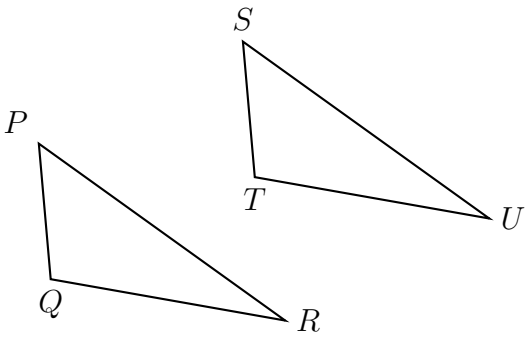
5.11 Exam: Transformational Geometry

1. A translation maps triangle PQR onto triangle STU.



Write each corresponding object.

(a) $Q \to$ _____

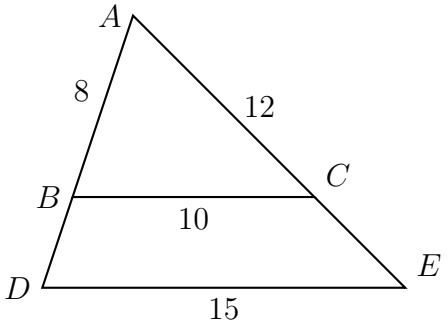
(b) $\angle QRP \cong$ _____

(c) _____ $\cong \overline{ST}$

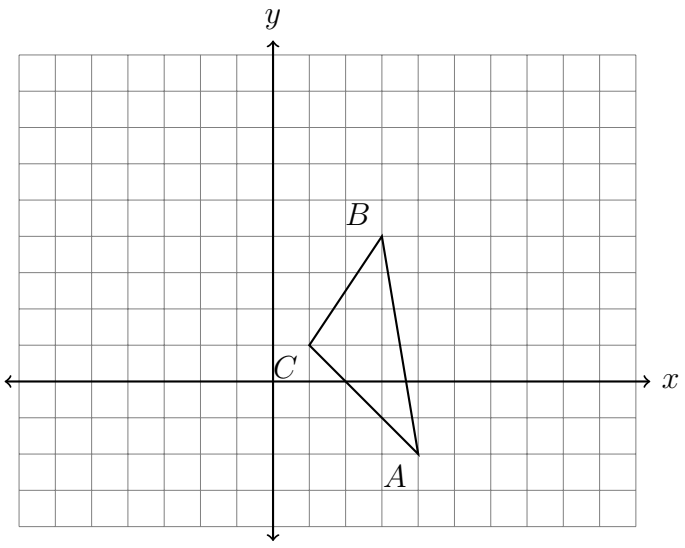
(d) Justify $\triangle PQR \cong \triangle STU$. Use the words "rigid motion".

2. Triangle ABC is dilated with a scale factor of k centered at A, yielding $\triangle ADE$, as shown. Given $AB = 8$, $BC = 10$, $AC = 12$, and $DE = 15$.

   Find AD, CE, and k (the scale factor).

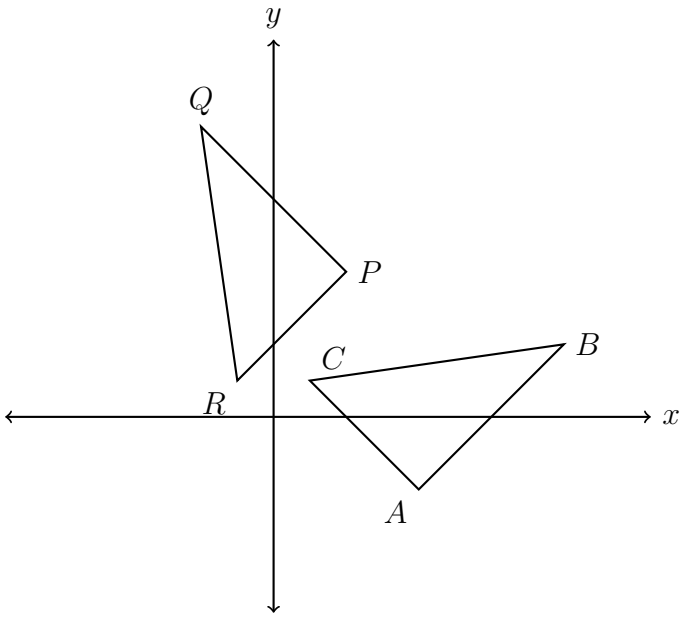


3. Translate $\triangle ABC$ by $(x, y) \to (x + 3, y + 4)$. Make a table of the coordinates and plot and label the image on the axes.

