

# Geometry Unit 9: Dilation and similarity

Bronx Early College Academy

Christopher J. Huson PhD

13 March 2023 - 31 March 2023

9.1 Dilation introduction	13 March
9.2 Solving for $k$ , similarity	15 March
9.3 Overlapping triangle practice	16 March
9.4 Composition	17 March
9.5 Composition	21 March
9.6 Midline and medians	22 March
9.7 Midline and medians	24 March
9.8 Scaling	29 March
9.9 Scaling	30 March

# Learning Target: I can dilate a triangle

HSG.SRT.B.5 Use similarity criteria for triangles to solve problems

9.1 Monday 13 March

Do Now

1.  $12 \times \frac{1}{3} =$

2.  $10 \times \frac{7}{5} =$

3. Find  $x$  if  $9 \cdot x = 15$

Lesson: Dilation, transformations, fraction operations

Test results, check Jumprope

Homework: Complete the classwork practice, Deltamath problem set

## A dilation centered at the origin with scale factor $k = 2$

$$\triangle ABC \rightarrow \triangle A'B'C'$$

$$A(0, 0) \rightarrow A'(0, 0)$$

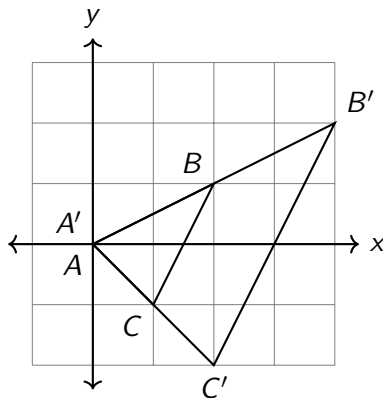
$$B(2, 1) \rightarrow B'(4, 2)$$

$$C(1, -1) \rightarrow C'(2, -2)$$

**Dilation** A transformation stretching objects on the plane by a scale factor away from a point

**Center** Dilation stretches figures away from a stationary point, the “center of dilation”

**Scale factor** The ratio  $k$  of the lengths of the corresponding sides of dilated figures

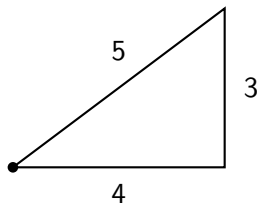


## Learning Target: I can identify and explain similarity

HSG.SRT.B.5 Use similarity criteria for triangles to solve problems

9.2 Wednesday 15 March

Do Now: A triangle with side lengths 3, 4, and 5 is dilated by a factor of  $k = 2$  centered at one of its vertices. Find the lengths of the image's sides.



Lesson: Similar objects, solving for scale factor  $k$

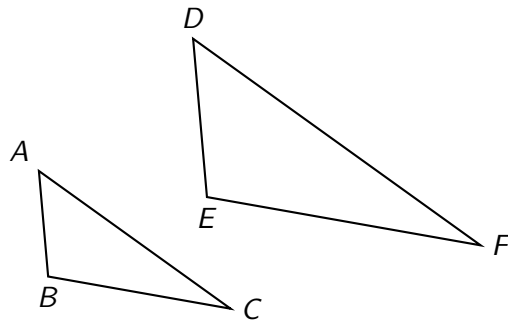
Homework: Complete the classwork practice, Deltamath problem set

# Similarity, corresponding parts, and scaled proportions

**Similarity** Objects with the same shape, but not necessarily the same size, are similar. Their corresponding angles are congruent and their corresponding sides are proportional.

**Notation** This is the symbol for similar triangles:  $\triangle ABC \sim \triangle DEF$

**Definition** Two figures are similar if one or more rigid motions and a dilation will carry one figure onto the other.



# Learning Target: I can solve overlapping similar triangles

HSG.SRT.B.5 Use similarity criteria for triangles to solve problems

9.3 Thursday 16 March

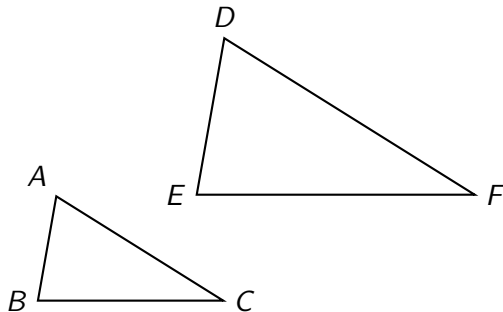
Do Now: Given  $\triangle ABC \sim \triangle DEF$ ,  $k = 2$

