

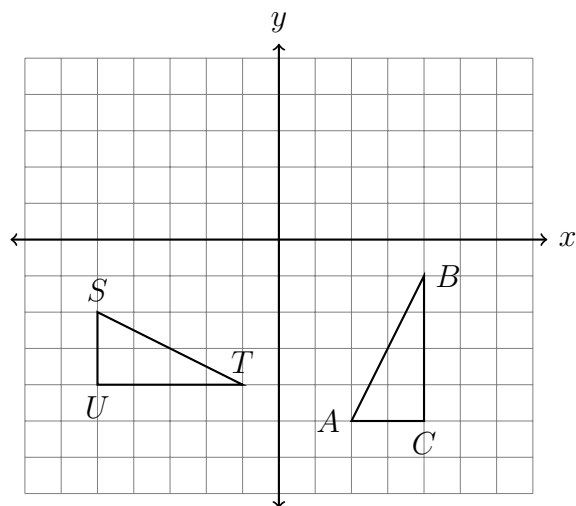
6 March 2020

**9.9 Exam: Congruence and similarity transformations, compositions**

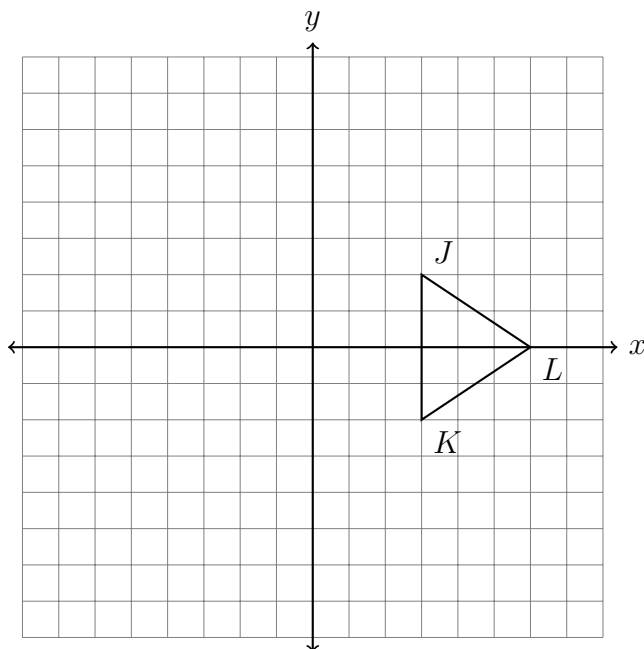
1. State the translation that would map  $M(-2, 9)$  onto  $M'(-1, 8)$ .

2. On the set of axes below,  $\triangle ABC \cong \triangle STU$ .

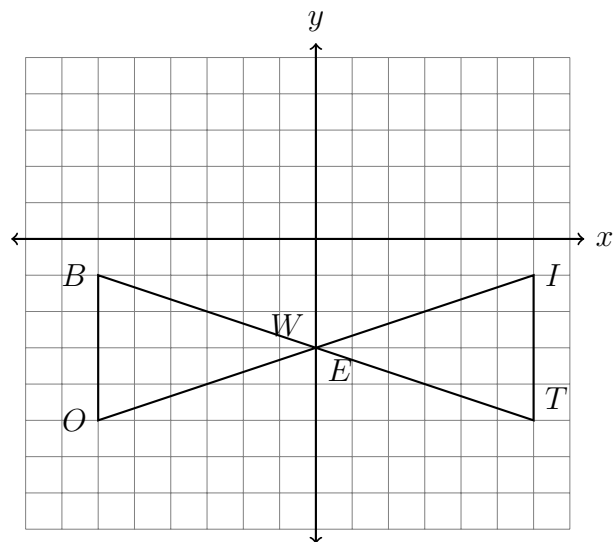
Describe the rigid motion that maps  $\triangle ABC$  onto  $\triangle STU$ .