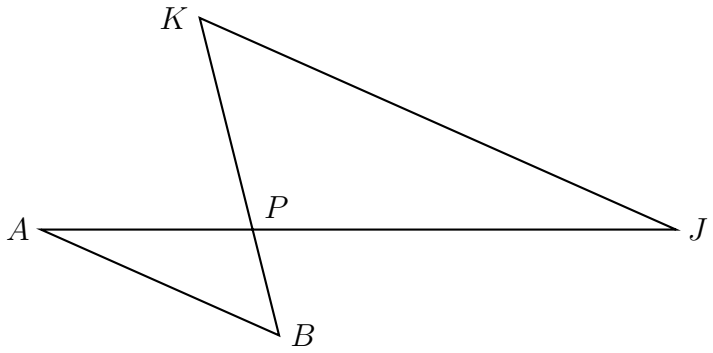


4. A rotation of 90° is applied to $\triangle ABC$, mapping it onto $\triangle PQR$, as shown.

   Which triangle has the larger area, or are they equal? Justify your answer.

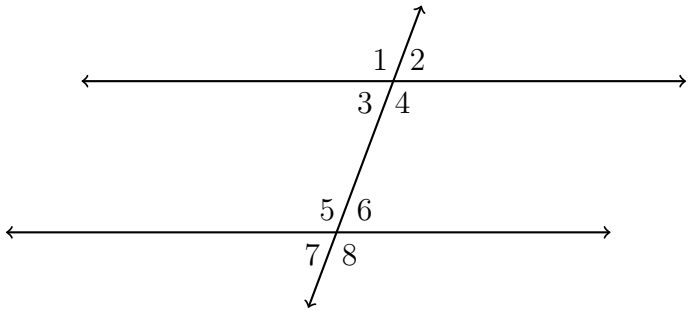


5. Given $\triangle ABP \sim \triangle JKP$ as shown below. $\overline{AB} \parallel \overline{JK}$. $AP = 5.7$, $JP = 11.4$, and $JK = 14.8$. Find AB.



6. Find the image of $A(-3, 1)$ after the translation $(x, y) \to (x + 4, y - 2)$.

7. Given two parallel lines and a transversal, as shown below.



(a) State the angle corresponding with $\angle 6$.

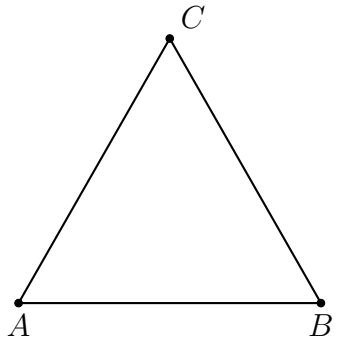
(b) What theorem would justify $m\angle 5 + m\angle 6 = 180°$? _____

(c) What theorem would justify $m\angle 7 = m\angle 2$? _____

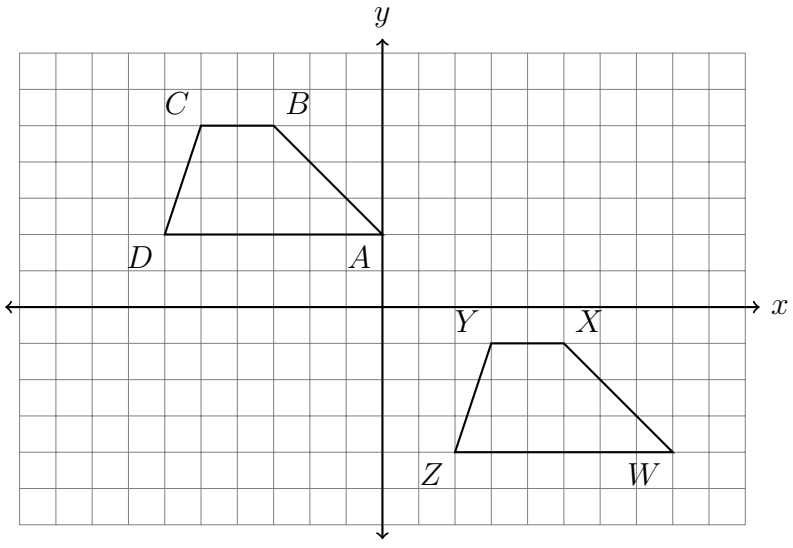
(d) Given $m\angle 3 = 73°$ and $m\angle 5 = (3x - 1)°$. Find x.

