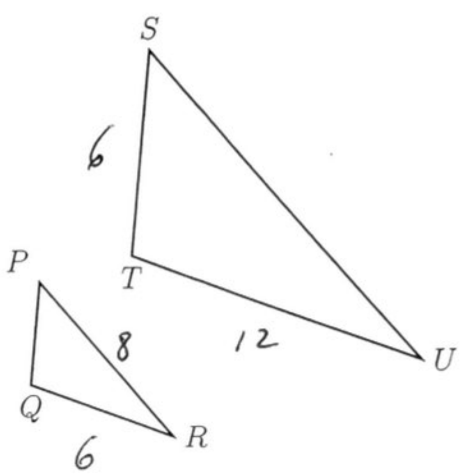
BECA / Dr. Huson / Geometry
Unit 10: Similarity and proportions
31 March 2023

Name: SOLUTIONS

9.10 Classwork: 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) $\overline{PR} \to$ $\overline{SU}$

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

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

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

   $SU = 2(8) = 16$

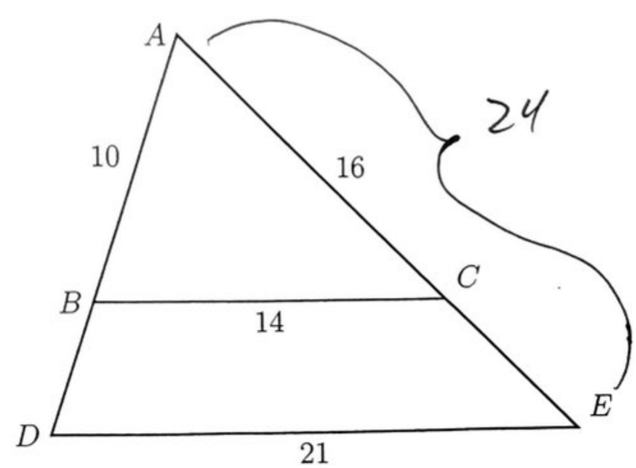
   (d) Given $ST = 6$, find PQ.