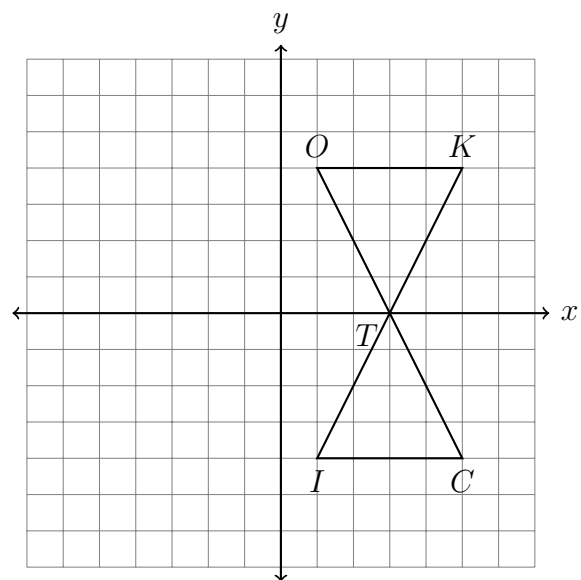
3. Rotate  $\triangle JKL$   $90^\circ$  clockwise around the origin on the axes below, labeling the image  $\triangle J'K'L'$ .



4. Determine and state the transformation mapping  $\triangle BOW$  onto  $\triangle TIE$ .



5. Describe a rigid motion that maps  $\triangle TIC$  onto  $\triangle TOK$ .



6. Find the coordinates of the image of the point  $D(3, 5)$  after a reflection across the  $x$ -axis.

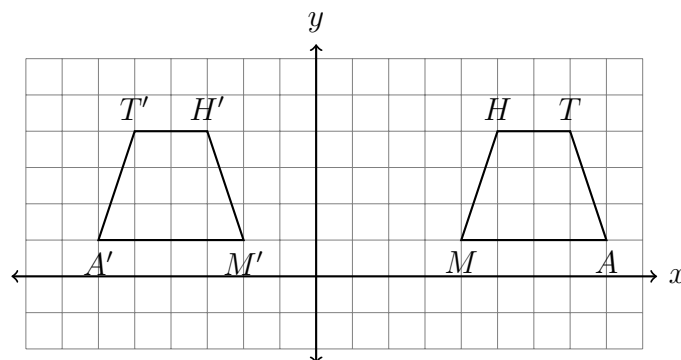
7. The quadrilateral  $MATH$  is mapped to  $M'A'T'H'$  by a rigid motion. What transformation has been applied?

(a) Dilation

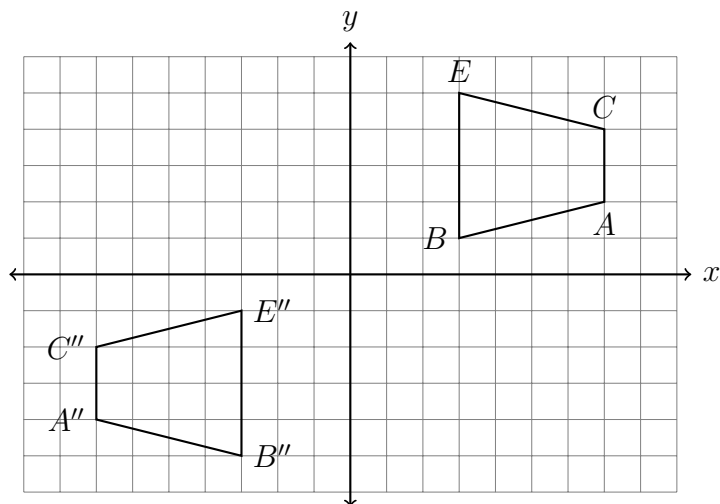
(b) Reflection

(c) Rotation

(d) Translation



8. Determine and state the sequence of transformations applied to map  $BECA$  to  $B''E''C''A''$ .



9. Which of the following would map  $\triangle DOG \rightarrow \triangle D'O'G'$ ?

T F  $(x, y) \rightarrow (x - 6, y + 0)$

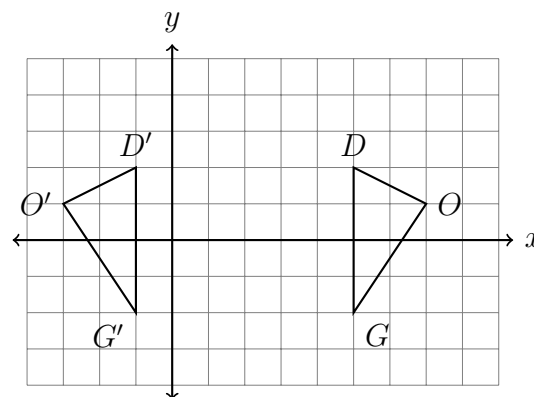
T F Rotated  $90^\circ$  clockwise around  $(2, 0)$