8. A translation maps $D(2, 4) \rightarrow D'(-3, 4)$. What is the image of $E(5, -5)$ under the same translation?

9. Given isosceles $\triangle ABC$ with $\overline{AC} \cong \overline{AB}$, $m\angle A = x$, $m\angle B = 55$, and $m\angle C = y$. Find x and y. (*the diagram is not to scale*)



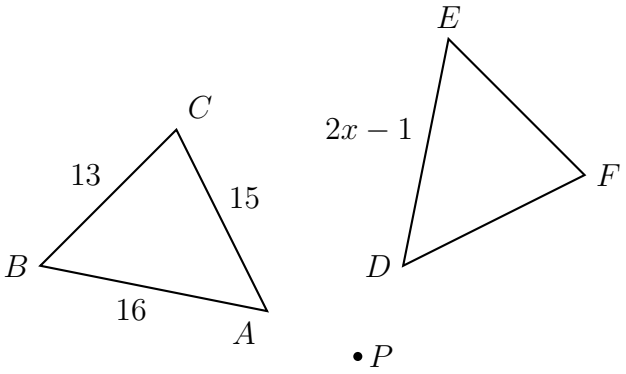
10. The trapezoid $ABCD$, shown below, undergoes a rigid transformation carrying it onto trapezoid $WXYZ$. State the transformation. (be specific)



11. The image of triangle ABC after a rotation is $\triangle A'B'C'$. Is the area of the triangle greater, smaller, or the same after the transformation? Justify your answer.

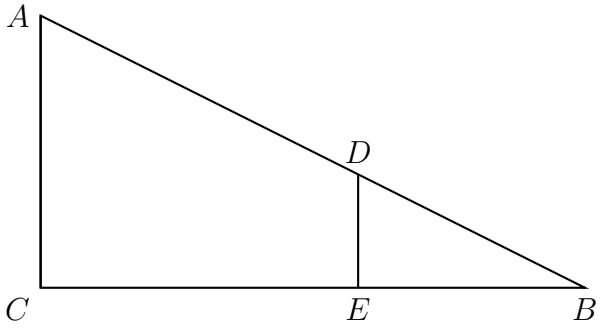
12. In the diagram below, $\triangle ABC$ with sides of 13, 15, and 16, is mapped onto $\triangle DEF$ after a clockwise rotation of 90° about point P.

    If $DE = 2x - 1$, what is the value of x?

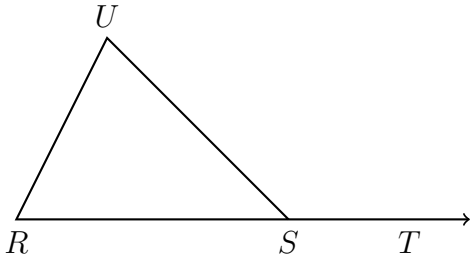


13. In right triangle ABC shown below, point D is on $\overline{AB}$ and point E is on $\overline{BC}$ such that $\triangle ABC \sim \triangle DBE$.

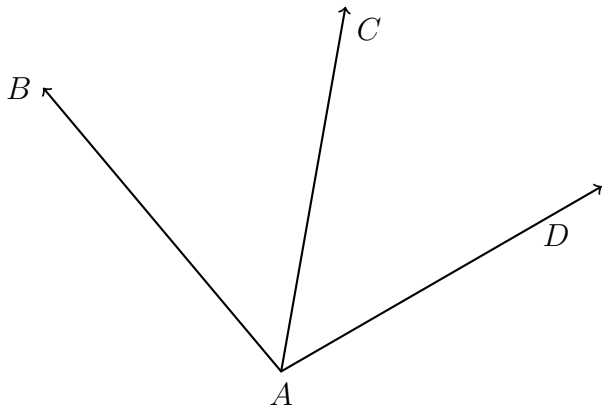
    If $AB = 15$, $BC = 12$, and $EC = 7$, what is the length of $\overline{BD}$?



