

1. Do the following linear equations graph lines that are parallel, perpendicular, or neither? Use numbers to justify your answer.

$$\begin{cases} 3x + 2y = 4 \\ 4x - 6y = -18 \end{cases}$$

$$y = mx + b$$

↑
Slope
(when y is isolated)

Same slope

opposite reciprocal slopes
or
slopes' product is -1.

$$\begin{array}{r} 3x + 2y = 4 \\ -3x \quad -3x \\ \hline 2y = -3x + 4 \\ \hline y = \frac{-3x + 4}{2} \end{array}$$

$$\begin{array}{r} 4x - 6y = -18 \\ -4x \quad -4x \\ \hline -6y = -4x - 18 \\ \hline -6y = -4x - 18 \\ -6 \quad -6 \quad -6 \\ \hline y = \frac{4x + 18}{6} \end{array}$$

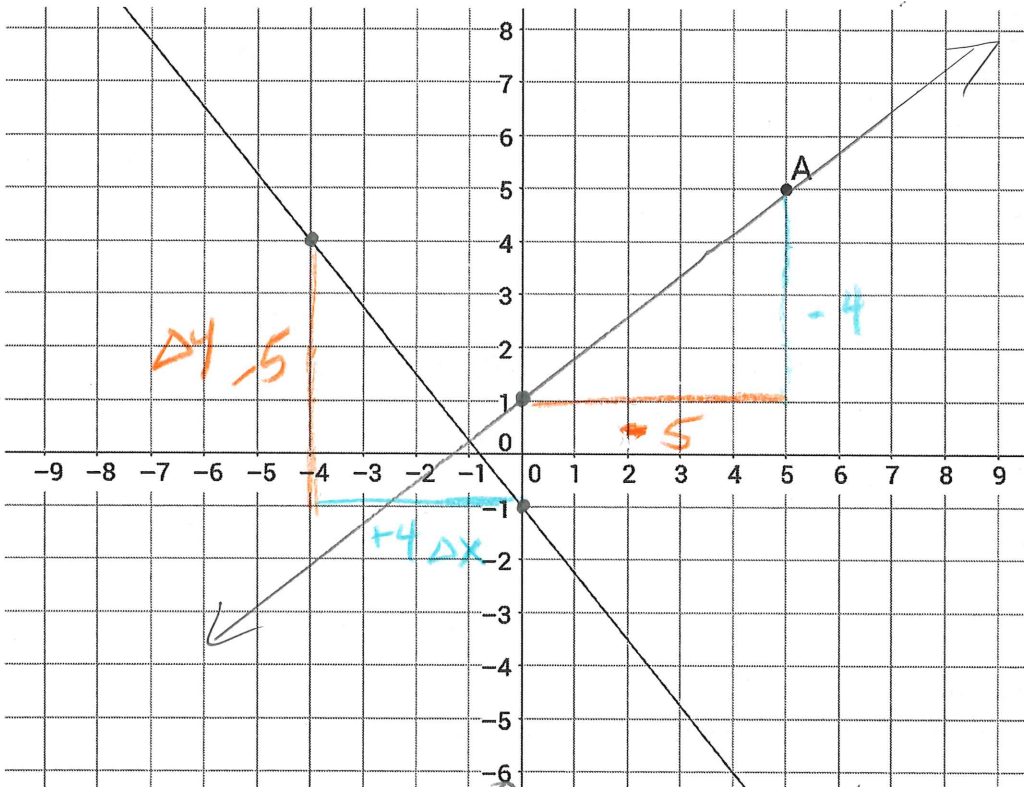
$$y = \frac{-3}{2}x + 2$$

$$y = \frac{4}{6}x + 3 \xrightarrow{\text{simplify}} y = \frac{2}{3}x + 3$$

$-\frac{3}{2} \perp \frac{2}{3}$ Perp.

-or-
 $-\frac{3}{2} \cdot \frac{2}{3} = -\frac{6}{6} = -1$

2. Graph a line that is perpendicular to the given line, that passes through the given point.



① Find points on grid on line.
 $m = \frac{-5}{4} = \frac{\Delta y}{\Delta x}$

② Make slope perpendicular (opp. reciprocal)
 $m_{\perp} = \frac{4}{5}$

③ Go to point and "apply" slope.
→ Note, not enough room to go up 4, right 5...
so go DOWN 4, BACK 5

④ Connect new point to A to make line.

