7.7b Exam: Similarity ratios, dilation, the tangent function, transformations, symmetry

1. Given the following two linear equations:

   $l_1 : y = \frac{5}{4}x - 3$ $l_2 : 5x + 4y = 8$

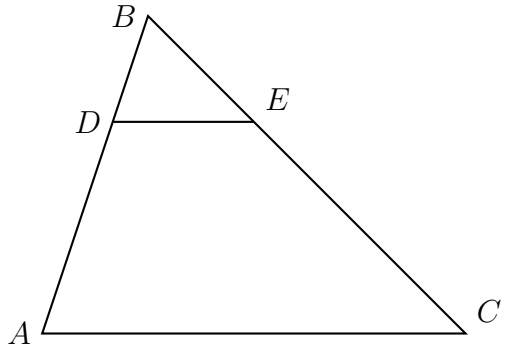
   Write down the slopes of the two lines.

   $m_1 =$ $m_2 =$

   Are the lines parallel, perpendicular, or neither? Justify your answer using the slopes.

2. Given $\triangle ABC \sim \triangle DEF$. $m\angle A = 80°$ and $m\angle F = 40°$. Find the measure of $\angle C$.

3. In the diagram below of $\triangle ABC$, D is a point on $\overline{BA}$, E is a point on $\overline{BC}$, and $\overline{DE}$ is drawn.
   If $BD = 7$, $BA = 21$, and $BE = 8$, what is the length of $\overline{BC}$ so that $\overline{AC} \parallel \overline{DE}$?



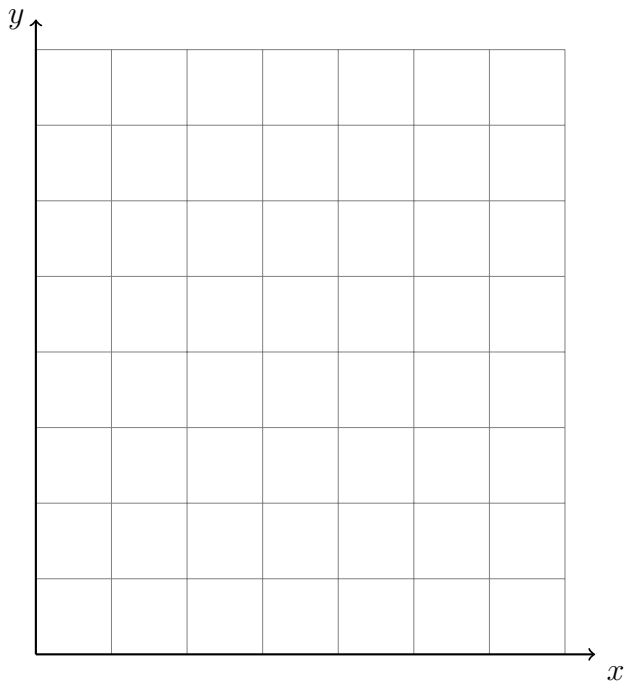
4. Find the image of $P(3, -5)$ after the translation $(x, y) \to (x - 5, y + 8)$.

5. Graph and label $\triangle ABC$ with $A(0,0)$, $B(5,6)$, and $C(5,0)$. Calculate each length:

   (a) $AC =$

   (b) $BC =$

   (c) $AB =$



   (d) Write down the equation of the line $\overleftrightarrow{BC}$.

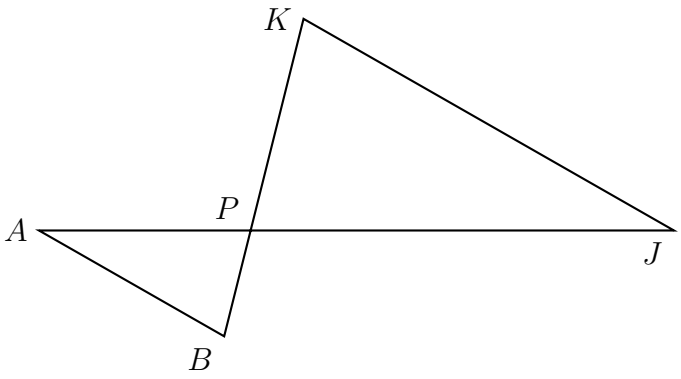
   (e) Write down the equation of the line $\overleftrightarrow{AB}$.

   (f) The tangent of an angle is the ratio of the side lengths *opposite* over *adjacent* to the angle. Write down the value as a fraction.

   $\tan \angle BAC =$

   (g) Find $m\angle A$ with a calculator's inverse tangent function, $m\angle BAC = \tan^{-1}(\frac{opp}{adj})$, rounded to the *nearest whole degree*.

