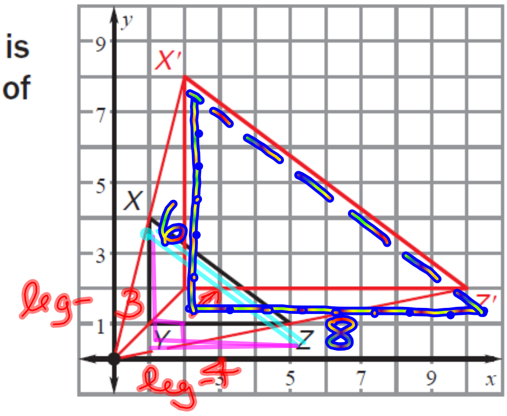
k>1 :)

Dilation in a Coordinate Plane

Draw a dilation of △XYZ. Use the origin as the center and use a scale factor of 2. Find the perimeter of the preimage and the perimeter of the image.

Solution

Because the center of the dilation is the origin, you can find the image of each vertex by multiplying its coordinates by the S.F. = 2.



S.F.=2

* X(1, 4) → * X′(2, 8)

Y(1, 1) → Y′(2, 2)

Z(5, 1) → Z′(10, 2)

To find the perimeters of the preimage and image, you need to find XZ and X′Z′.

$$XZ = \sqrt{(\overset{\Delta x\text{'s}}{1 - 5})^2 + (\overset{\Delta y\text{'s}}{4 - 1})^2}$$

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

$$= \sqrt{16 + 9}$$

$$= \sqrt{25}$$

$$= 5$$

$a^2+b^2=c^2$

$3^2+4^2=c^2$

$9+16=c^2$

$\sqrt{25}=\sqrt{c^2}$

$5=c$

Perimeter of △XYZ = leg 4 + leg 3 + hyp 5 = 12

$$X'Z' = \sqrt{(2 - 10)^2 + (8 - 2)^2}$$

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

$$= \sqrt{64 + 36}$$

$$= \sqrt{100}$$

$$= 10$$

$a^2+b^2=c^2$

$6^2+8^2=c^2$

$36+64=c^2$

$\sqrt{100}=\sqrt{c^2}$

S.F.=2

$10=c$

Perimeter of △X′Y′Z′ = leg 6 + leg 8 + hyp 10 = 24

Questionnaire!