T F Reflected across the  $y$ -axis

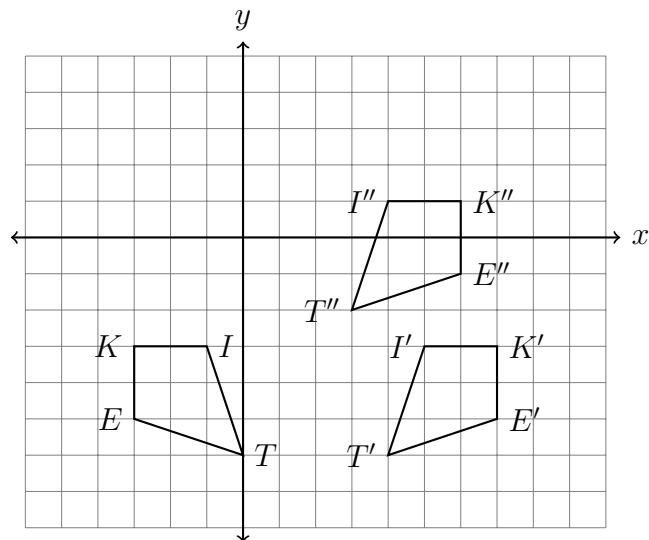
T F Translated six to the left, down zero

T F Slid to the left four, then reflected across the  $y$ -axis

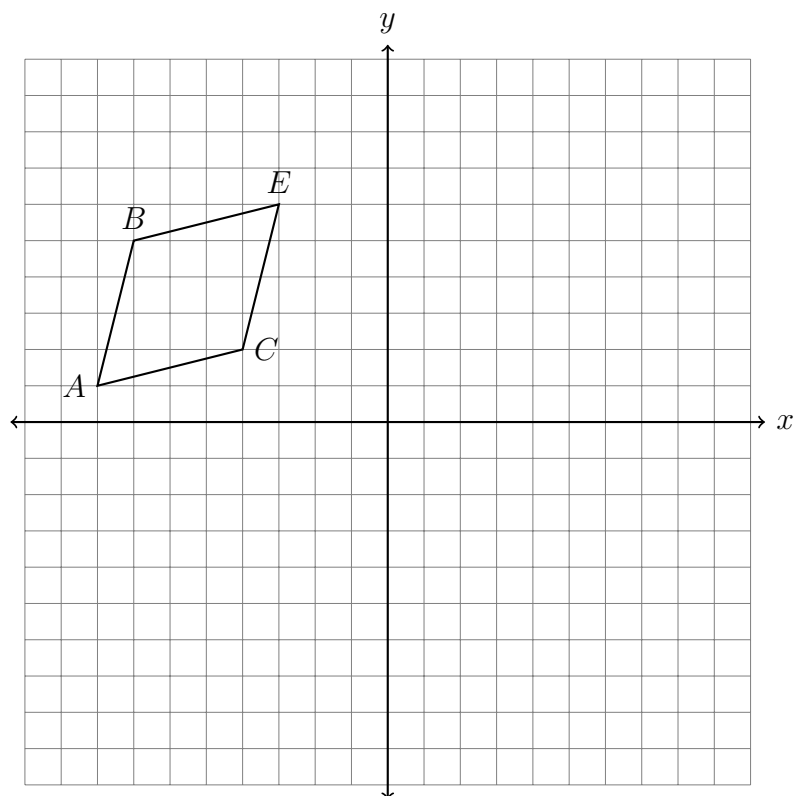
T F Reflected across the line  $x = 2$



10. The quadrilateral  $KITE$  undergoes rigid motions, shown below. Describe the sequence of transformations applied.



11. Reflect the rhombus  $BECA$  across the  $x$ -axis, then translated  $(x, y) \rightarrow (x + 4, y + 2)$ . Label the images  $B'E'C'A'$  and  $B''E''C''A''$ .