If  $BC = 4$ , find  $EF$

If  $m\angle B = 80^\circ$ , find  $m\angle E$

Lesson: Flexibly applying similarity to situations

Homework: Complete the classwork practice, Deltamath problem set

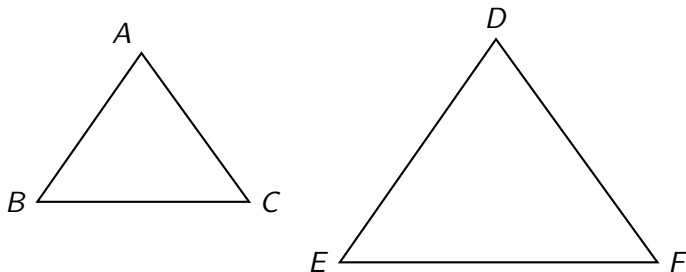


“Solve” a triangle by finding all of its sides' and angles' measures

Given  $\triangle ABC \sim \triangle DEF$

$BC = 4$ ,  $EF = 6$ ,  $AB = 3$

$m\angle B = 55^\circ$ ,  $m\angle D = 70^\circ$





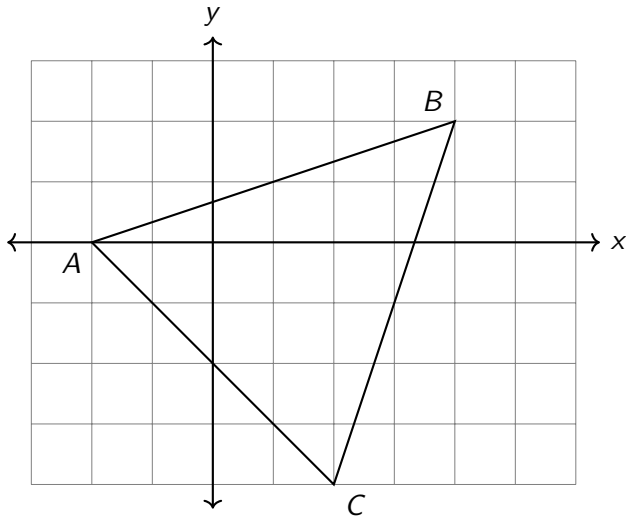
Apply a dilation centered at the origin with scale factor  $k = \frac{1}{2}$

$$\triangle ABC \rightarrow \triangle A'B'C'$$

$$A(-2, 0) \rightarrow$$

$$B(4, 2) \rightarrow$$

$$C(2, -4) \rightarrow$$



Apply a dilation centered at the origin with scale factor  $k = \frac{1}{2}$

$$\triangle ABC \rightarrow \triangle A'B'C'$$

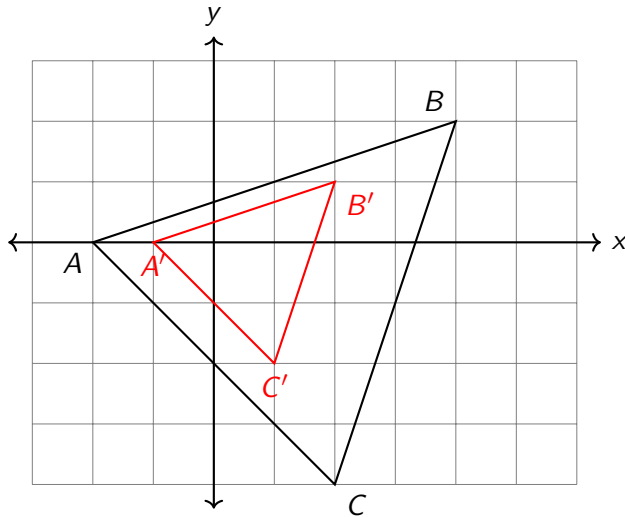
$$A(-2, 0) \rightarrow A'(-1, 0)$$

$$B(4, 2) \rightarrow B'(2, 1)$$

$$C(2, -4) \rightarrow C'(1, -2)$$

Note:

