Unit 8 Similarity Figures and Dilations

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

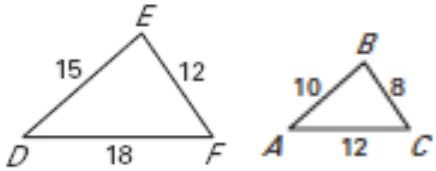
Similar Polygons: change of _____ or _____ *of a figure)*

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:**

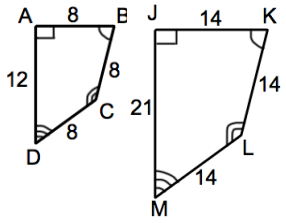
   Are all three ratios equal?

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?

Linear Scale Factor:

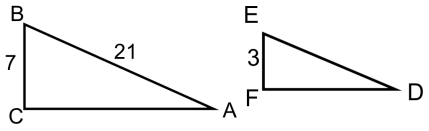
Annotate Here

(location, size)

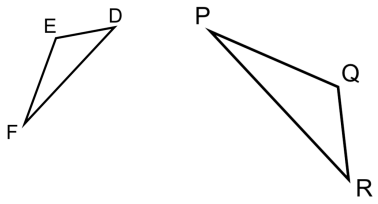
(ratio, lengths, corresponding)

YOU TRY NOW!

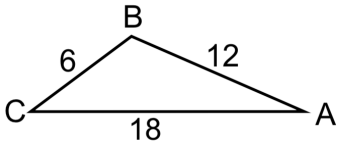
a) $\Delta ABC \sim \Delta DEF$. *What is the length of ED?*

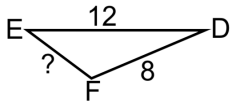


b) *The triangles are similar:* $\Delta DEF \sim \Delta RQP$. *Which angles are congruent?*



c) *What is the length of FE? The triangles are similar.*





Annotate Here

3.2 –Dilations

Target 2 – Perform and identify dilations

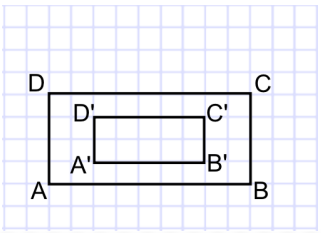
Vocabulary

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 _____.

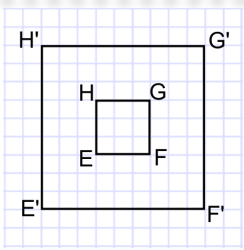
Example 1: Identify dilations

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

a)

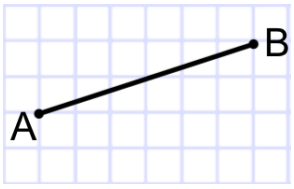


b)



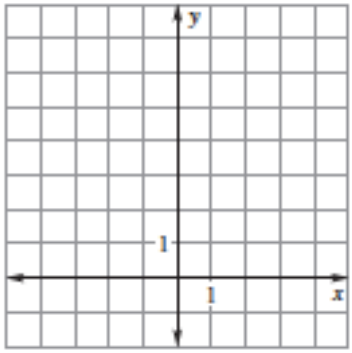
Example 2: Perform a dilation

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.

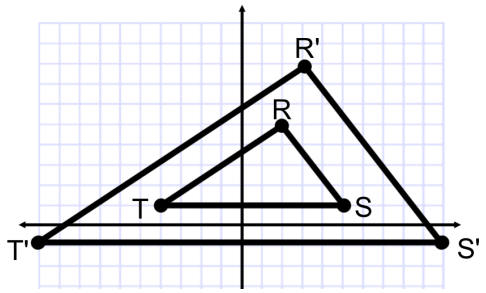


Annotate Here

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

YOU TRY NOW!

a) Calculate the scale factor for the dilation shown.



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

c) 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.

QUESTIONS OR REFLECTION

What concepts were important to take away from this target? Questions?

Questions	Summary
1)	a)
2)	b)
3)	c)
4)	d)

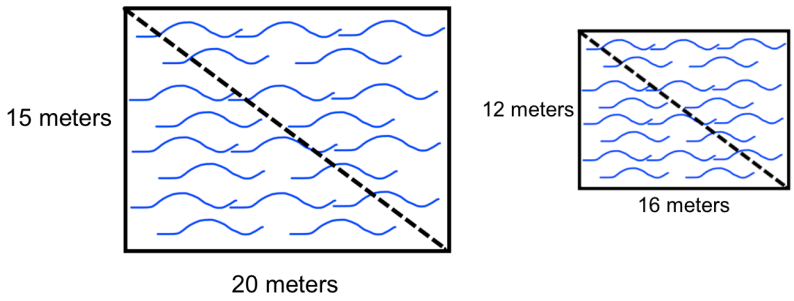
Annotate Here

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

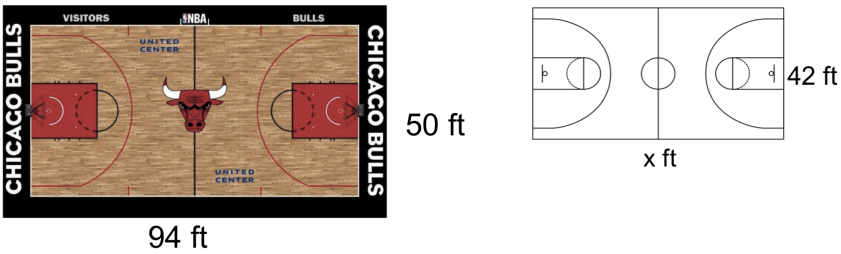
Example 1: Use similar polygons to find lengths of unkown corresponding parts

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.