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



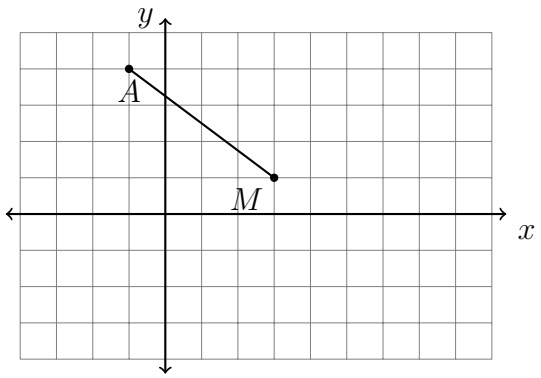
7. The line l has the equation $y = \frac{3}{2}x + 5$. To each line below, circle whether l is parallel, perpendicular, or neither.

   (a) parallel perpendicular neither $y = \frac{3}{2}x - 2$

   (b) parallel perpendicular neither $y = \frac{2}{3}x + 7$

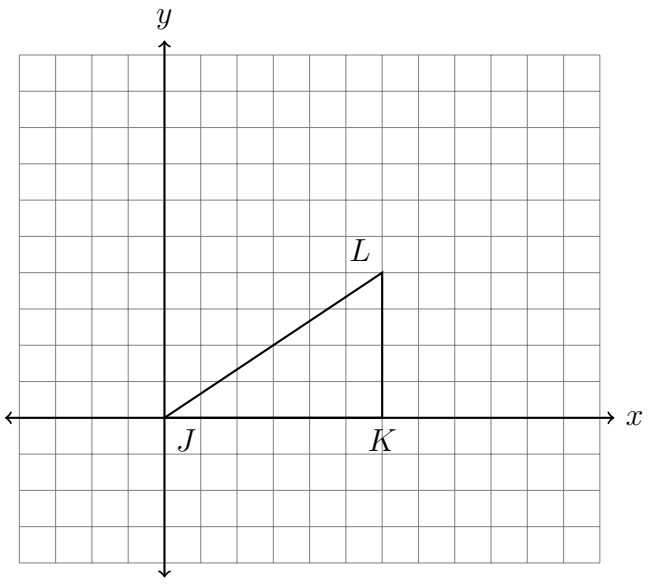
   (c) parallel perpendicular neither $3x - 2y = -6$

8. $A(-1, 4)$ is one endpoint of $\overline{AB}$. The segment's midpoint is $M(3, 1)$, as shown below. Find the coordinates of the other endpoint, B.

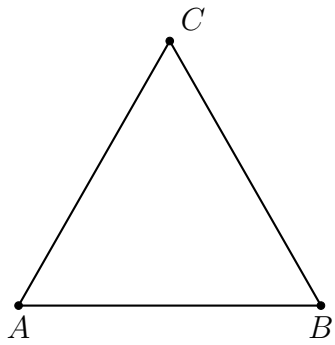


9. The vertices of $\triangle JKL$ have the coordinates $J(0,0)$, $K(6,0)$, and $L(6,4)$, as shown.

   Apply a dilation to $\triangle JKL \rightarrow \triangle J'K'L'$, 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.



10. Given isosceles $\triangle ABC$ with $\overline{AB} \cong \overline{BC}$, $m\angle A = 53$. Mark and label the diagram, and then find $m\angle B$. (*the diagram is not to scale*)



11. A translation maps $N(-3,7) \rightarrow N'(-4,1)$. What is the image of $M(0,-5)$ under the same translation?

12. Solve each equation for x, rounding to the nearest hundredth.

(a) $\tan 50^\circ = \dfrac{x}{10}$

(b) $\tan 22^\circ = \dfrac{3}{x}$

(c) $\sin 35^\circ = \dfrac{x}{3.5}$

(d) $\cos 80^\circ = \dfrac{x}{20}$

13. Solve for x, rounding to the nearest whole degree.

(a) $x = \tan^{-1}(\dfrac{6}{10})$

(b) $\tan x^\circ = \dfrac{4.2}{2.9}$

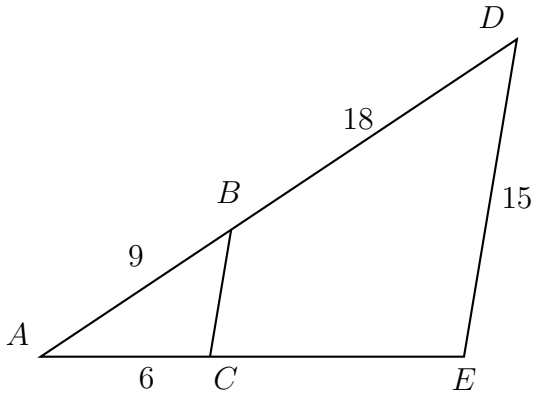
14. A dilation centered at A maps $\triangle ABC \to \triangle ADE$. Given $AB = 9$, $AC = 6$, $BD = 18$, and $DE = 15$. Find AD and the scale factor k. Then find AE and BC.