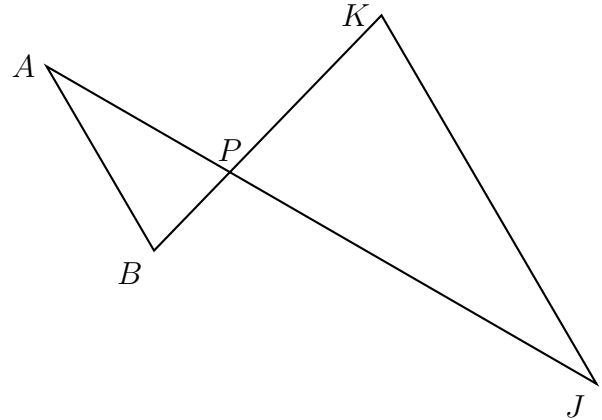


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12. Two triangles are shown with  $P$  the intersection of  $\overline{AJ}$  and  $\overline{BK}$ .

(a) Justify  $\angle APB \cong \angle JPK$ .

(b) What angle must be congruent to  $\angle K$  to prove  $\triangle ABP \sim \triangle JKP$  by *angle-angle similarity*?

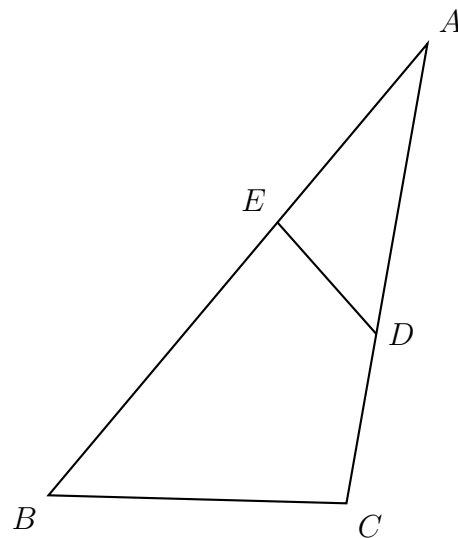


13. Given  $\triangle PQR \sim \triangle STU$ ,  $m\angle P = 37^\circ$ , and  $m\angle T = 46^\circ$ . Find  $m\angle R$ .

14. The diagram below shows  $\triangle ABC$ , with  $\overline{AEB}$  and  $\overline{ADC}$ .

(a) Justify  $\angle BAC \cong \angle DAE$ .

(b) What angle must be congruent to  $\angle ABC$  to prove  $\triangle ABC \sim \triangle ADE$  by *angle-angle similarity*?

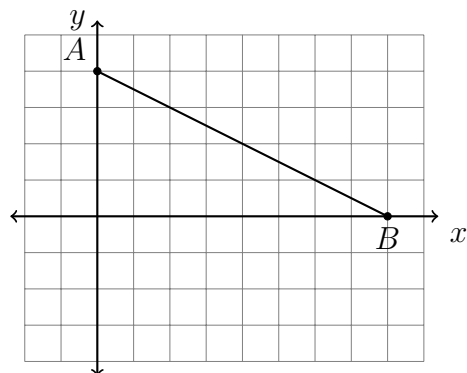


15. A dilation centered at the origin with scale factor  $k = \frac{1}{2}$  maps  $\overline{AB} \rightarrow \overline{A'B'}$ .

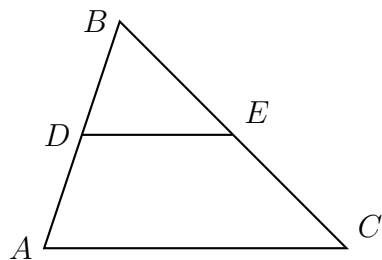
(a) Draw and label the image.

(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  $\overline{AB}$ ?



