Unit 3 Similarity Figures and Dilations

Date	Target	Assignment	Done!
M 9-25	3.1	3.1 Worksheet	
T 9-26	3.2	3.2 Worksheet	
W 9-27	3.1-3.2	3.1-3.2 Review Worksheet	
R 9-28	Quiz	Quiz 3.1-3.2	
F 9-29	3.3a	3.3a Day 1 Worksheet	
M 10-2	3.3a	3.3a Day 2 Worksheet	
T 10-3	3.3b	3.3b Day 1 Worksheet	
W 10-4	3.3b	3.3b Day 2 Worksheet	
R 10-5	3.4	3.4 Worksheet	
F 10-6	Quiz	Quiz 3.3-3.4	
M 10-9		COLUMBUS DAY – NO SCHOOL	
T 10-10	Rev	Unit 3 Review	
W 10-11		PSAT DAY – NO CLASSES	
R 10-12	Rev	Unit 3 Review	
F 10-13	Test	Unit 3 Test	

Target 1 – Use proportions to identify lengths of corresponding parts in similar figures

Target 2 – Perform and identify dilations

Target 3 – Use ratios of lengths, perimeter, & area to determine unknown corresponding parts

- ***3.3a –Use Scale Factor & Similarity to Determine Unknown Lengths in Polygons & Circles***
- ***3.3b –Use Scale Factor & Similarity to Determine Unknown Corresponding Parts***

Target 4 – Perform compositions of figures to determine the coordinates and location of the image

Name: _____

3.1 – Similar Figures

Target 1 – Use proportions to identify lengths of corresponding parts in similar figures

Vocabulary

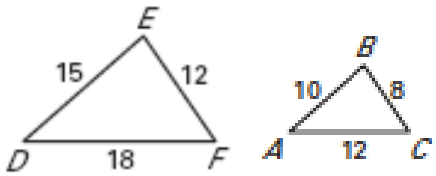
Similar Polygons: change of _____ or _____ *of a figure)*

Linear Scale Factor: _____ of the _____ of _____ sides.

Example 1: Use similarity statements

In the diagram, $\Delta ABC \sim \Delta DEF$.

1. List all pairs of congruent angles



2. Check that the ratios of corresponding side lengths are equal.
   Ratio 1: **Ratio 2:** **Ratio 3:**

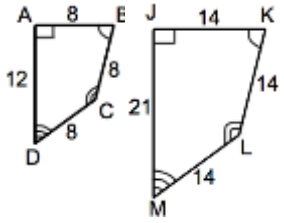
   Are all three ratios equal?

3. Write the ratios of the corresponding side lengths in a statement of proportionality.

Example 2: Find the linear scale factor

Determine whether the polygons are similar. If they are, write the similarity statement and find the scale factor of ABCD to JKLM.

Step 1: Identify pairs of congruent angles
(Write congruent statements for all pairs)



Step 2: Show that corresponding side lengths are proportional.
Ratio 1: **Ratio 2:** **Ratio 3:** **Ratio 4:**

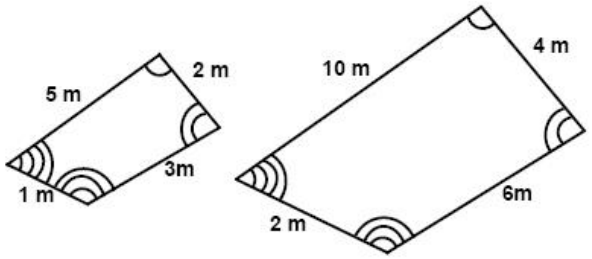
Are all four ratios equal? If so, what is the linear scale factor?

Annotate Here
(location, size)

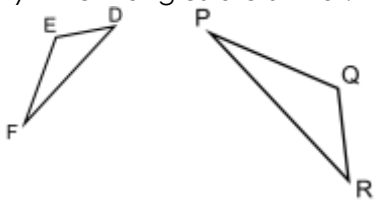
(ratio, lengths, corresponding)

YOU TRY NOW!