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

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

   $m\angle E = m\angle B = 95°$

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

   $14 \to 21$

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

   (b) Find AD

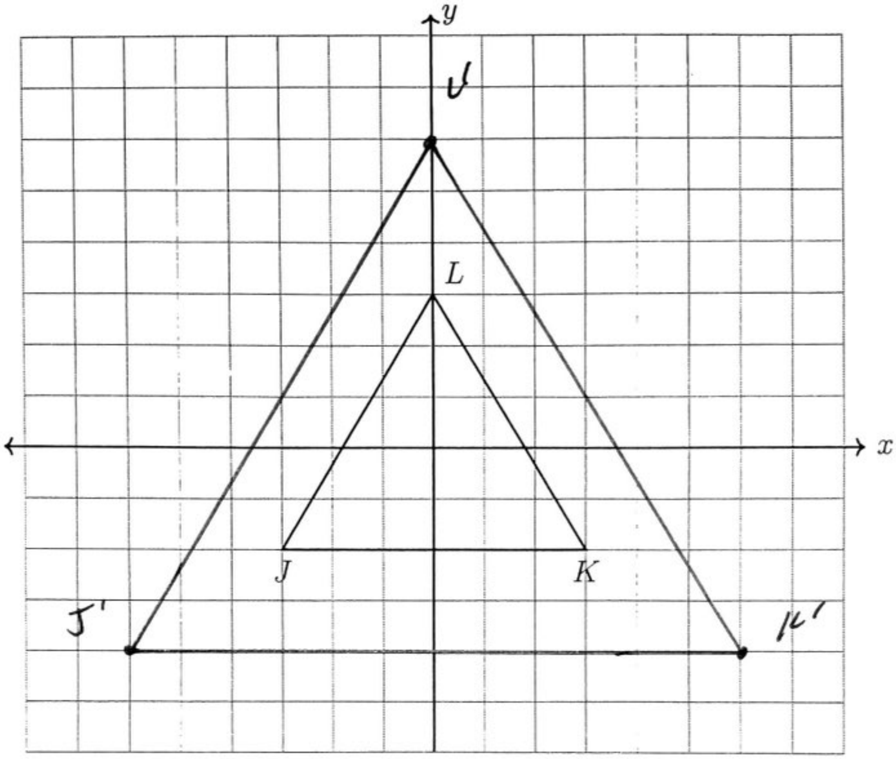
   $AD = \frac{3}{2}(10) = 15$

   (c) Find CE

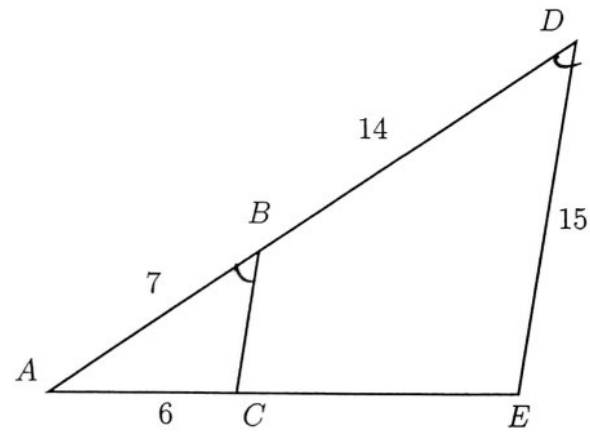
   $AE = \frac{3}{2}(16) = 24$

   $CE = 24 - 16 = 8$

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) $AD =$ 21

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

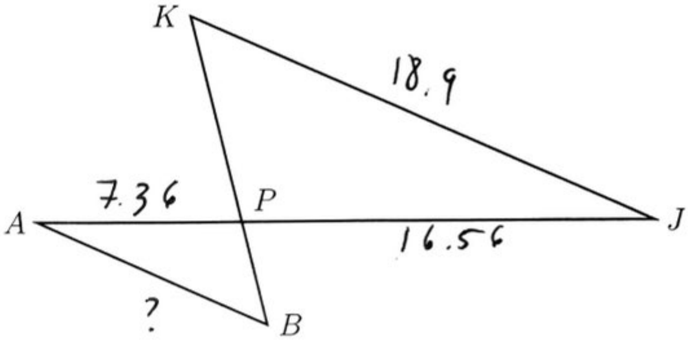
(c) $AE =$ $3(6) = 18$

(d) $BC =$ $\frac{15}{(3/2)} = 10$

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.

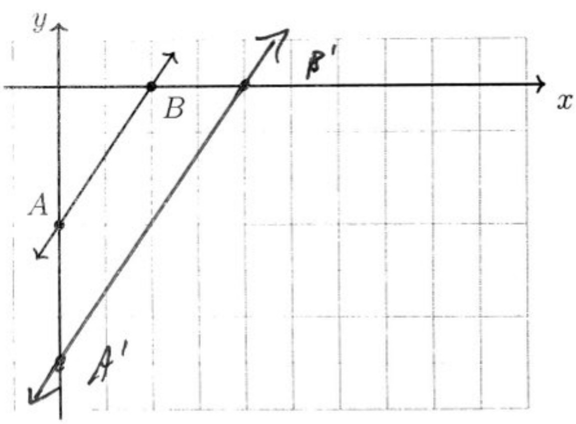
$k = \frac{16.56}{7.36}$

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

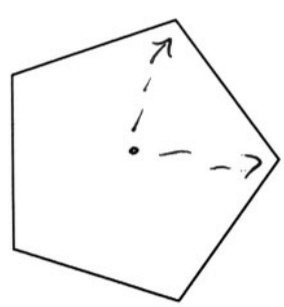


7. The line $\overleftrightarrow{AB}$ has the equation $y = \frac{3}{2}x - 3$. Apply a dilation mapping $\overleftrightarrow{AB} \rightarrow \overleftrightarrow{A'B'}$ with a factor of $k = 2$ centered at the origin. Draw and label the image on the grid. Write the equation of the line $\overleftrightarrow{A'B'}$.

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



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



$\frac{360}{5} = 72°$

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

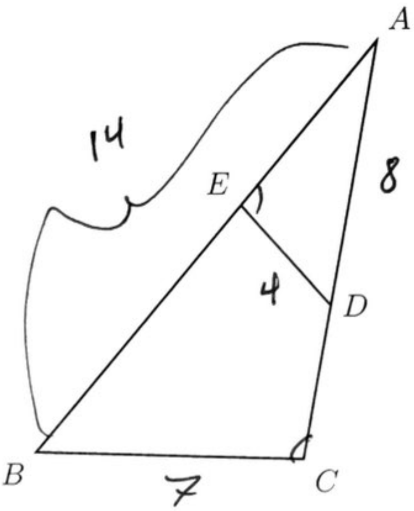
   (c) $\triangle ADE \sim$ $\triangle ABC$

   (d) What is the scale factor?

   $k = \frac{14}{8} = 1.75$

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

   $BC = 1.75(4) = 7$



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

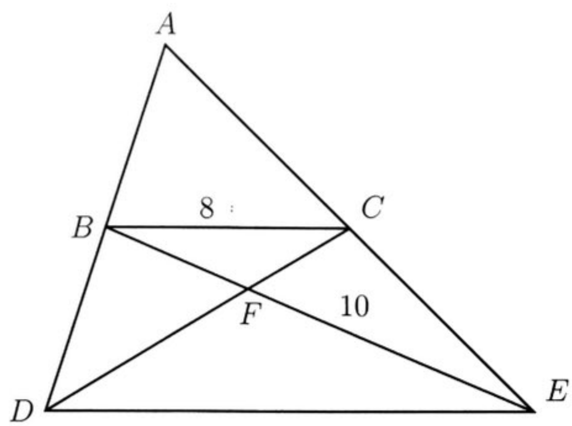
    (b) Given $\triangle FCB \sim \triangle FDE$ with scale factor $k = 2$.