Slope is invariant under dilation



# Learning Target: I can compose dilations with other transformations

HSG.SRT.B.5 Use similarity criteria for triangles to solve problems

9.4 Friday 17 March

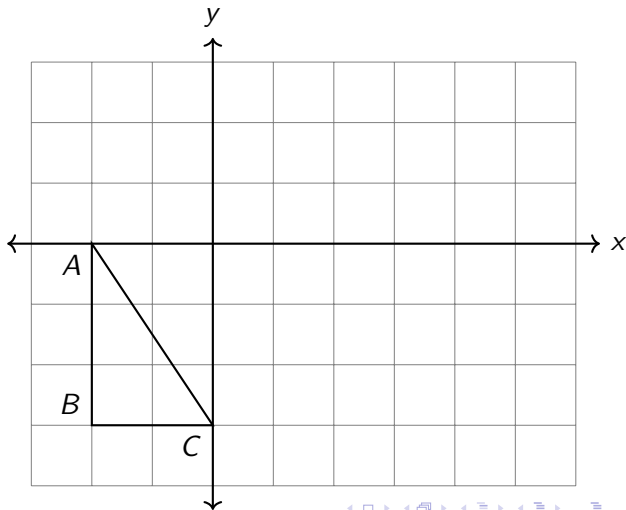
Do Now:

First reflect  $\triangle ABC$  over the  $y$ -axis

Then slide it up one and the right 3

Lesson: Applying dilation and rigid motions in compositions

Homework: Complete the classwork practice, Deltamath problem set



# Learning Target: I can compose dilations with other transformations

HSG.SRT.B.5 Use similarity criteria for triangles to solve problems

9.4 Friday 17 March

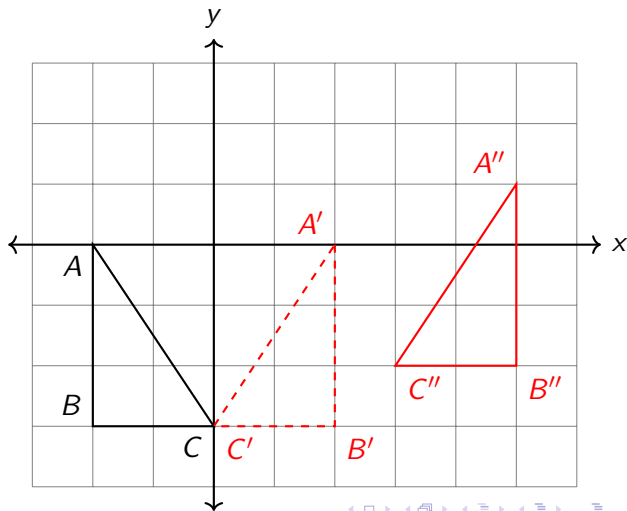
Do Now:

First reflect  $\triangle ABC$  over the  $y$ -axis

Then slide it up one and the right 3

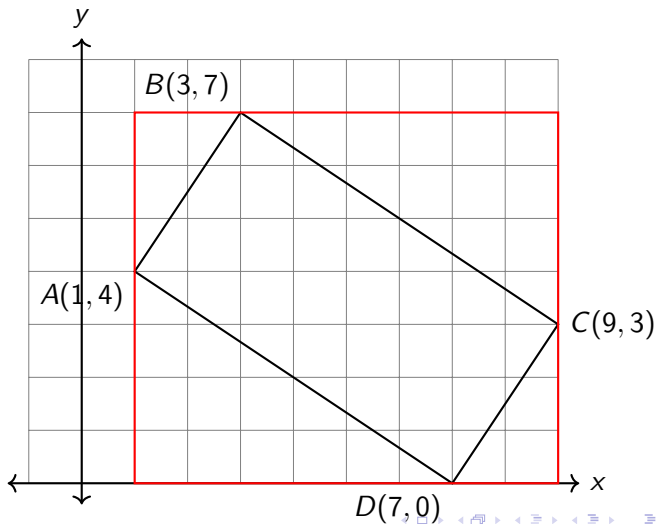
Lesson: Applying dilation and rigid motions in compositions

Homework: Complete the classwork practice, Deltamath problem set



# Find the area of the large and small rectangles

(use the areas of the small triangles)