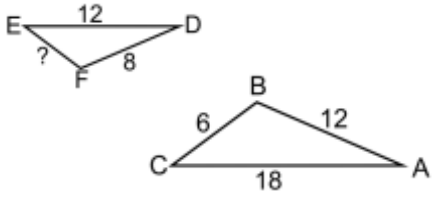
1) *The two figures below are similar. What is the linear scale factor?*



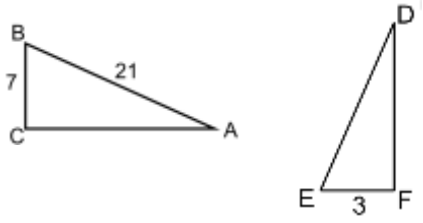
2) *The triangles are similar: $\Delta DEF \sim \Delta RQP$. Which angles are congruent?*



3) *$\Delta ACB \sim \Delta DEF$. What is the length of FE? The triangles are similar.*



4) *$\Delta ABC \sim \Delta DEF$. What is the length of $\overline{ED}$?*



5) ***HONORS ONLY*** *$\Delta STU \sim \Delta FED$. $ST = x + 2$, $UT = x^2 - x - 14$, $DE = 2$, and $DE = 2$. Find the measure of $\overline{ST}$.*

6) ***HONORS ONLY*** *The lengths of the sides of a triangle have a ratio 1:2:3. If the perimeter of the triangle is 60 yards, what is the length of the smallest side?*

Annotate Here

YOU TRY NOW

1. yes; $\frac{1}{2}$ or $\frac{2}{1}$ 2. $\angle D \cong \angle R$; $\angle E \cong \angle Q$; $\angle F \cong \angle P$ 3. $EF = 3$ 4. $ED = 9$
5. $ST = 8$ 6. Smallest side = 10

3.2 –Dilations

Target 2 – Perform and identify dilations

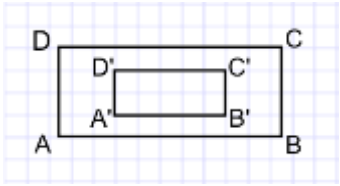
Vocabulary

Dilation: a transformation where the _____ or _____ of a figure occurs, where the sides are _____ or _____ proportionally about a center. Dilations do not change the _____ of the _____.

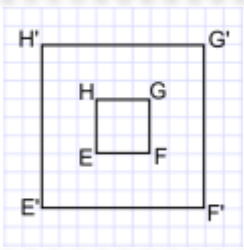
Example 1: Identify dilations

Determine whether the dilation is a *reduction (shrink)* or an *enlargement (expand)*. Find the scale factor of the dilation.

a)

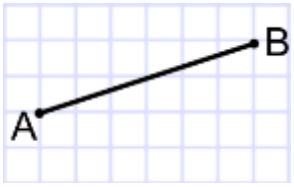


b)



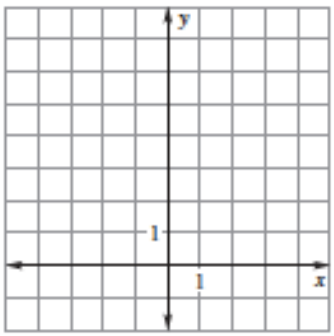
Example 2: Perform a dilation

Dilate $\overline{AB}$ by a scale factor of $\frac{2}{3}$.



Example 3: Use scalar multiplication in a dilation

The vertices of triangle *ABC* are A (-3, 0), B (0, 6), C (3, 6). Use scalar multiplication to find *A'B'C'* after a dilation with is center at the origin and a scale factor of $\frac{1}{3}$. Graph *ABC* and its image.



Annotate Here

(shrinking, expanding, shrink, expand, measures, angles)

- The letter "k" is used represent "scale factor."

