6.3 Classwork: Standard form of a linear equation

Equations of a straight line: $f(x) = mx + c$, $ax + by + d = 0$, $(y - y_1) = m(x - x_1)$

Gradient: $m = \dfrac{y_2 - y_1}{x_2 - x_1}$
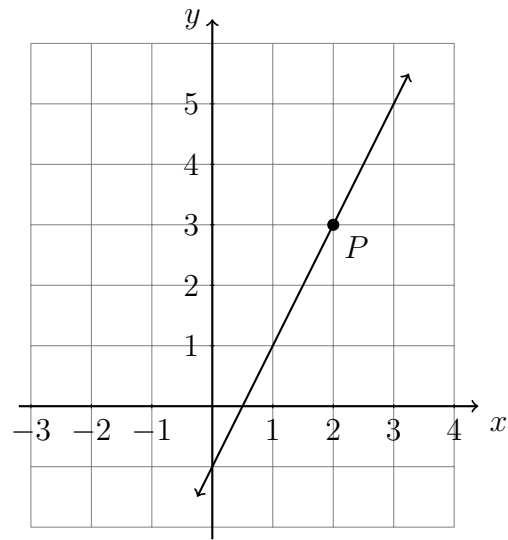
1. A linear equation f is graphed below.

   (a) Write down it's slope.
       $m =$

   (b) Write down it's y-intercept.
       $b =$

   (c) Write down the equation of the line.

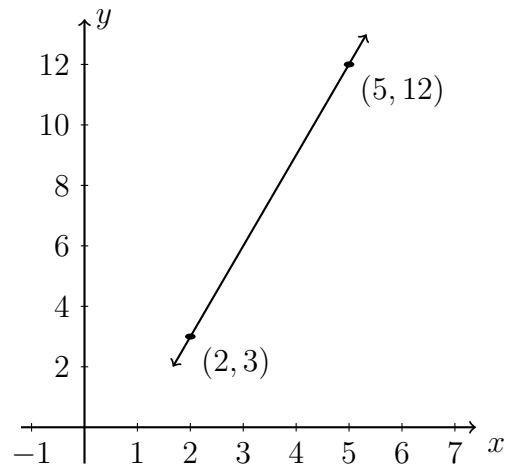   (d) State the coordinates of the point P.

2. Write the linear equation $y - 2 = 3(x + 1)$ in the form $y = mx + c$.

3. A line has a gradient (slope) of $-\dfrac{3}{2}$ and passes through the point $(4, 1)$. Find the equation of the line in the form $y = mx + b$.

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4. A line goes through the points $(2, 3)$ and $(5, 12)$.

   (a) Find the gradient of the line.

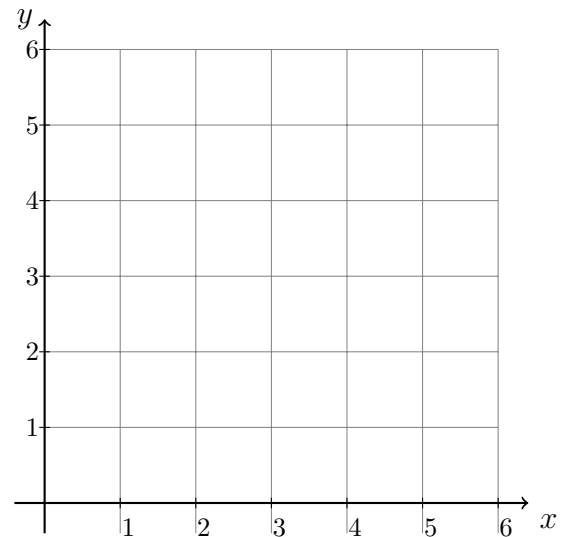   (b) Find the equation of the line in the form $y = mx + b$.

