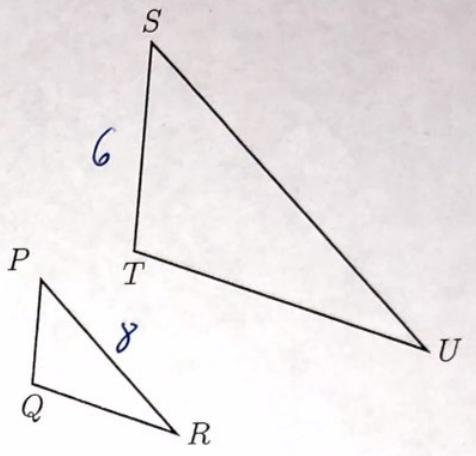
Name: Solutions

BECA / Dr. Huson / Geometry 7 Similarity

7.14 Exam: Similarity transformations

I can solve problems using similarity criteria. CCSS.HSG.SRT.B.5

1. A dilation maps triangle PQR onto triangle STU with $QR = 6$ and $TU = 12$.



(a) $\overline{PR} \rightarrow$ $\overline{SU}$

(b) What scale factor maps $\triangle PQR \rightarrow \triangle STU$?

$K = \frac{12}{6} = 2$

(c) Given $PR = 8$, find SU.

$SU = 2 \times 8 = 16$

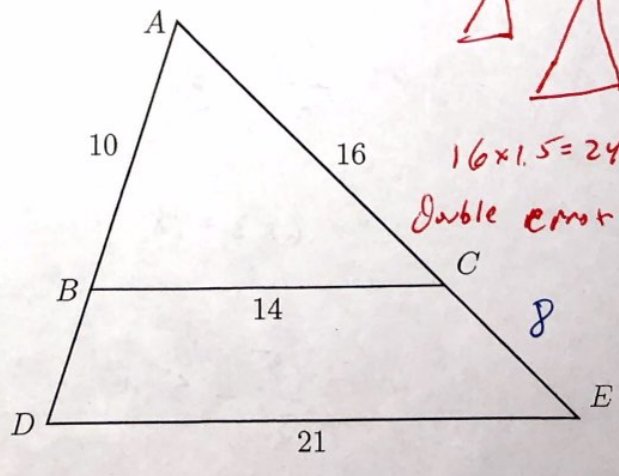
(d) Given $ST = 6$, find PQ.

$PQ = \frac{6}{2} = 3$

2. Given $\triangle ABC \sim \triangle DEF$, $m\angle A = 55°$, and $m\angle B = 95°$. Find $m\angle E$.

$m\angle E = 95°$

3. Triangle ABC is dilated with a scale factor of k centered at A, yielding $\triangle ADE$, as shown. Given $AB = 10$, $BC = 14$, $AC = 16$, and $DE = 21$.