Linear Scale Factor

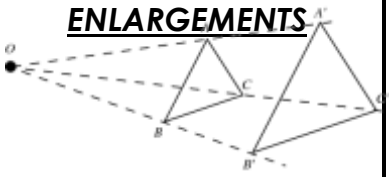
Look at distance from the _____ to _____

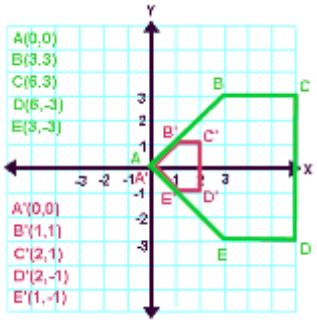
$$\text{_____} = \frac{\text{Prime Distance}}{\text{PreImage Distance}}$$

How to tell if the image is an enlargement or reduction!

- **If k** < 1, then the image is a _____
- **If k** > 1, then the image is an _____

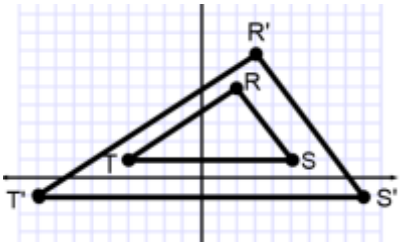
Examples of an ENLARGEMENTS





YOU TRY NOW!

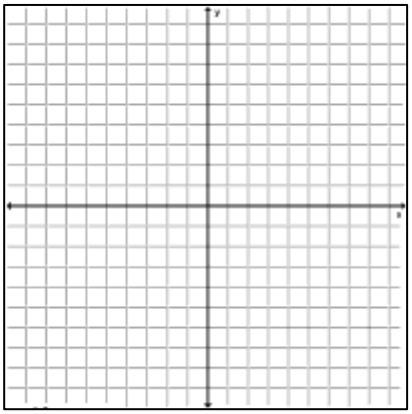
1) ***HONORS ONLY*** *Find the center of dilation of the two similar triangles below.*



2) ΔABC *is dilated to form triangle* $\Delta A'B'C'$. *If* $\frac{AB}{A'B'} = 7$, *what is* $\frac{B'C'}{BC}$*?*

3) The vertices of ΔABC *is A (-7, 8), B (7, -5), C (8, 10). Find the vertices of the dilated image with scale factor of* $\frac{1}{2}$. *The center of the dilation is the origin.*

4) ***HONORS ONLY*** *The vertices of* ΔABC *is A(-3, 4), B(3, -2), C(2, 3). Find the vertices of the dilated image with scale factor of 2. The center of the dilation is (0, 1).*



Annotate Here

REFLECTION

What concepts were important to take away from this target?

1.

2.

3.

QUESTIONS

1.

2.

3.

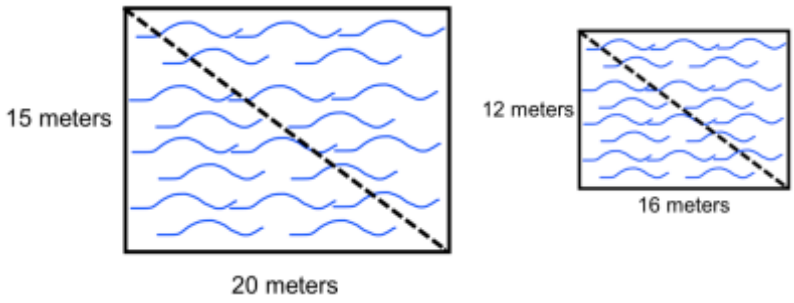
YOU TRY NOW

1. (1,3) 2. $\frac{1}{7}$ 3. A'(-3.5, 4), B'(3.5, -2.5), C'(4,5) 4. A'(-7, 6), B'(5, -5), C'(3, 5)
5. $ST = 8$ 6. Smallest side = 10

3.3a –Use Scale Factor & Similarity to Determine Unknown Lengths in Polygons & Circles
Target 3 – Use ratios of lengths, perimeter & area to determine unknown corresponding parts

Example 1: Use similar polygons to find lengths of unknown corresponding parts

The two rectangular swimming pools are similar. How far is it diagonall across each pool?