3. Which of the following linear equations graphs a line that passes through point (1, -3) and is parallel to $y = -2x + 6$? Select all that apply.

$y = -2x - 1$

$y + 3 = -2(x - 1)$

$y = \frac{1}{2}x - \frac{7}{2}$

$y = -2x - 3$

Same slope
 $m = -2$

POINT SLOPE FORM:

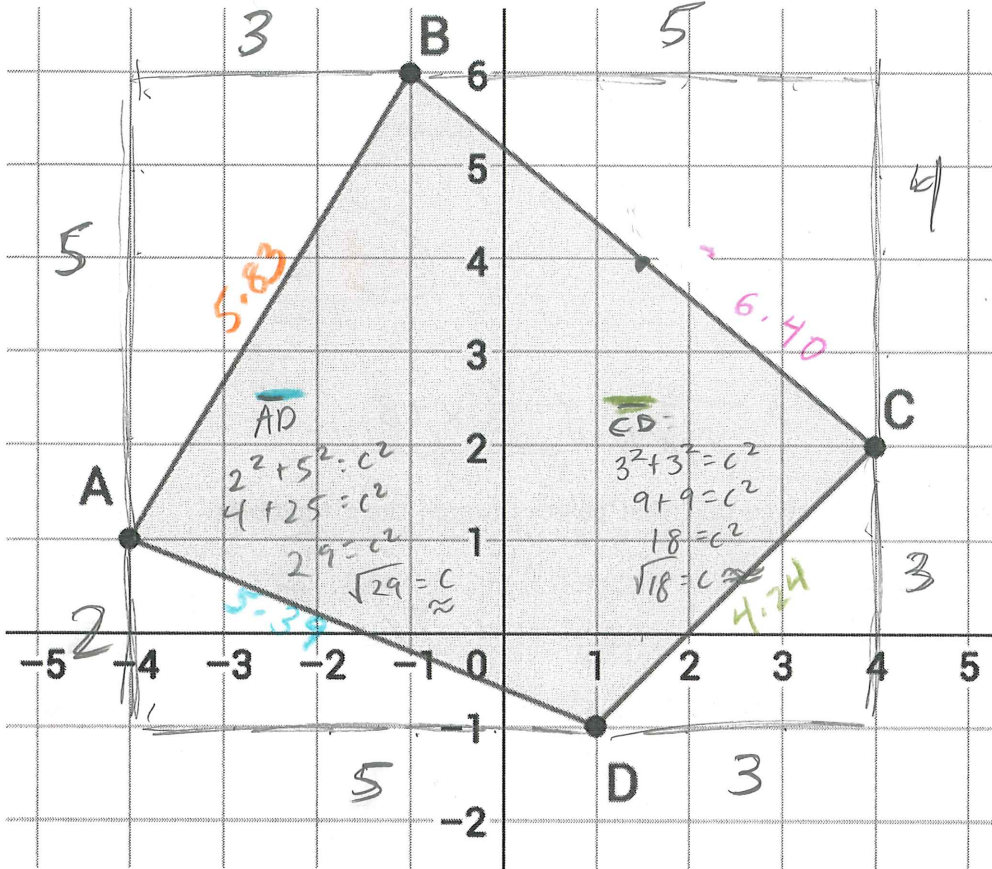
$$y - y_1 = m(x - x_1)$$

$$\begin{aligned} y + 3 &= -2(x - 1) \\ y + 3 &= -2x + 2 \\ y &= -2x - 1 \end{aligned}$$

2 solve for y.

SEE P. 3 FOR ALTERNATE APPROACH.

4. Find the perimeter, to the nearest hundredth, of the quadrilateral ABCD. Show all work.



Perimeter: 21.86

5. Using the figure above, find the coordinates of the midpoint of \overline{BC} .

$B: (-1, 6)$ $C: (4, 2)$

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$\left(\frac{-1 + 4}{2}, \frac{6 + 2}{2} \right)$$

$$\left(\frac{3}{2}, \frac{8}{2} \right)$$

$$\left(1.5, 4 \right)$$

6. (no figure provided) Suppose point S has coordinates $(-12, 29)$ and point R has coordinates $(-14, 20)$. Find the exact distance between points S and R. Show all work.