(a) Find the scale factor, k

$K = \frac{21}{14} = \frac{3}{2}$

(b) Find AD

$AD = \frac{3}{2} \times 10 = 15$

(c) Find CE

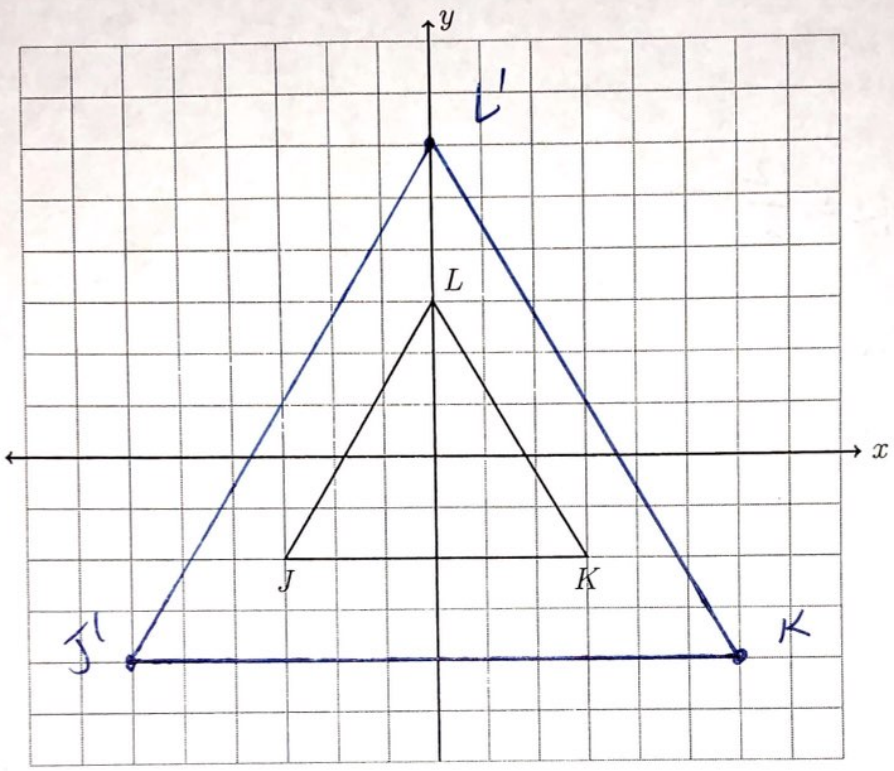
$AE = \frac{3}{2} \times 16 = 24$

$CE = 24 - 16 = 8$

$16 \times 1.5 = 24 - 16 = 8 = CE$

Double error

4. Dilate $\triangle JKL$ with a scale factor $k = 2$ centered on the origin. Draw the image $\triangle J'K'L'$ and label its vertices. Given $J(-3, -2)$, $K(3, -2)$, and $L(0, 3)$.



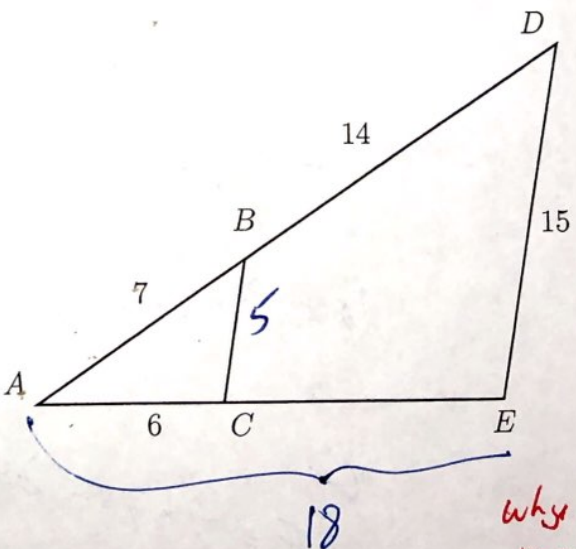
5. In the diagram below, $\angle ABC \cong \angle ADE$, $AB = 7$, $AC = 6$, $BD = 14$, and $DE = 15$. Find AD and the scale factor k. Then find AE and BC.

(a) $AD =$ $7+14=21$

(b) $k =$ $\frac{21}{7} = 3$

(c) $AE =$ $6 \times 3 = 18$

(d) $BC =$ $\frac{15}{3} = 5$



why is
$k=2$
$AE=18$
$BC=7.5$
wrong?

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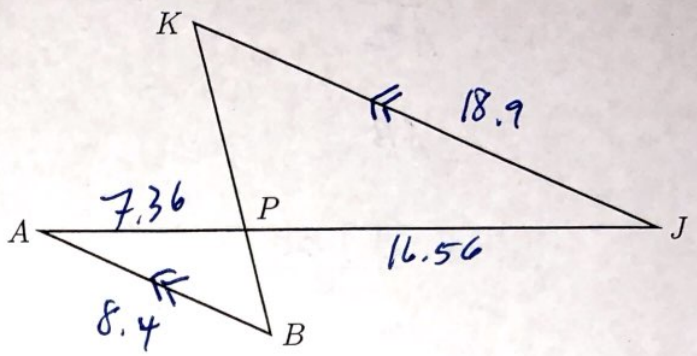
6. Given $\triangle ABP$ and $\triangle JKP$ as shown below. $\overline{AB} \parallel \overline{JK}$. $AP = 7.36$, $JP = 16.56$, and $JK = 18.9$. Find AB.

$\triangle ABP \to \triangle JKP$

$k = \frac{16.56}{7.36} = 2.25$

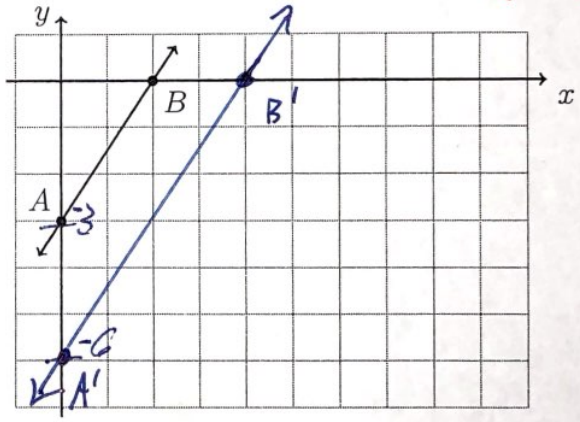
$AB = \frac{18.9}{2.25} = 8.4$



7. The line $\overleftrightarrow{AB}$ has the equation $y = \frac{3}{2}x - 3$. Apply a dilation mapping $\overleftrightarrow{AB} \to \overleftrightarrow{A'B'}$ with a factor of $k = 2$ centered at the origin. Draw and label the image on the grid. Write the equation of the line $\overleftrightarrow{A'B'}$.