Example 2: Use similar polygons to find lengths of unkown corresponding parts

A high school wants to build a basketball court that is similar to an NBA basketball court, which is 94 feet long and 50 feet wide. Unforunately, the high school has room for a court that is 42 feet wide. How long should the court be, to the nearest foot?

QUESTIONS OR REFLECTION

Write down at least 2 questions from this page to ask the next day.

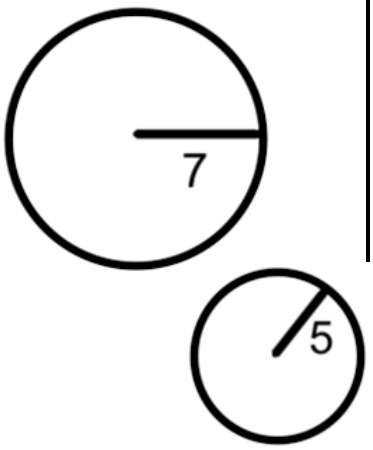
1)

2)

Annotate Here

FUN FACT!

All circles are similar! All angles are congruent because circles have a 360°angle. All lengths are proportional because radii and circumferences are proportional!



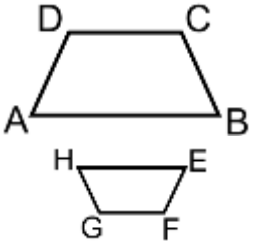
The scale factor is

$$\frac{7}{5} \text{ or } \frac{5}{7}$$

depending on which circle is the pre-image

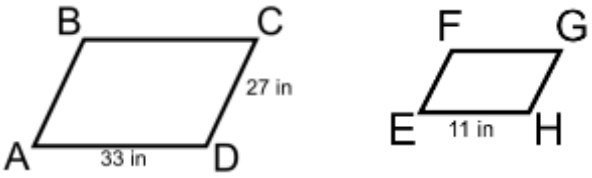
YOU TRY NOW!

1) Given the similar trapezoids ABCD and EHGF below, identify the side that is proportional to $\overline{BC}$.



2) The vertex of B of *octagon ABCDEFGH is located at (24, -16). The octagon is dilated by a factor of 0.25, with the center of dilation at the origin. What are the coordinates of B'?*

3) *Parallelograms ABCD and EFGH are similar. What is the length of $\overline{GH}$?*



Annotate Here

YOU TRY NOW
1. $\overline{GH}$ 2. B'(6, -4) 3. GH =9

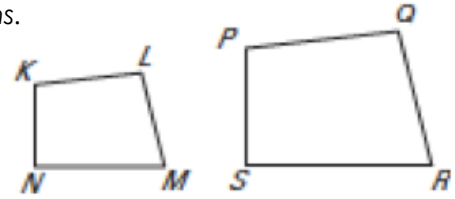
3.3b –Use Scale Factor & Similarity to Determine Unknown Corresponding Parts

Target 3 – Use ratios of lengths, perimeter, & area to determine unknown corresponding parts

PERIMETERS OF SIMILAR POLYGONS

If two polygons are similar, then the ratio of their perimeters is equal to the ratios of their corresponding side lengths.

If KLMN ~ PQRS, then



$$\frac{KL + LM + MN + NK}{PQ + QR + RS + SP} =$$

Example 1: Find the perimeter of similar figures

A larger cement court is being poured for a basketball hoop in place of a smaller one. The court will be 20 feet wide and 25 feet long. The old court was similar in shape, but only 16 feet wide.

Find the scale factor of the new court to the old court.

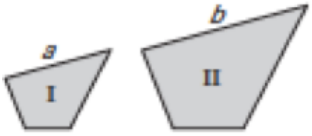
Find the ratio of the perimeters of the new court to the old court.

Areas of Similar Polygons

If two polygons are similar with the lengths of corresponding sides in the ratio a:b, then the ratio of their areas is _____: _____.

