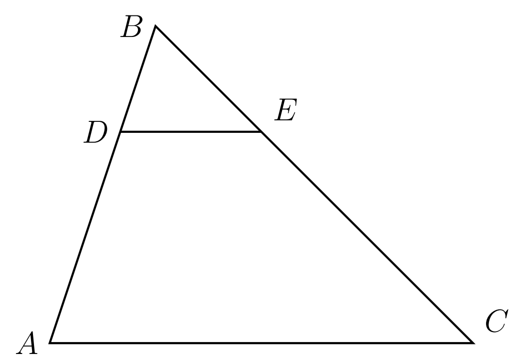
Unit 9: Congruence & similarity transformations Name:
2 March 2020

9.7 Classwork: Similarity ratios, dilation, transformations, symmetry

1. Find the image of $P(1,-4)$ after the translation $(x,y) \rightarrow (x-5, y+4)$.

2. Given $\triangle ABC \sim \triangle DEF$. $m\angle A = 90°$ and $m\angle F = 45°$. Find the measure of $\angle D$.

3. In the diagram of $\triangle ABC$, D is a point on $\overline{BA}$, E is a point on $\overline{BC}$, and $\overline{DE}$ is drawn. If $BD = 6.5$, $DA = 13$, and $BE = 8$, what is the length of $\overline{BC}$ so that $\overline{AC} \parallel \overline{DE}$?



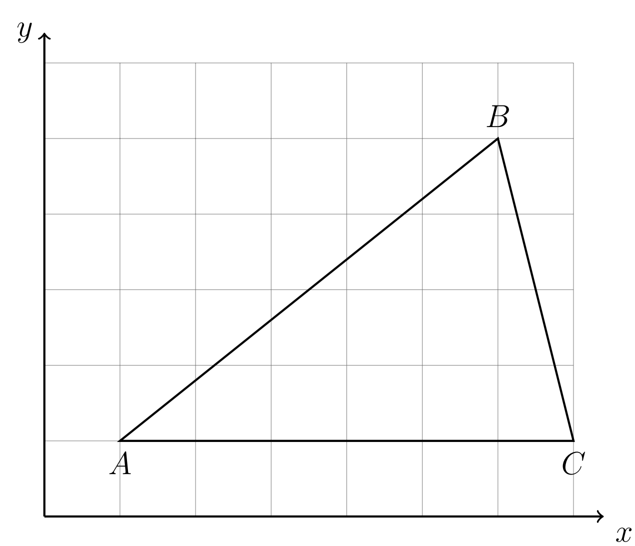
4. (a) In diagram below, each centimeter represents one foot. Find the length of each side in feet. (measure with a metric scale)

   i. $AC =$

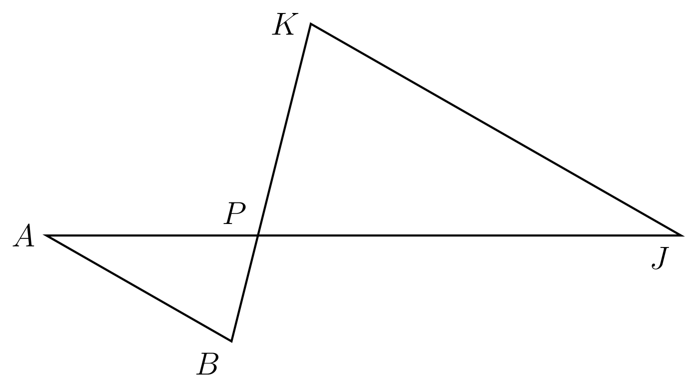
   ii. $BC =$

   iii. $AB =$

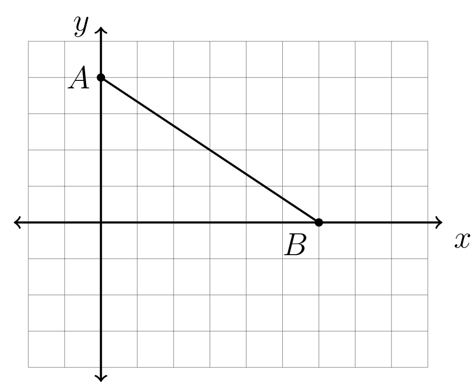
   iv. Find the area of $\triangle ABC$



5. Given $\triangle ABP \sim \triangle JKP$ as shown below. $AB = 13.5$, $AP = 10.0$, $BP = 9$, and $JP = 27.0$. Find JK.