16. Given  $\triangle ABC$ ,  $D$  is the midpoint of  $\overline{BA}$ ,  $E$  is a point on  $\overline{BC}$ , and  $\overline{DE}$  is drawn. If  $BA = 8$  and  $BE = 6$ , what is the length of  $\overline{BC}$  so that  $\overline{AC} \parallel \overline{DE}$ ?



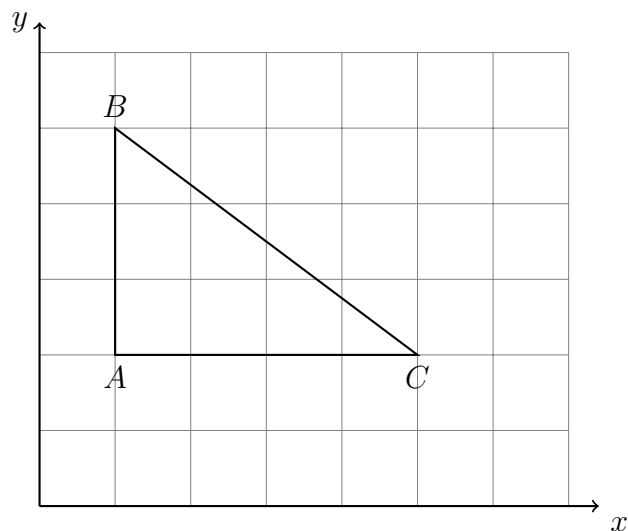
17. In diagram below, each centimeter represents six inches. Find the value of each item below in feet.