Scale Factor:

$$\frac{\textbf{Side Length of Polygon 1}}{\textbf{Side Length of Polygon 2}} = \_\_\_\_\_$$



Polygon I ~ Polygon II

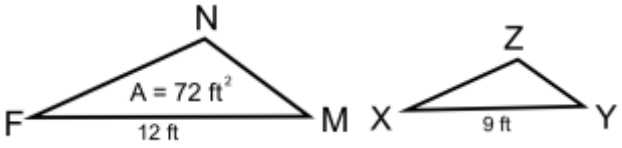
Ratio of Perimeters:

Ratio of the Areas:

Annotate Here

Example 2: Find the area of similar figures

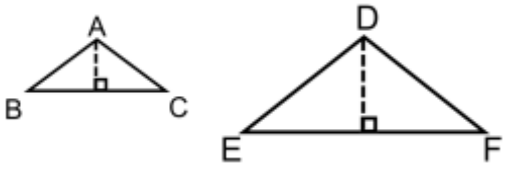
What is the area of triangle XYZ? $\Delta FMN \sim \Delta XYZ$.



YOU TRY NOW!

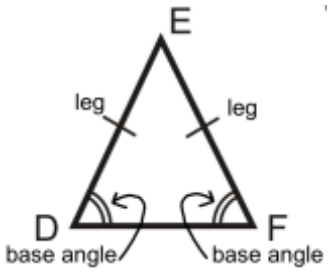
1) *$\Delta ABC \sim \Delta DEF$. AB = 3 inches, DE = 6 inches, and the area of ΔABC is 72 square inches. What is the area of ΔDEF?*

2) *$\Delta ABC \sim \Delta DEF$.* Both triangles are also isosceles triangles. *AB = 5 inches, EF = 21 inches, and the altitude (height) of ΔABC = 4. The altitudes bisects (divides EF into two congruent parts) the bottom sides of the triangles. Calculate the altitude of ΔDEF.*



Annotate Here

Properties Isosceles Triangle



Base angles are congruent
Two legs are congruent

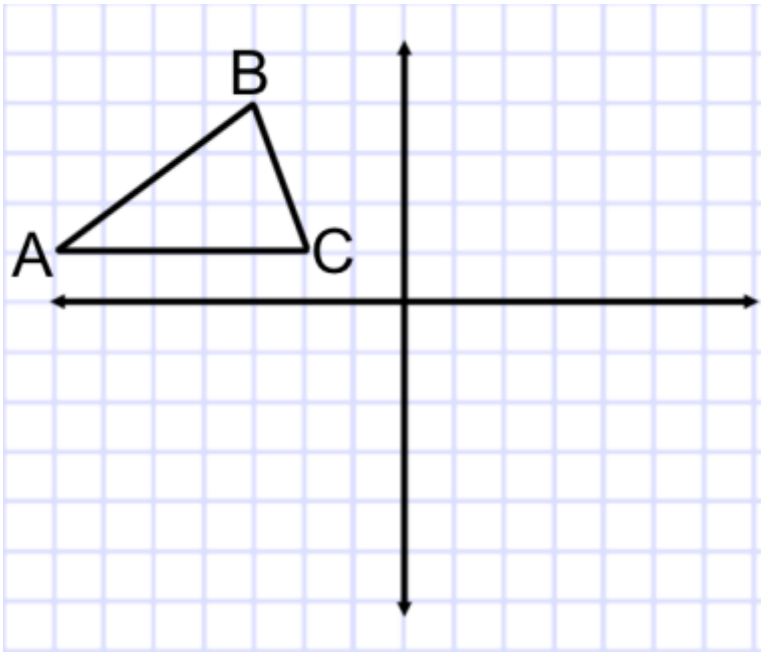
YouTryNow
1. 288 in²
2. 14 inches

3.4 – Similarity and Transformations

Target 4 – Perform compositions of figures to determine the coordinates and location of the image

Example 1: Perform the composition

The vertices of a triangle ABC is shown below. The triangle is translated 5 units to the right creating image A'B'C'. Then, the image is reflected across the x-axis. Finally, the triangle is dilated by a factor of 1.5. What are the final coordinates of triangle A'''B'''C'''?