6. A dilation centered at the origin with scale factor $k = \frac{1}{2}$ maps $\overline{AB} \to \overline{A'B'}$.



(a) Draw and label the image.

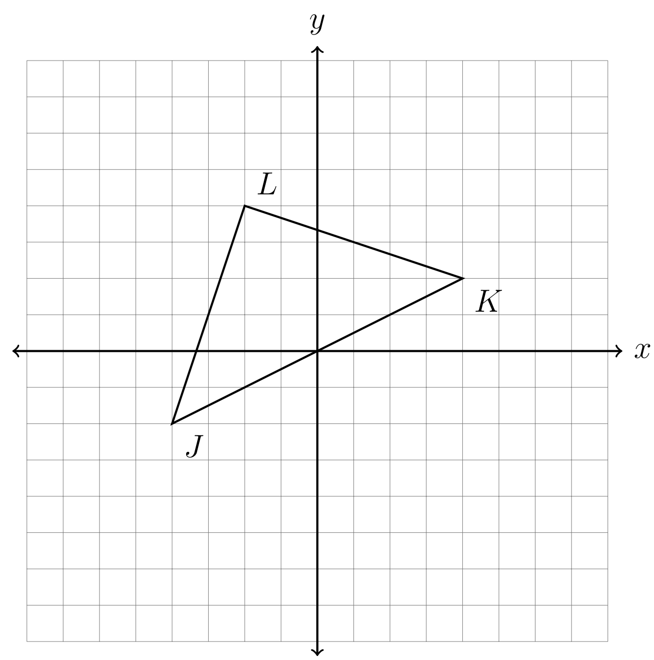
(b) What is the ratio of the length of $\overline{A'B'}$ to $\overline{AB}$?

(c) What is the relationship of the slope of $\overline{A'B'}$ and $\overline{AB}$?

7. A translation maps $N(-2, 7) \to N'(-4, 9)$. What is the image of $M(3, -1)$ under the same translation?

8. The vertices of $\triangle JKL$ have the coordinates $J(-4,-2)$, $K(4,2)$, and $L(-2,4)$, as shown.

   Apply a dilation to $\triangle JKL \to \triangle J'K'L'$, centered on the origin and with a scale factor $k = 1.5$. Draw the image $\triangle J'K'L'$ on the set of axes below, labeling the vertices, and make a table showing the correspondence of both triangles' coordinate pairs.



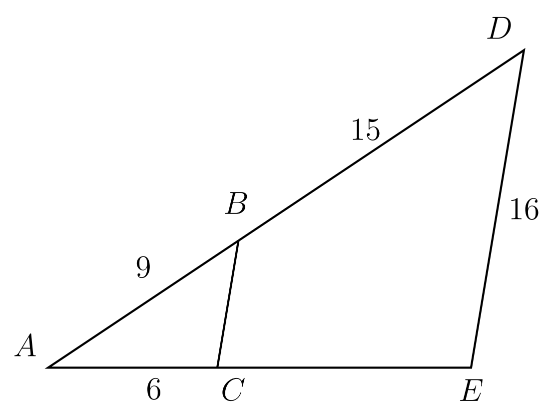
9. A dilation centered at A maps $\triangle ABC \to \triangle ADE$. Given $AB = 9$, $AC = 6$, $BD = 15$, and $DE = 16$. Find AD and the scale factor k. Then find AE and BC.

   (a) $AD =$

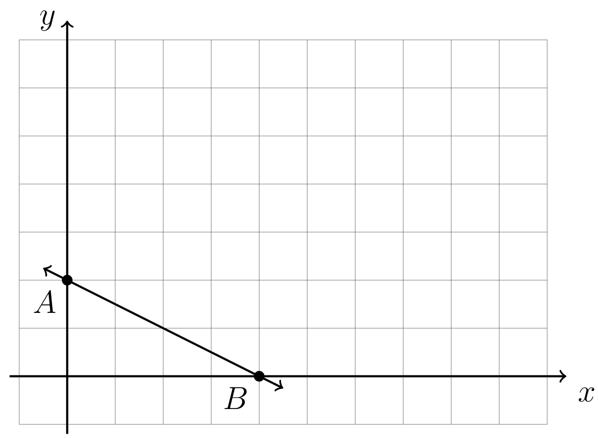
   (b) $k =$

   (c) $AE =$

   (d) $BC =$



10. The line $\overleftrightarrow{AB}$ has the equation $y = -\frac{1}{2}x + 2$. 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 $\overleftrightarrow{A'B'}$.

