

10 January 2019

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.

$$m_1 =$$

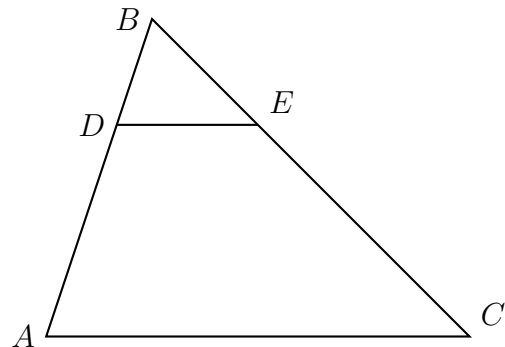
$$m_2 =$$

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

2. Given $\triangle ABC \sim \triangle DEF$. $m\angle A = 80^\circ$ and $m\angle F = 40^\circ$. 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 $\overline{AC} \parallel \overline{DE}$?



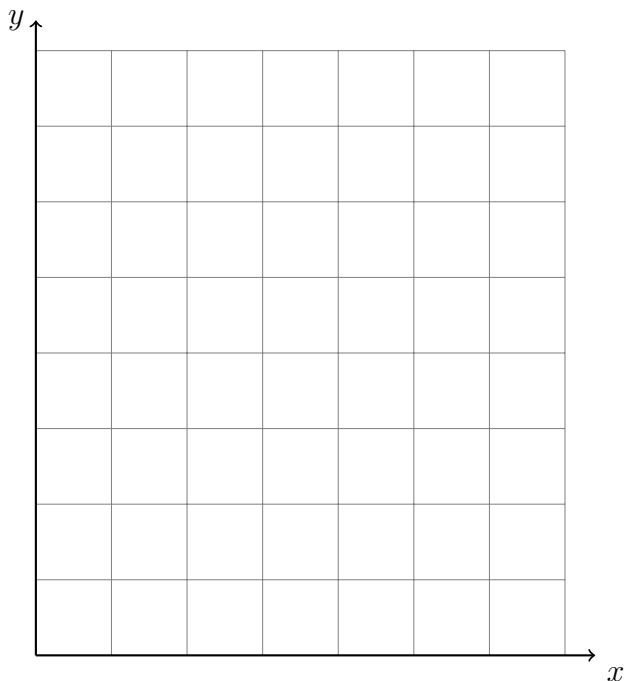
4. Find the image of $P(3, -5)$ after the translation $(x, y) \rightarrow (x - 5, y + 8)$.

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

i. $AC =$

ii. $BC =$

iii. $AB =$



- (b) Write down the equation of the line \overleftrightarrow{BC} .

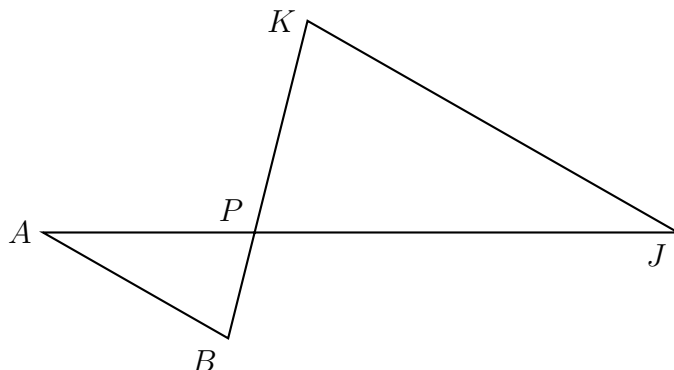
- (c) Write down the equation of the line \overleftrightarrow{AB} .