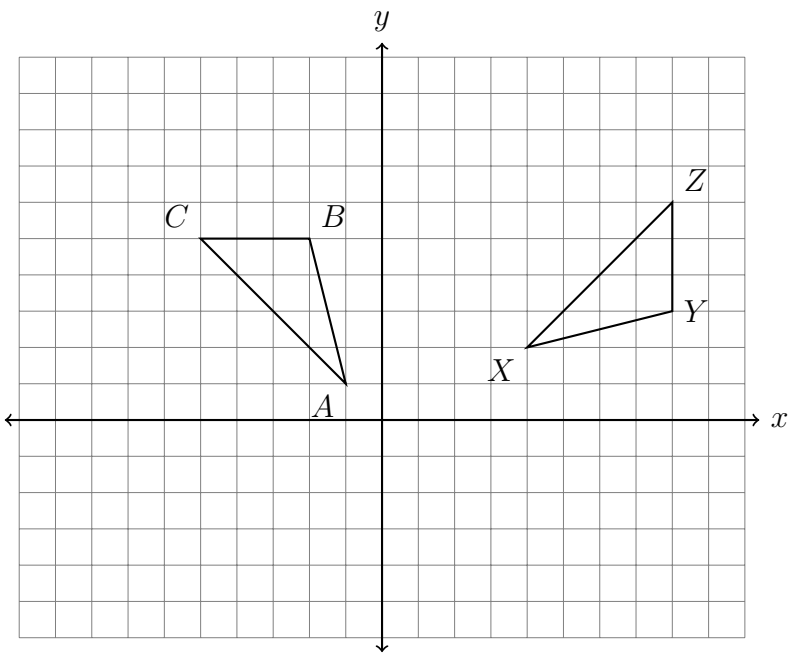
14. Given isosceles $\triangle RSU$ with $\overline{UR} \cong \overline{RS}$. If $m\angle UST = 140$ find $m\angle U$.



15. An angle bisector is shown below, with $\overrightarrow{AC}$ bisecting $\angle BAD$. Given $m\angle BAC = 6x - 5$ and $m\angle BAD = 9x + 17$, find $m\angle BAD$. (Show check)

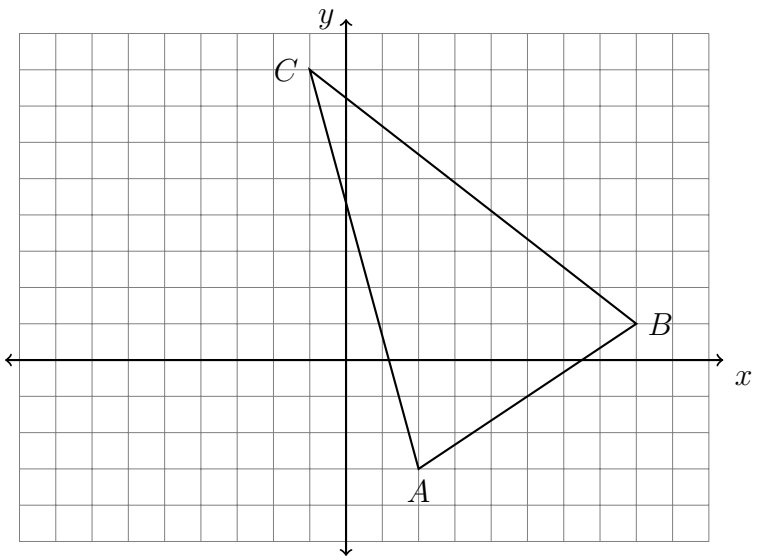


16. The triangle ABC, shown below, undergoes two rigid motions carrying it onto triangle XYZ. State the two isometric transformations. (be specific)

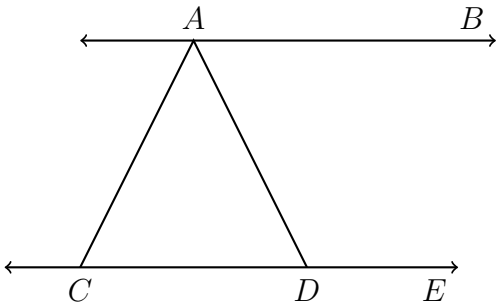


17. Triangle $\triangle ABC$ is graphed on the set of axes below. The vertices of $\triangle ABC$ have the coordinates $A(2, -3)$, $B(8, 1)$, and $C(-1, 8)$.

    Reflect the triangle across the y-axis. Write down its coordinates in a table and plot and label it on the graph.



18. Given parallel lines $\overleftrightarrow{AB} \parallel \overleftrightarrow{CDE}$ with $\overline{AC} \cong \overline{AD}$. If $m\angle BAD = 70$ find $m\angle ACD$.