(a)  $AC =$

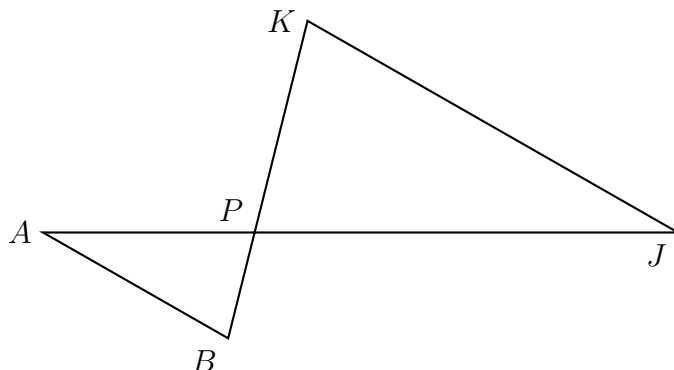
(b)  $BC =$

(c) Find the perimeter of  $\triangle ABC$

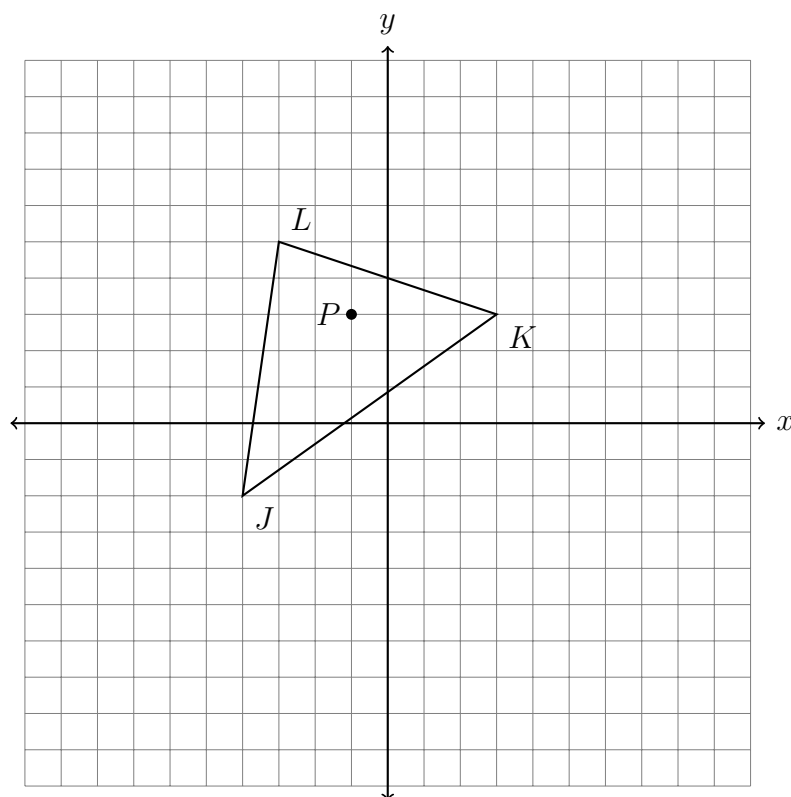
(d) Find the area of  $\triangle ABC$



18. Given  $\triangle ABP \sim \triangle JKP$  as shown below.  $AB = 9.0$ ,  $AP = 10.0$ ,  $BP = 5.5$ , and  $AJ = 25.0$ . Find  $JK$ .

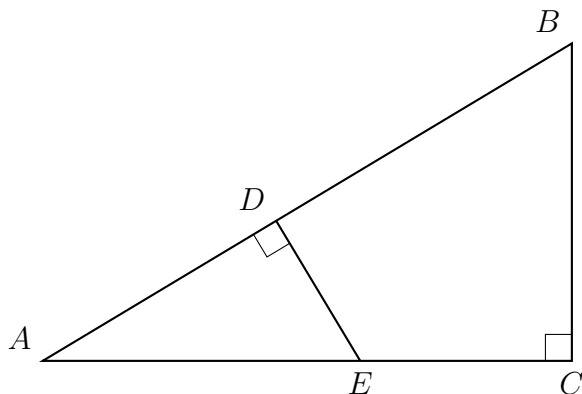


19. The vertices of  $\triangle JKL$  have coordinates  $J(-4, -2)$ ,  $K(3, 3)$ , and  $L(-3, 5)$ , as shown. Apply a dilation to  $\triangle JKL \rightarrow \triangle J'K'L'$ , centered at  $P(-1, 3)$  and with a scale factor  $k = 2$ . Draw the image  $\triangle J'K'L'$  on the set of axes below, labeling the vertices.



What is the ratio of the area of  $\triangle JKL$  to  $\triangle J'K'L'$ ?

20. In  $\triangle ABC$  shown below,  $\angle ACB$  is a right angle,  $E$  is a point on  $\overline{AC}$ , and  $\overline{ED}$  is drawn perpendicular to hypotenuse  $\overline{AB}$ .



If  $AB = 9$ ,  $BC = 6$ , and  $DE = 4$ , what is the length of  $\overline{AE}$ ?

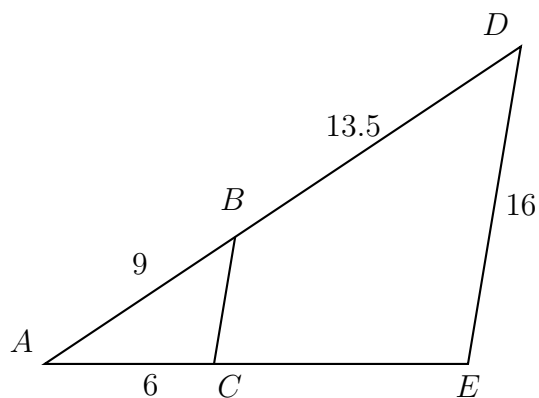
21. In the diagram below,  $\angle ABC \cong \angle ADE$ ,  $AB = 9$ ,  $AC = 6$ ,  $BD = 13.5$ , and  $DE = 16$ . Find  $AD$  and the scale factor  $k$ . Then find  $AE$  and  $BC$ .