    Find BF.

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

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

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



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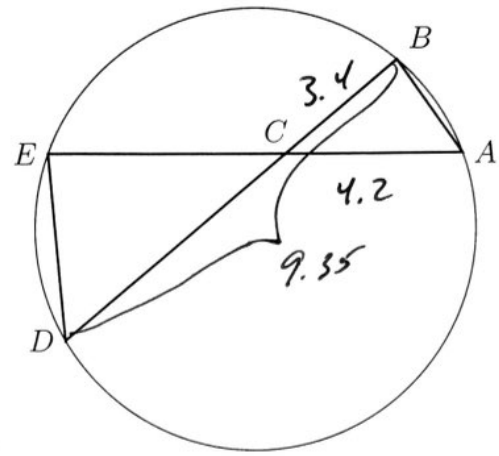
11. In the diagram below, the chords $\overline{AE}$ and $\overline{BD}$ intersect at C, with $\triangle ABC \sim \triangle DEC$, $BC = 3.4$, $AC = 4.2$, and $BD = 9.35$. Determine the length of $\overline{CE}$.

$CD = 9.35 - 3.4$
$= 5.95$

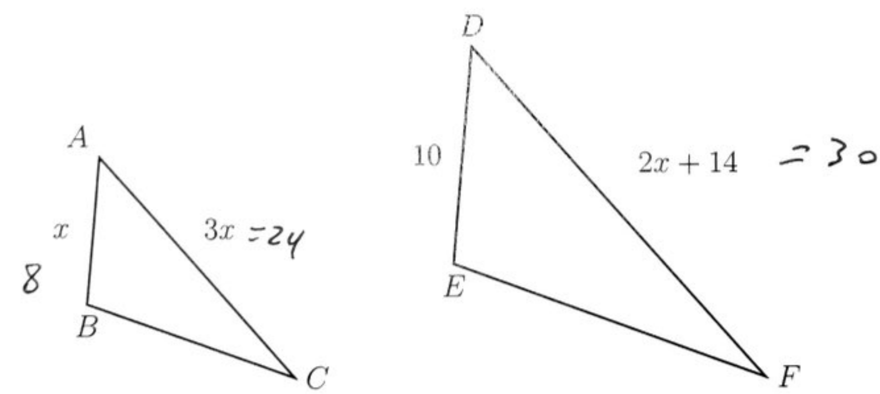
$4.2 \to 5.95$

$K = \frac{5.95}{4.2}$



$CE = \frac{5.95}{4.2}(3.4) = 4.81\bar{6}$

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



$x \to 10$ $3x \to 2x+14$

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

$30 = 2x+14$
$x = 8$
$AB = 8$

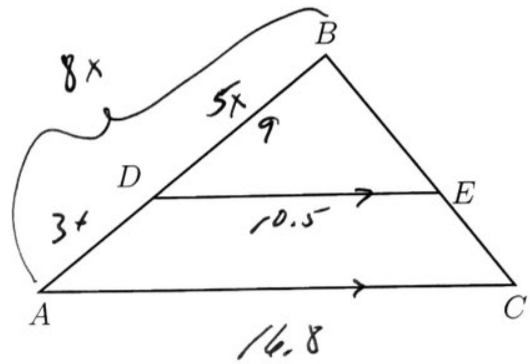
check
$K = 1\frac{1}{4}$
$8(1\frac{1}{4}) = 10$ ✓
$24(1\frac{1}{4}) = 30$ ✓

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*?

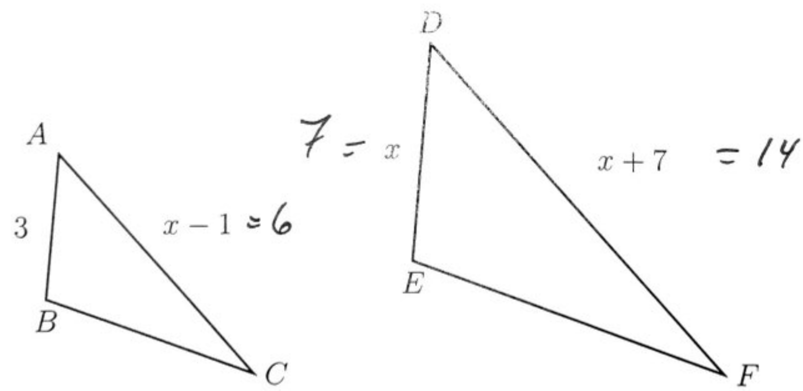
$$K = \frac{8}{5}$$

$$AC = 10.5\left(\frac{8}{5}\right) = 16.8$$



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

Find x.



check

$$\frac{7}{3} \stackrel{?}{=} \frac{14}{6} \checkmark$$

$$K = \frac{x}{3} = \frac{x+7}{x-1}$$

$$x(x-1) = 3(x+7)$$

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

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

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

$$x = 7$$

Disregard $x = -3$