# Learning Target: I can compose dilations with other transformations

HSG.SRT.B.5 Use similarity criteria for triangles to solve problems

9.5 Tuesday 21 March

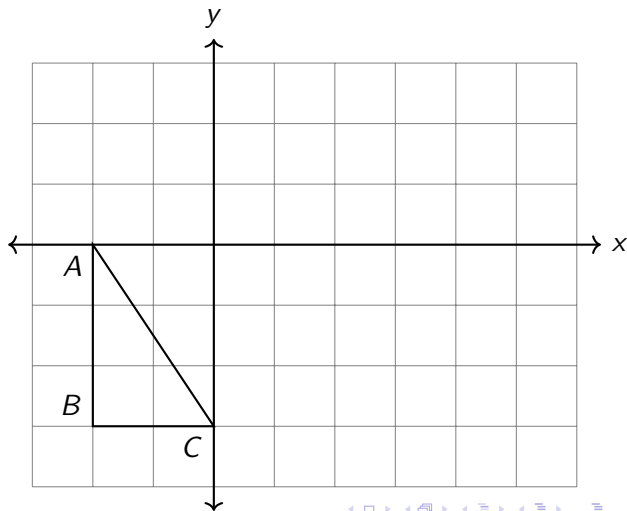
Do Now:

First reflect  $\triangle ABC$  over the  $y$ -axis

Then slide it up one and the right 3

Lesson: Applying dilation and rigid motions in compositions

Homework: Complete the classwork practice, Deltamath problem set



# Learning Target: I can compose dilations with other transformations

HSG.SRT.B.5 Use similarity criteria for triangles to solve problems

9.5 Tuesday 21 March

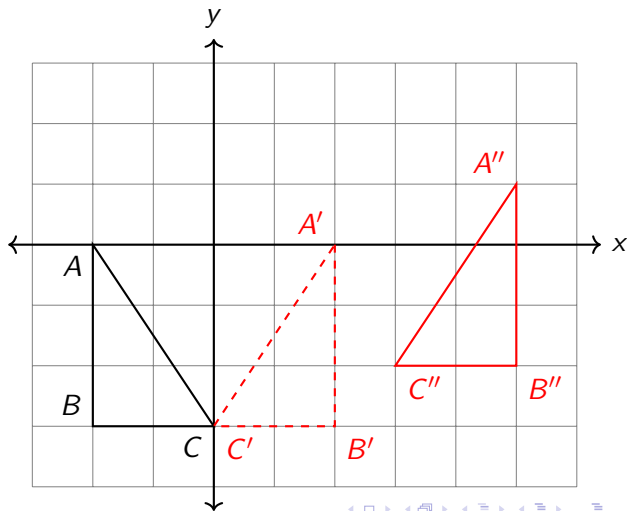
Do Now:

First reflect  $\triangle ABC$  over the  $y$ -axis

Then slide it up one and the right 3

Lesson: Applying dilation and rigid motions in compositions

Homework: Complete the classwork practice, Deltamath problem set



# Learning Target: I can plot triangle midlines and medians

HSG.SRT.B.5 Use similarity criteria for triangles to solve problems

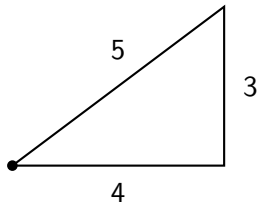
9.6 Wednesday 22 March

Do Now:

Rotating the triangle around its longer leg will make what 3-dimensional shape?

Lesson: Regents pointers. Be on time tomorrow.

Homework: Complete the classwork practice, Deltamath problem set





# Learning Target: I can plot triangle midlines and medians

HSG.SRT.B.5 Use similarity criteria for triangles to solve problems

9.7 Friday 24 March

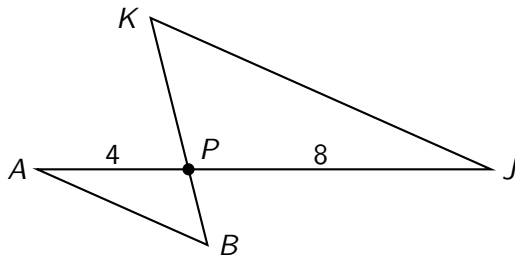
Do Now:

What sequence of transformations  
map similar triangles

$\triangle ABP \rightarrow \triangle JKP$ ?