- (d) 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.

$$\tan \angle BAC =$$

- (e) Find $m\angle A$ with a calculator's inverse tangent function, $m\angle BAC = \tan^{-1}\left(\frac{opp}{adj}\right)$

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



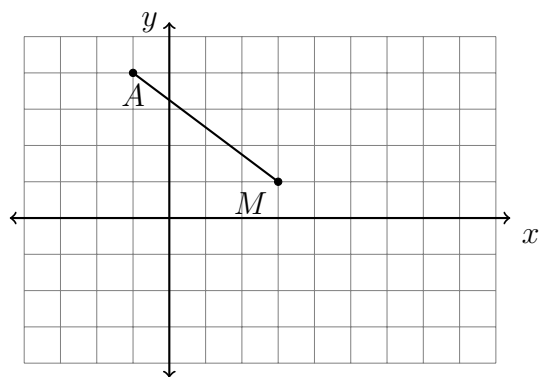
7. The line l has the equation $y = \frac{3}{2}x + 5$. To each line below, circle whether l is parallel, perpendicular, or neither.

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

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

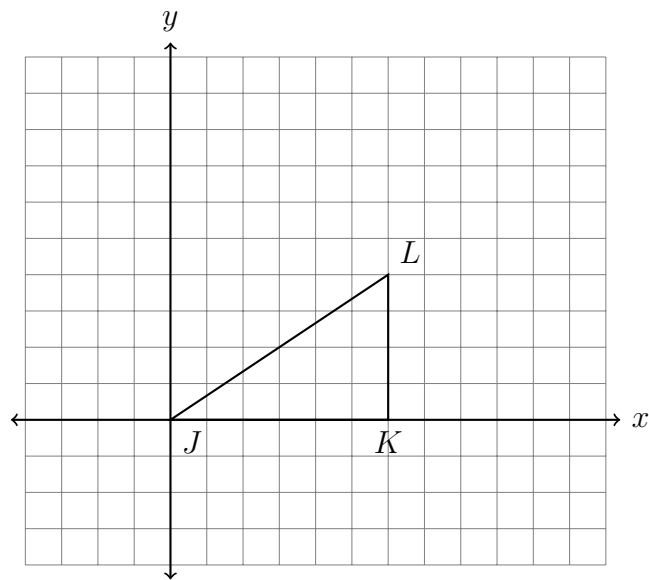
(c) parallel perpendicular neither $3x - 2y = -6$

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 .

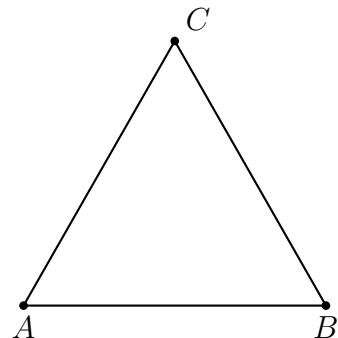


9. The vertices of $\triangle JKL$ have the coordinates $J(0,0)$, $K(6,0)$, and $L(6,4)$, as shown.

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?

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

12. $\tan 50^\circ = \frac{x}{10}$

14. $\sin 35^\circ = \frac{x}{3.5}$

13. $\tan 22^\circ = \frac{3}{x}$

15. $\cos 80^\circ = \frac{x}{20}$

Solve for x , rounding to the nearest whole degree.

16. $x = \tan^{-1}\left(\frac{6}{10}\right)$

17. $\tan x^\circ = \frac{4.2}{2.9}$

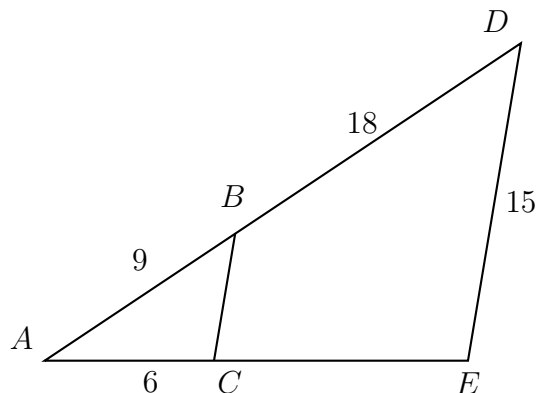
18. A dilation centered at A maps $\triangle ABC \rightarrow \triangle ADE$. Given $AB = 9$, $AC = 6$, $BD = 18$, and $DE = 15$. Find AD and the scale factor k . Then find AE and BC .