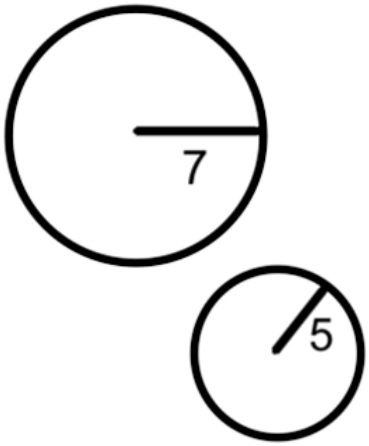
1)

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!**



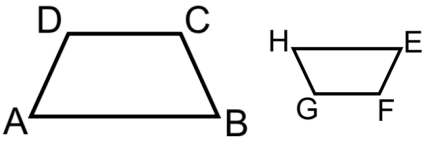
The scale factor is

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

YOU TRY NOW!

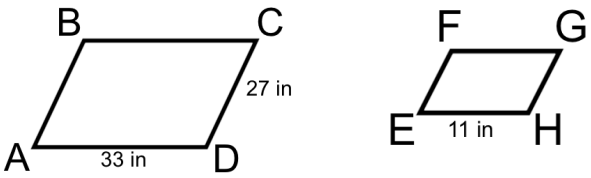
a) The vertex of J of a regular hexagon has the coordinates (-6, 27). If the hexagon is dilated by a factor of $\frac{1}{5}$. Note: "Regular" means that all sides of a polygon are the same length and all interior angles are congruent.

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



c) The vertex of B of an octagon 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'?

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



QUESTIONS OR REFLECTION

Write down at most 2 questions that you can ask the next day. BE SPECIFIC.

1)

2)

Annotate Here

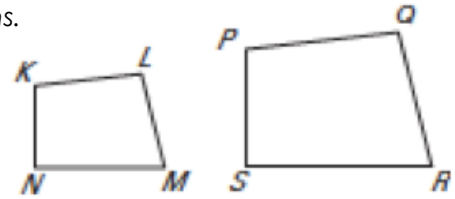
3.3b –Use Scale Factor & Similarity to Determine Unknown Corresponding Parts

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.

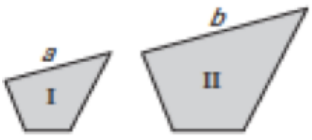
Find the ratio of the perimeters of the new court to the old court.

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

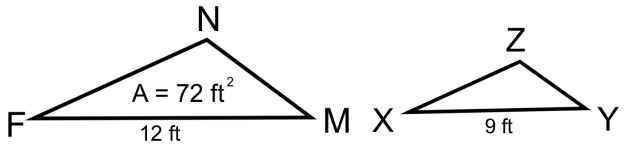
Ratio of Perimeters:

Ratio of the Areas:

Annotate Here

Example 2: Find the ares of similar figures

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

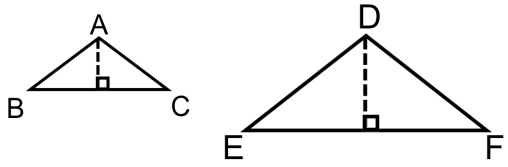


Annotate Here

YOU TRY NOW!

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

b) *$\Delta ABC \sim \Delta DEF$.* Both triangles are also isosceles triangles. *AB = 5 inches, EF = 21 inches, and the altitude (height) of ΔABC = 4. The altitudes bisect (divides in half) the bottom sides of the triangles. Calculate the altitude of ΔDEF.*

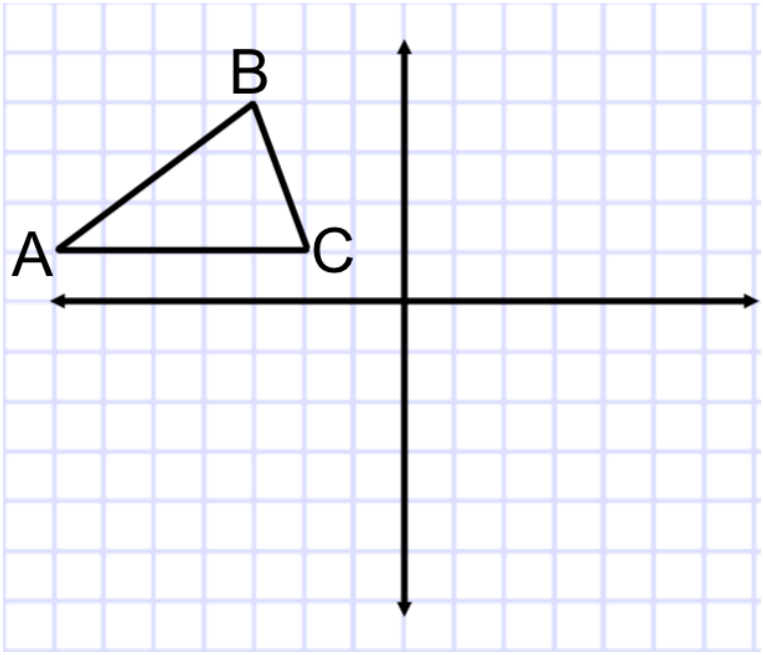


3.4 – Similarity and Transformations

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'''(,)

SUMMARY

In your own words, describe what a composition is.