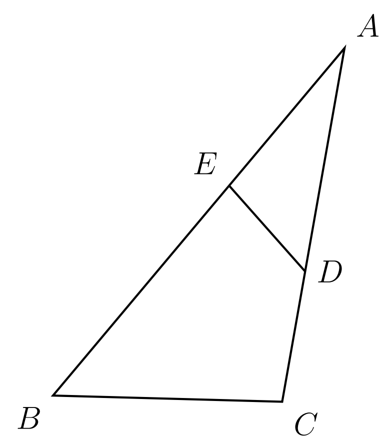


11. The diagram below shows $\triangle ABC$, with $\overline{AEB}$, $\overline{ADC}$, and $\angle ACB \cong \angle AED$. $AB = 18$, $AD = 12$, $AE = 9$, and $DE = 7$. Find the scale factor k, AC, and BC.

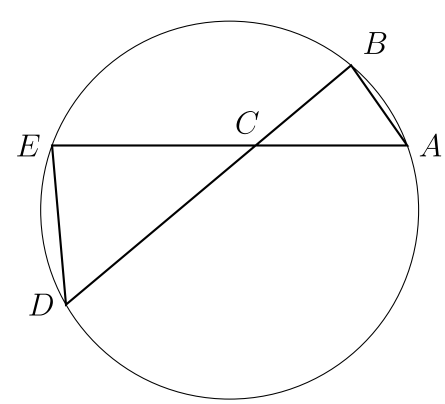
(a) $k =$

(b) $AC =$

(c) $BC =$

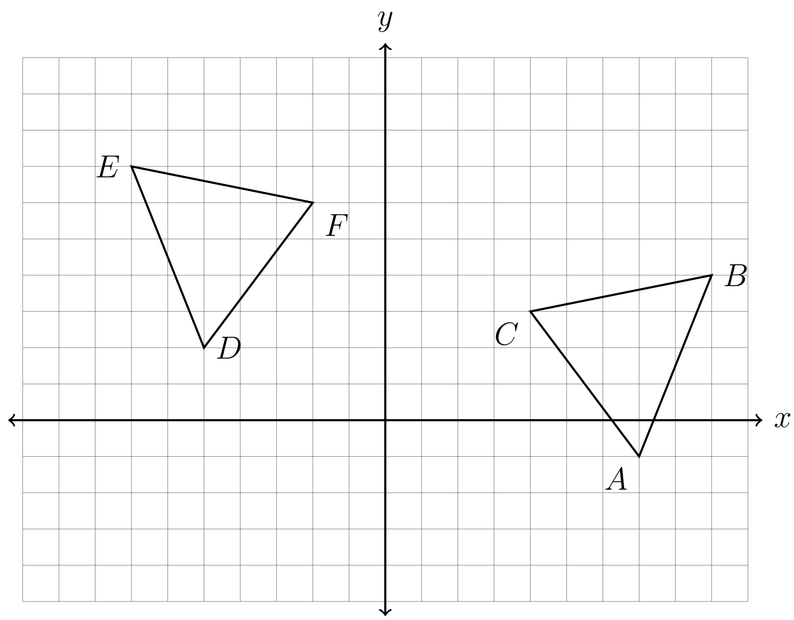


12. In the diagram below, the chords $\overline{AE}$ and $\overline{BD}$ intersect at C. Given $\triangle ABC \sim \triangle DEC$, $BC = 6$, $CD = 10$, and $CE = 8$. Determine the length of $\overline{CA}$.