error

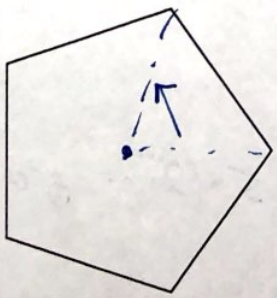
$y = \frac{3}{2x} - 6$



$y = \frac{3}{2}x - 6$

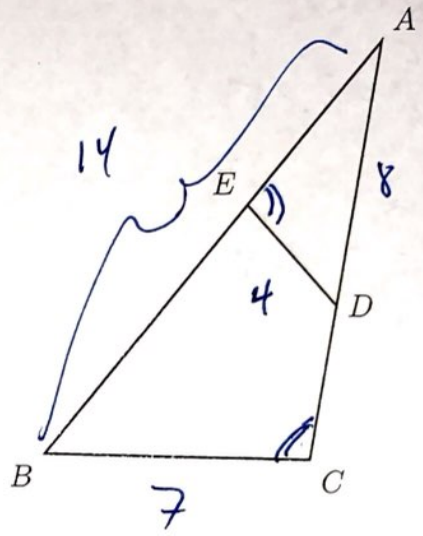
8. What is the smallest non-zero angle of rotation about its center that would map the pentagon onto itself?

$\theta = \frac{360}{5} = 72°$



which rotations would map onto? Smallest

9. The diagram below shows $\triangle ABC$, with $\overline{AEB}$, $\overline{ADC}$, and $\angle ACB \cong \angle AED$. $AB = 14$, $AD = 8$, and $DE = 4$.



(a) $\overline{AE} \rightarrow$ $\overline{AC}$

(b) $\overline{AD} \rightarrow$ $\overline{AB}$

(c) $\triangle ADE \sim$ $\triangle ABC$

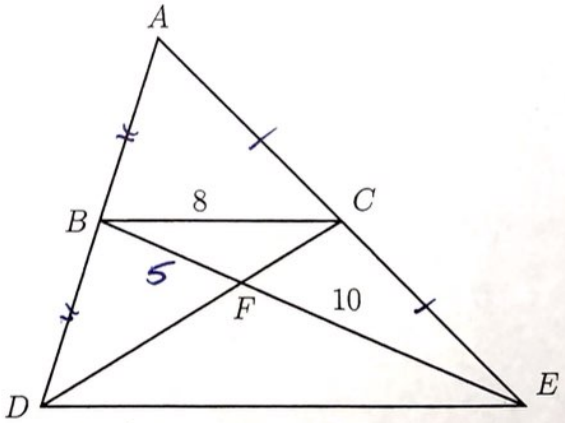
(d) What is the scale factor?

$k =$ $\frac{14}{8} = \frac{7}{4}$

(e) What is the length of $\overline{BC}$?

$BC = 4 \times \frac{7}{4} = 7$

10. Triangle ADE and its midline $\overline{BC}$ are drawn, with B the midpoint of $\overline{AD}$ and C the midpoint of $\overline{AE}$. The two medians $\overline{BE}$ and $\overline{CD}$ are drawn, as shown, intersecting in point F, the centroid. Given $BC = 8$, $FE = 10$.



(a) Write down DE.

16

(b) Given $\triangle FCB \sim \triangle FDE$ with scale factor $k = 2$.

Find BF.

$BF = \frac{10}{2} = 5$

(c) Given the area of $\triangle FCB = 12.5$, find the area of $\triangle FDE$.

$A_{\triangle FDE} = 12.5 \times (2)^2 = 50$

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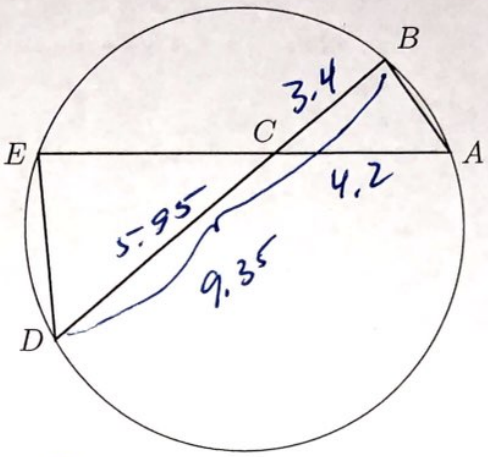
11. In the diagram below, the chords $\overline{AE}$ and $\overline{BD}$ intersect at C, with $\triangle ABC \sim \triangle DEC$, $BC = 3.4$, $AC = 4.2$, and $BD = 9.35$. Determine the length of $\overline{CE}$.