Lesson: Midlines and triangle  
medians

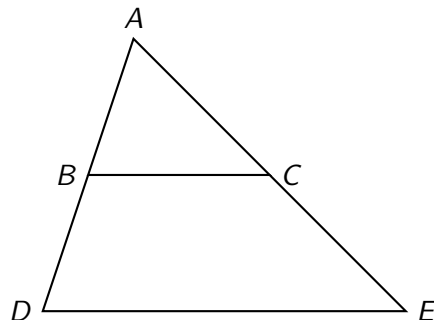
Homework: Complete the classwork  
practice, Deltamath problem set



# Triangle midline and medians create similar triangles

**Midpoint** The point on a segment that divides the segment into two equal parts.

**Midline** The line segment that connects the midpoints of two sides of a triangle.



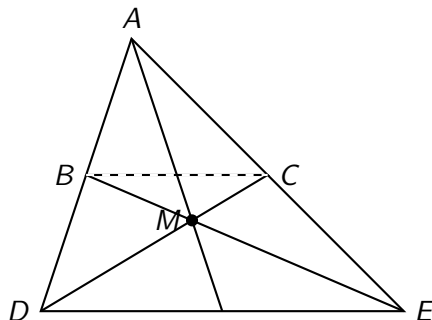
## Triangle midline and medians create similar triangles

**Midpoint** The point on a segment that divides the segment into two equal parts.

**Midline** The line segment that connects the midpoints of two sides of a triangle.

**Medians** Segments connecting a vertex to the midpoint of the opposite side.

**Centroid** The point where the three medians intersect.



# Learning Target: I can scale area and perimeter

HSG.SRT.B.5 Use similarity criteria for triangles to solve problems

9.8 Wednesday 29 March

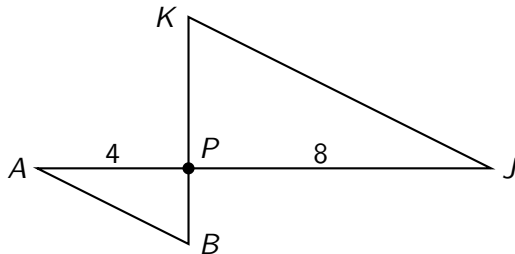
Do Now:

What sequence of transformations  
map similar triangles

$\triangle ABP \rightarrow \triangle JKP$ ?

Lesson: Scale factor  $k$ , area scales  
by  $k^2$ , volume by  $k^3$

Homework: Complete the classwork  
practice, Deltamath problem set



# Learning Target: I can prove triangles similar using AA similarity

HSG.SRT.B.5 Use similarity criteria for triangles to solve problems

9.9 Thursday 30 March

Do Now:

Given  $\triangle ABC \sim \triangle XYZ$ ,  $m\angle A = 50^\circ$ ,  $m\angle Y = 60^\circ$

Find the remaining angle measures.

Lesson: Triangles with congruent corresponding angles are similar

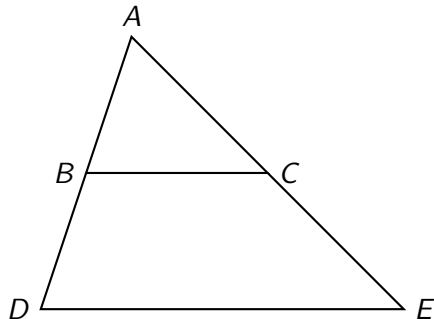
Homework: Complete the classwork practice, Deltamath problem set

# Theorem of AA Similarity

**Corresponding** Parts (sides or angles) of two triangles that are in the same position.

**AA Similarity** If two triangles have two corresponding angles congruent, then the triangles are similar.

**Converse** If two triangles are similar, then their corresponding angles are congruent.



# Notebook check scoring

Start quickly at the beginning of class: notebook, pencil, folder, calculator; get to work

Jumprope mastery score

1. I have a notebook  $\rightarrow$  1
2. I have class notes  $\rightarrow$  2
3. I have stars indicating I quickly sit down and write the learning target  $\rightarrow$  3
4. I have stars and I complete the Do Now right away  $\rightarrow$  4