    (a) $AD =$

    (b) $k =$

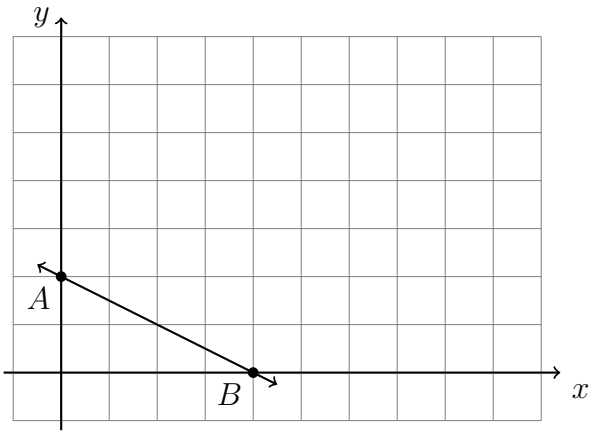
    (c) $AE =$

    (d) $BC =$



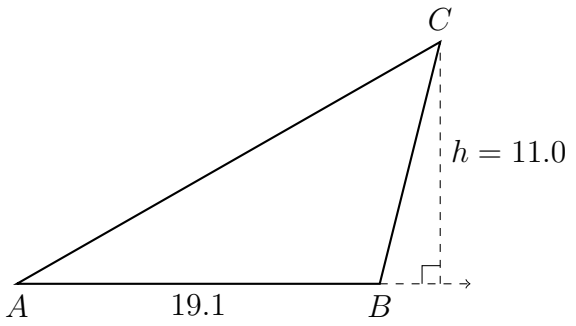
15. The line $\overleftrightarrow{AB}$ has points $A(0, 2)$ and $B(4, 0)$. Apply a dilation mapping $\overleftrightarrow{AB} \to \overleftrightarrow{A'B'}$ with a factor of $k = 2$ centered at the origin.

    (a) Draw and label the image on the grid.

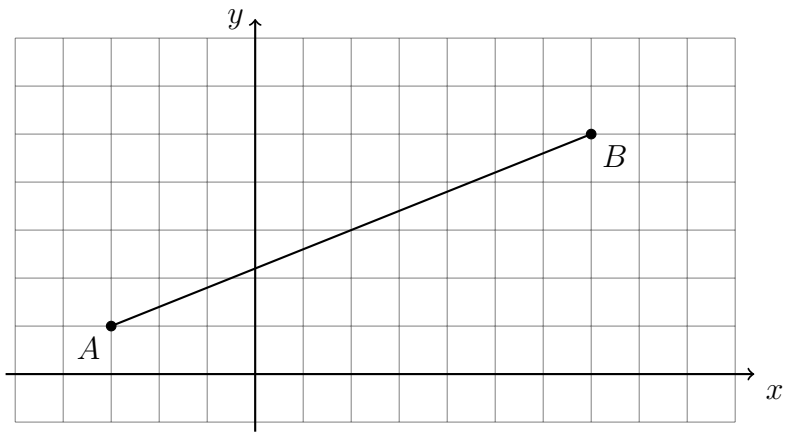


    (b) Write the coordinates of the points A' and B'.

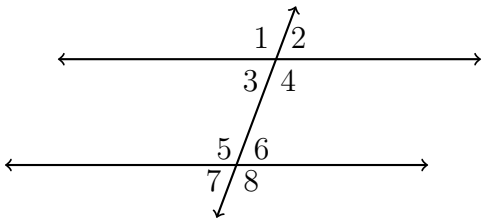
16. The side $\overline{AB}$ of triangle ABC is extended and an altitude to the vertex C is drawn, as shown below. The triangle's height is $h = 11.0$ and its base measures $AB = 19.1$. Find the area of the triangle.



17. Find the midpoint M of $\overline{AB}$ with coordinates $A(-3, 1)$ and $B(7, 5)$. Mark and label it on the diagram below.



18. Given two parallel lines and a transversal, as shown below. Given $m\angle 1 = 108°$.



(a) Find the measure $m\angle 2$.

(b) Find the measure $m\angle 8$.

(c) Given $m\angle 5 = (6x - 12)°$. Find x.

19. Given two points $A = -4.7$ and $B = 3.3$. Find the value of the midpoint M between A and B, and mark and label it on the numberline below.