$CD = 9.35 - 3.4$

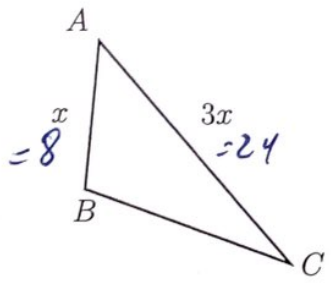
$= 5.95$

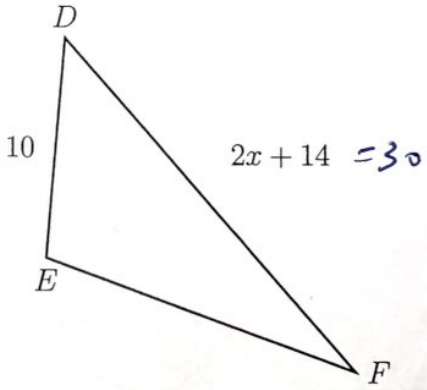
$\overline{AC} \to \overline{DC}$

$k = \frac{5.95}{4.2} = 1\frac{5}{12}$

$CE = 3.4 \times 1\frac{5}{12} = 4.81\overline{6}$

12. In the diagram below $\triangle ABC \sim \triangle DEF$, $DE = 10$, $AB = x$, $AC = 3x$, $DF = 2x + 14$. Determine the length of $\overline{AB}$.





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

$DF = 3x * \frac{10}{x} = 2x + 14$

$30 = 2x + 14$

$x = 8$

check

$k = \frac{5}{4}$ ✓

13. In triangle ABC, points D and E are on sides of $\overline{AB}$ and $\overline{BC}$, respectively, such that $\overline{DE} \parallel \overline{AC}$, and $BD : DA = 5 : 3$.

If $DB = 9.0$ and $DE = 10.5$, what is the length of $\overline{AC}$, to the *nearest tenth*?

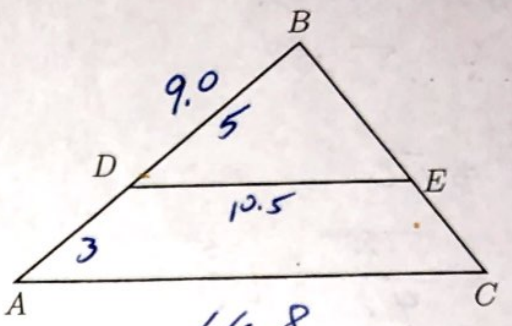
$\overline{BD} \to \overline{BA}$

$5 \to 8$

$k = \frac{8}{5}$

$AC = 10.5 \times \frac{8}{5}$

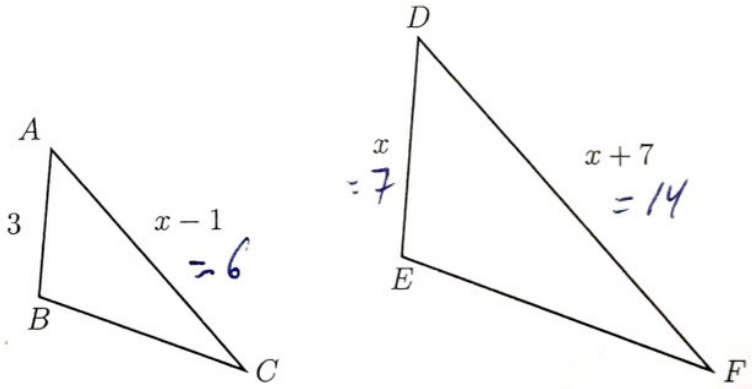
$= 16.8$



14. In the diagram below $\triangle ABC \sim \triangle DEF$, $DE = x$, $AB = 3$, $AC = x - 1$, $DF = x + 7$.

Find x.

$\triangle ABC \to \triangle DEF$



$k = \frac{x}{3}$

$DF = (x-1)\frac{x}{3} = x + 7$

$x^2 - x = 3x + 21$

$x^2 - 4x - 21 = 0$

$(x - 7)(x + 3) = 0$ (disregard negative 3)

$x = 7$

check $k = \frac{7}{3}$ ✓