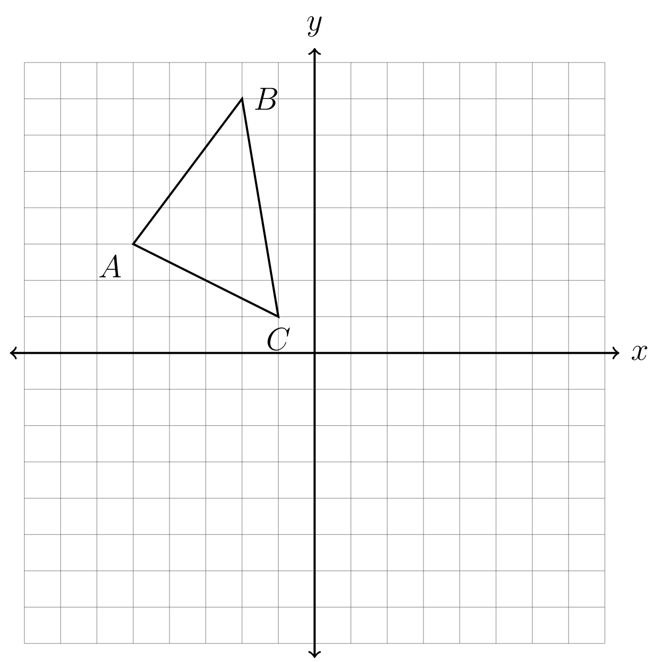


Congruence transformations

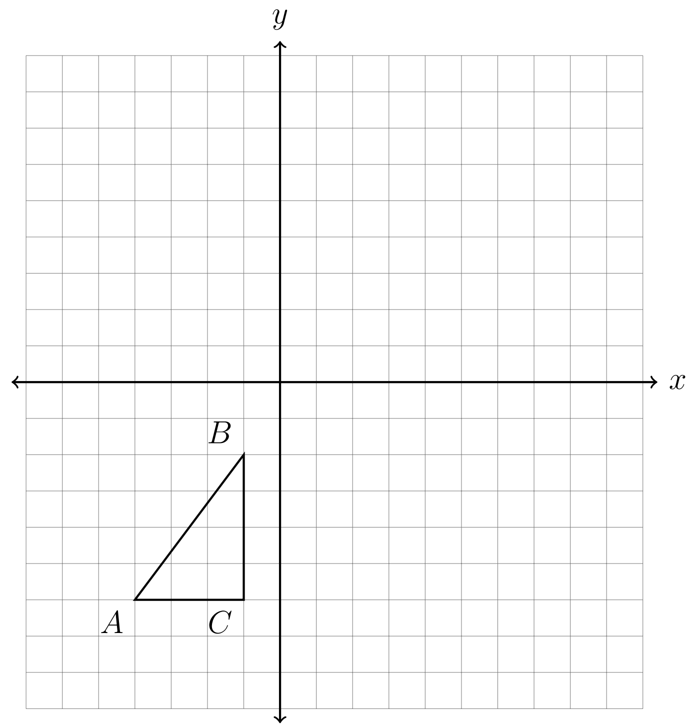
13. What transformation or series of transformations map $\triangle ABC$ onto $\triangle DEF$, shown below? Fully specify the transformation(s).



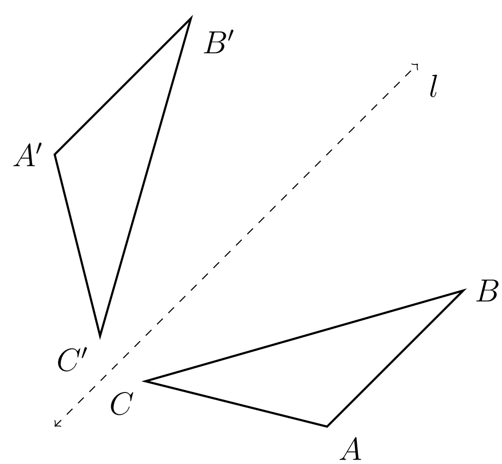
14. Reflect $\triangle ABC$ over the y-axis. Make a table of the coordinates and plot and label the image on the axes.



15. Rotate $\triangle ABC$ $90°$ counterclockwise around the origin, yielding $\triangle A'B'C'$. Then translate it by $(x, y) \to (x + 2, y + 7)$. Make a table of the coordinates showing $\triangle ABC \to \triangle A'B'C' \to \triangle A''B''C''$ and plot and label the images on the axes.



16. The $\triangle ABC$ is reflected across l to yield $\triangle A'B'C'$. $AB = 4x + 4$, $A'B' = 7x - 8$, and $BC = 5x + 10$. Find the length $B'C'$.



Using the distance formula to prove an isosceles triangle

17. In this problem use the following theorem (copy it at the bottom of the page after your calculations):

    A triangle is isosceles if and only two of its sides are congruent.

    Shown below is triangle ABC, $A(-2, 2)$, $B(4, 5)$, and $C(1, -1)$.

    Prove it is an isosceles triangle by

    (a) finding the length of each of the three sides,
    (b) stating which sides are congruent,
    (c) copying the theorem as your conclusion, adding *therefore* $\triangle ABC$ *is isosceles.*