(a) $AD =$

(b) $k =$

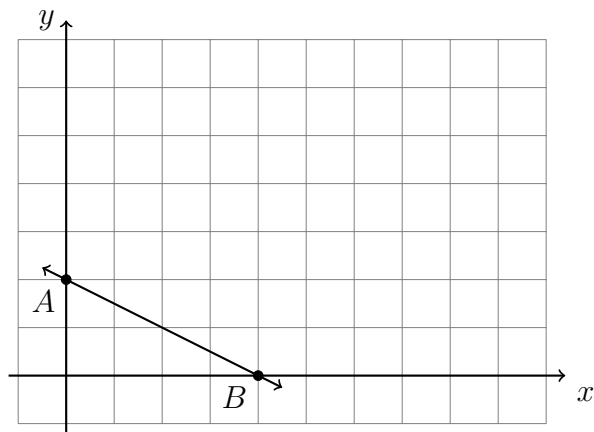
(c) $AE =$

(d) $BC =$



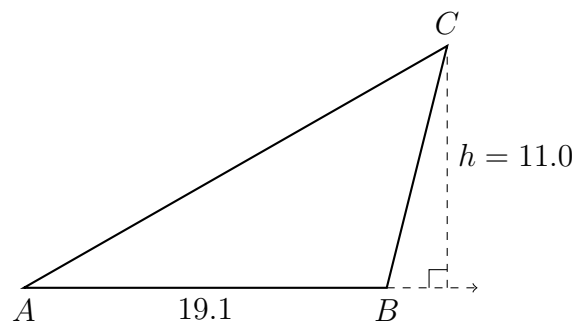
19. The line \overleftrightarrow{AB} has points $A(0, 2)$ and $B(4, 0)$. Apply a dilation mapping $\overleftrightarrow{AB} \rightarrow \overleftrightarrow{A'B'}$ with a factor of $k = 2$ centered at the origin.

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

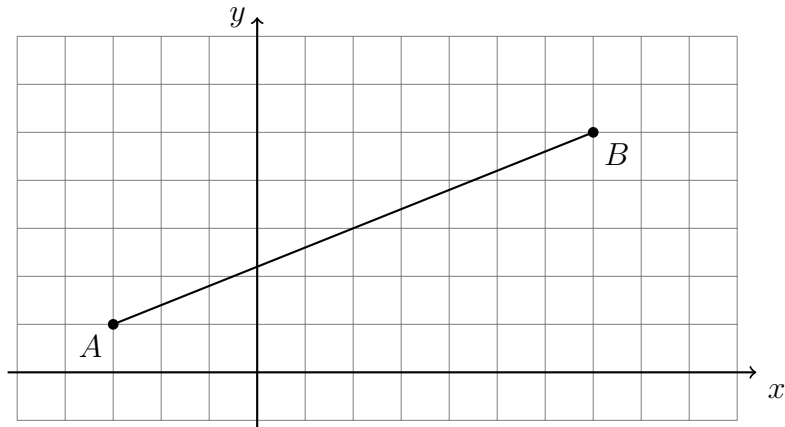


- (b) Write the coordinates of the points A' and B' .

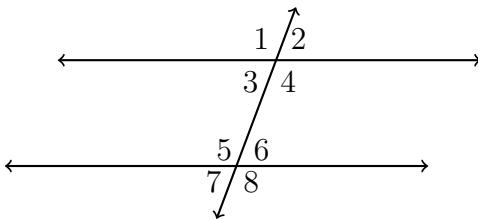
20. The side \overline{AB} of triangle ABC is extended and an altitude to the vertex C is drawn, as shown below. The triangle's height is $h = 11.0$ and its base measures $AB = 19.1$. Find the area of the triangle.



21. Find the midpoint M of \overline{AB} with coordinates $A(-3, 1)$ and $B(7, 5)$.



22. Given two parallel lines and a transversal, as shown below. Given $m\angle 1 = 108^\circ$.



- (a) Find the measure $m\angle 2$.
- (b) Find the measure $m\angle 8$.
- (c) Given $m\angle 5 = (6x - 12)^\circ$. Find x .
23. 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.