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} =$$

$$d = \sqrt{(-12 - (-14))^2 + (29 - 20)^2}$$

$$d = \sqrt{(2)^2 + (9)^2} \rightarrow \sqrt{4 + 81} = \sqrt{85}$$

Alt.

3. Which of the following linear equations graphs a line that passes through point $(1, -3)$ and is parallel to $y = -2x + 6$? Select all that apply.

$y = -2x - 1$

$y + 3 = -2(x - 1)$

$y = \frac{1}{2}x - \frac{7}{2}$

$y = -2x - 3$

Nope!
Slope is $\neq -2$.

Same slopes;
given line has slope -2 .

Technique: Plug $(1, -3)$ in for x and y to see if resulting equation is true or false.

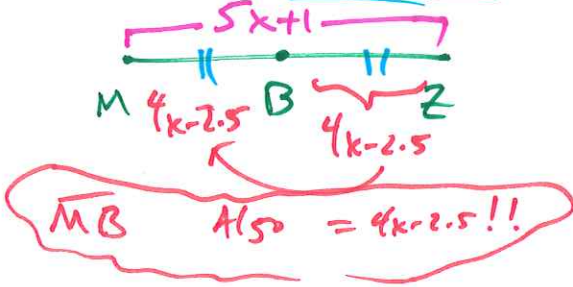
$y = -2x - 1$
 $-3 = -2(1) - 1$
 $-3 = -2 - 1$
 $-3 = -3$
true? yes!

$y + 3 = -2(x - 1)$
 $-3 + 3 = -2(1 - 1)$
 $0 = -2(0)$
 $0 = 0$
true? yes!

$y = -2x - 3$
 $-3 = -2(1) - 3$
 $-3 = -2 - 3$
 $-3 = -5$
true? No!
 $-3 \neq -5$

CO-D12a

7. Suppose B is the midpoint of \overline{MZ} , where $BZ = 4x - 2.5$ and $MZ = 5x + 1$. Find the length of \overline{MB}



thor, $\overline{MB} = \overline{BZ}$

$$\overline{MB} + \overline{BZ} = \overline{MZ}$$

$$(4x - 2.5) + (4x - 2.5) = 5x + 1$$

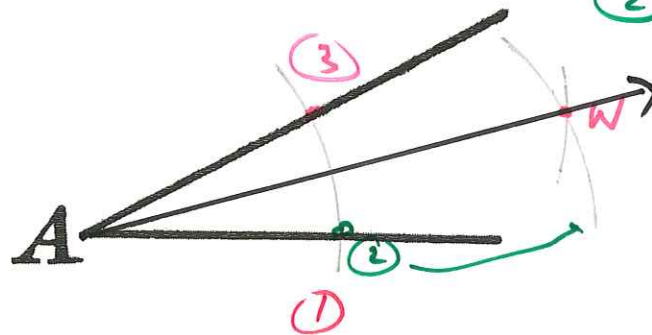
$$8x - 5 = 5x + 1$$

$$\begin{array}{r} -5x \\ \hline 3x - 5 = 1 \\ \hline \end{array}$$

$$\begin{array}{r} +5 \\ \hline 3x = 6 \\ \hline \end{array} \rightarrow x = 2$$

$$\begin{aligned} \overline{MZ} &= 5x + 1 \\ &= 5(2) + 1 \\ &= 10 + 1 \\ &= 11 \end{aligned}$$

8. Use a compass and straight edge to construct ray \overrightarrow{AW} such that \overrightarrow{AW} bisects $\angle A$. Leave circular marks as evidence of construction.



- ① Needle @ A, mark an arc crossing both rays.
- ② Needle at 1 crossing, mark a wide arc in the interior of the angle.
- ③ with same compass radius as step 2, Needle at other crossing, mark arcs' intersection. This is W.
- ④ Construct \overrightarrow{AW} .