(a)  $AD =$

(b)  $k =$

(c)  $AE =$

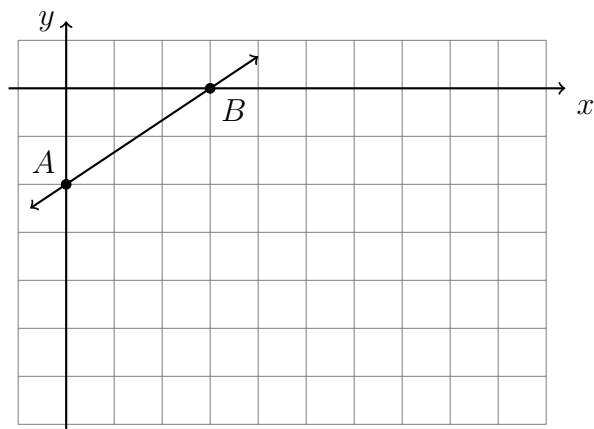
(d)  $BC =$





6 March 2020

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

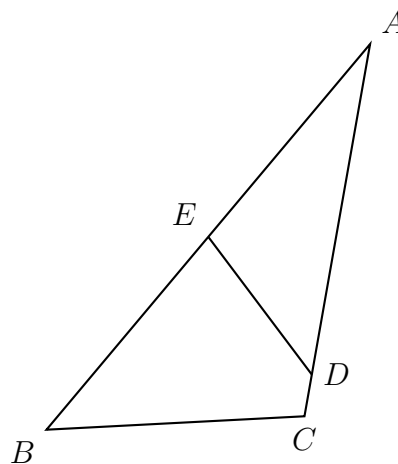


23. The diagram below shows  $\triangle ABC$ .  $E$  bisects  $\overline{AB}$ , and  $\angle ACB \cong \angle AED$ .  $AB = 20$ ,  $AC = 15$ , and  $DE = 7$ . Find the scale factor  $k$ ,  $BC$ , and  $AD$ .

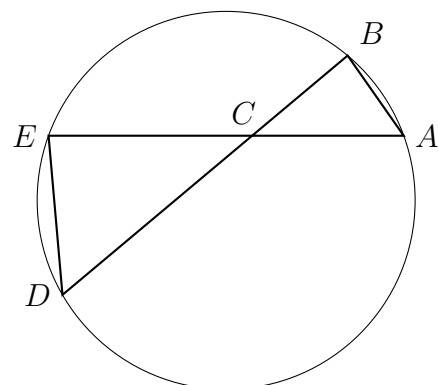
(a)  $k =$

(b)  $BC =$

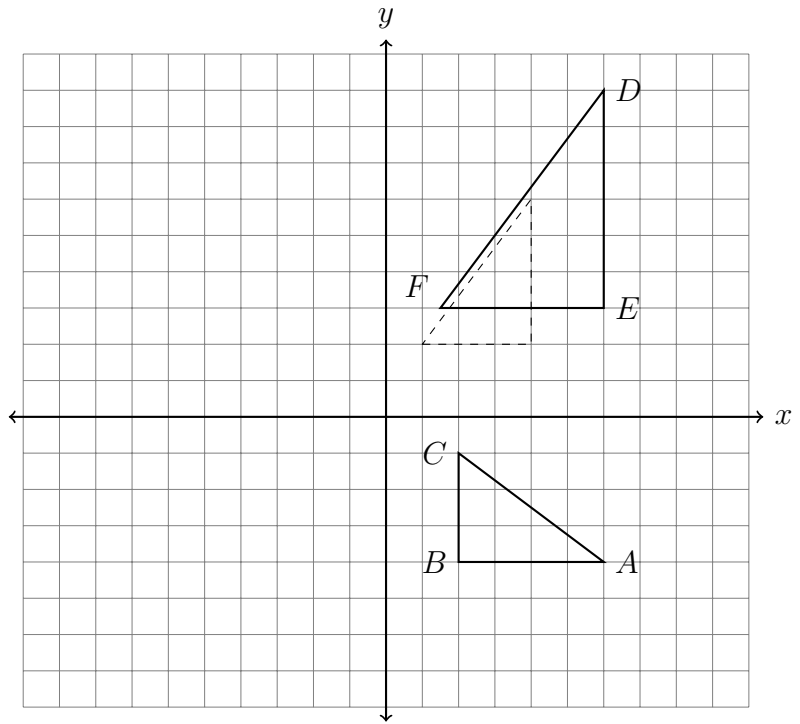
(c)  $AD =$



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



25. Determine and state the sequence of transformations applied to map  $\triangle ABC \rightarrow \triangle DEF$ .



26. What sequence of transformations would map  $\triangle ABC$  onto  $\triangle DEF$ ?