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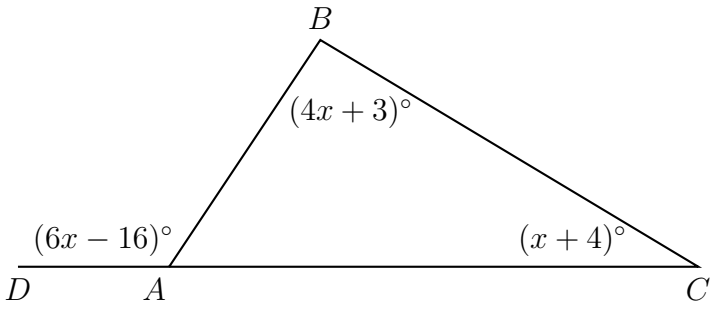
19. Of two complementary angles, the measure of $\angle A$ is two times that of $\angle B$. Find $m\angle A$.

20. In $\triangle ABC$ shown below, side $\overline{AC}$ is extended to point D with $m\angle DAB = (6x - 16)^\circ$, $m\angle C = (x + 4)^\circ$, and $m\angle B = (4x + 3)^\circ$.

    What is $m\angle BAC$?

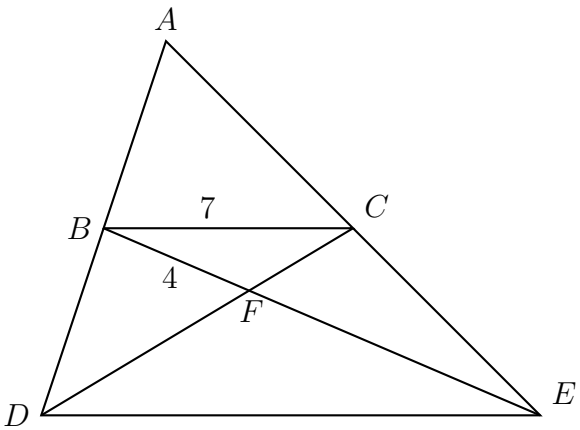


21. Triangle ADE and its midline $\overline{BC}$ are drawn, with B the midpoint of $\overline{AD}$ and C the midpoint of $\overline{AE}$. The two medians $\overline{AE}$ and $\overline{AE}$ are drawn, as shown, intersecting in point F, the centroid.

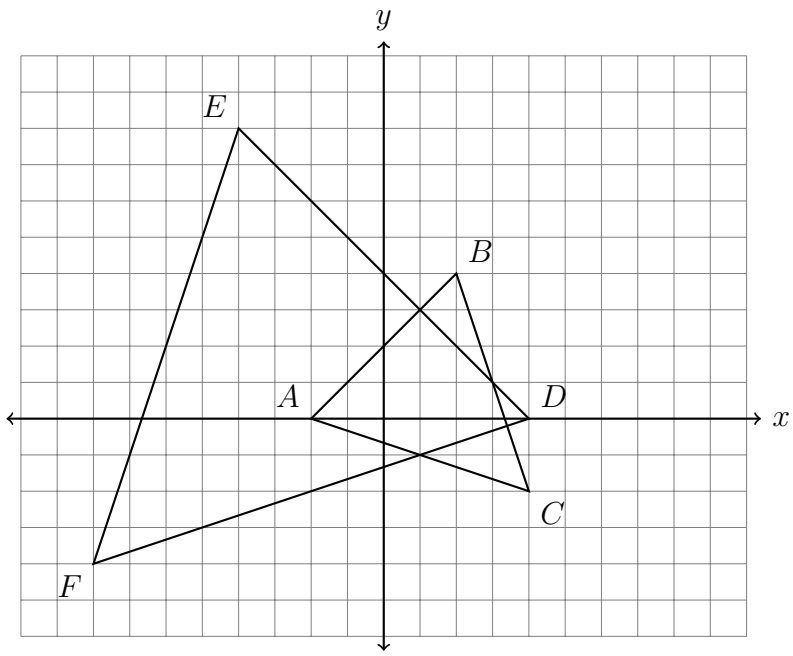
    $\triangle FCB \sim \triangle FDE$ with scale factor $k = 2$.

    Given $BC = 7$, find DE.

    Given $BF = 4$, find FE.



22. On the set of axes below, $\triangle ABC$ has vertices at $A(-2,0)$, $B(2,4)$, $C(4,-2)$, and $\triangle DEF$ has vertices at $D(4,0)$, $E(-4,8)$, $F(-8,-4)$.



Which tranformations map $\triangle ABC \to \triangle DEF$? Mark each statement True or False

(a) A dilation with a scale factor of -2 centered at the origin True False

(b) A dilation with a scale factor of $\frac{1}{2}$ centered at point A True False

(c) A dilation with a scale factor of 2 centered at the origin, followed by a rotation of 180° about the origin True False

(d) A dilation with a scale factor of 2 centered at the origin, followed by a reflection across the y-axis True False