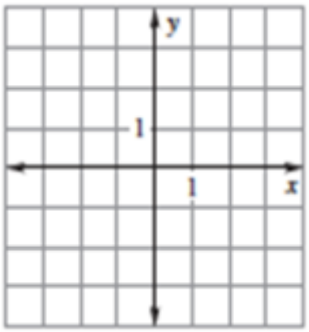


Coordinates after each transformation

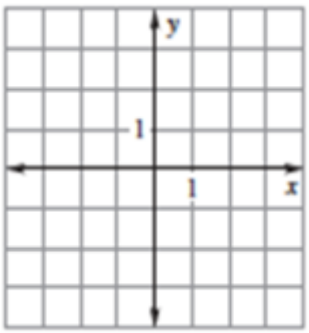
ΔABC	$\Delta A'B'C'$	$\Delta A''B''C''$	$\Delta A'''B'''C'''$
A(,)	A'(,)	A''(,)	A'''(,)
B(,)	B'(,)	B''(,)	B'''(,)
C(,)	C'(,)	C''(,)	C'''(,)

Annotate Here

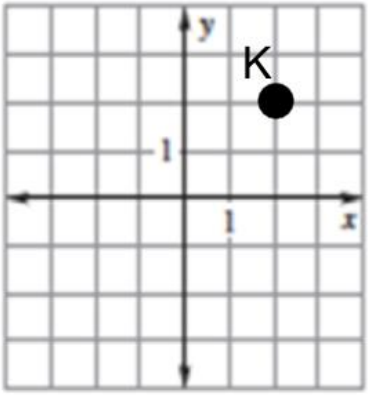
Graph y = 2



Graph x = -1

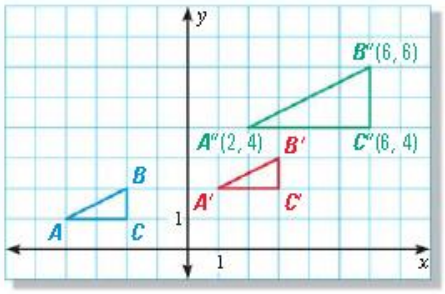


Rotate K 270 degrees CCW direction



YOU TRY NOW!

1. Describe the composition of transformations.
Give the exact translation, reflection or rotation using proper notation.



Transformation 1:

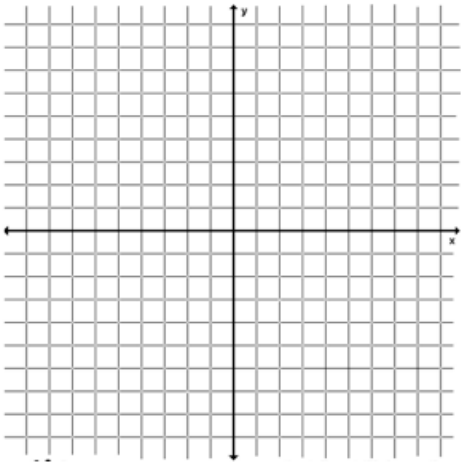
Transformation 2:

2. ***HONORS ONLY*** The endpoints of $\overline{CD}$ are C (-2, 3) and D (0, -2).
Graph the image of $\overline{CD}$ after the composition.

Transformation 1: Dilate by a scale factor of 3 centered at (-1, 0)
Transformation 2: Rotation: 90° *clockwise about (-1, 1)*

C' *D'*

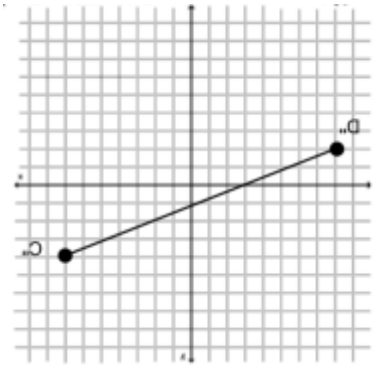
C'' *D''*



Annotate Here

SUMMARY

In your own words, describe what a composition is.



2.

YOU TRY NOW
1. transformation 1: $(x, y) \rightarrow (x + 5, y+1)$
transformation 2: Dilation by k = 2 centered at the origin