5. Find the equation of the line through the points $(4, 3)$ and $(-2, 18)$.
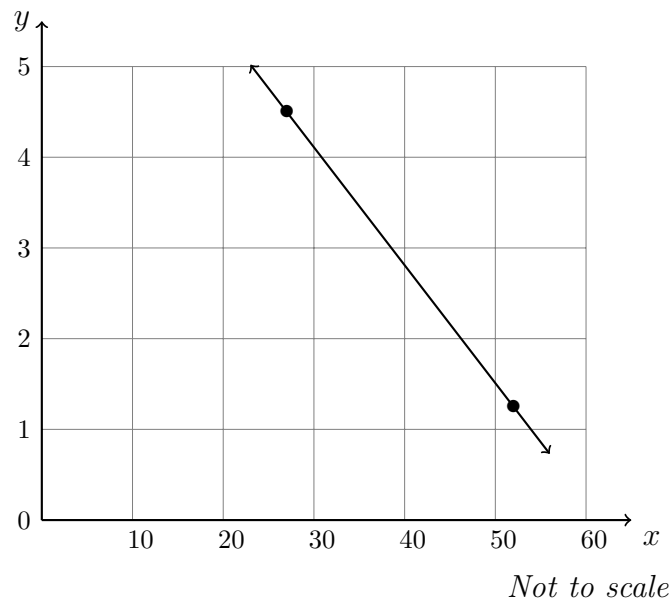
You must show the values substituted in the formula for credit. Optional: Graspable Math, Geogebra

6. Plot the points and the line $\overleftrightarrow{PQ}$, $P(2, 1)$, $Q(3, 4)$. Calculate its slope:

$$m = \frac{y_Q - y_P}{x_Q - x_P}$$

7. Find the slope of the line $\overleftrightarrow{AB}$, $A(27, 4.5)$, $B(52, 1.25)$. Express the value as a percent (the percent grade).
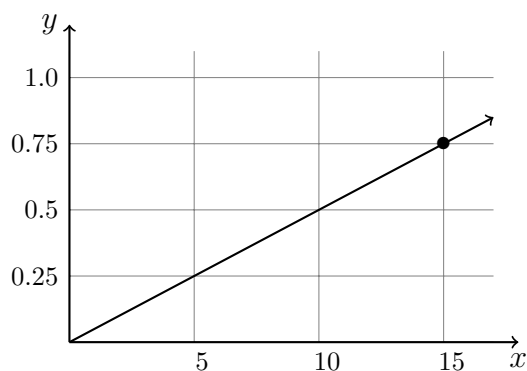

Not to scale

8. Find the slope (or "grade") for a nine inch rise over a run of 15 feet.

   Express your result as follows: (c) Percentage

   (a) Fraction

   (b) Decimal

Not to scale

9. Complete each statement about linear equations.

   (a) What is the slope of a horizontal line?

   (b) What is the y-intercept of the line $y = -5.75x - 8.25$?

   (c) What is the percent grade of the line $y = 0.075x + 135$?
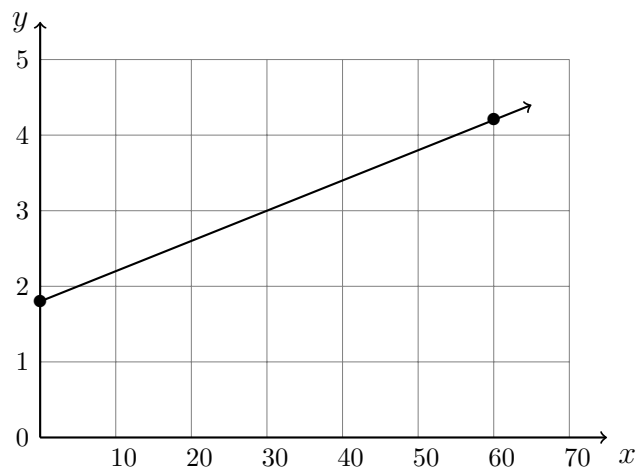
   (d) What is the slope of the line $y = 73.2$?

   (e) If $m = 0.25$ then $m_\perp =$

   (f) Lines p and q have slopes $m_p = -2$ then $m_q = 0.50$. Are they parallel, perpendicular, or neither? Justify your answer by showing the product of their slopes.

10. Find the equation of the line through the points $(0, 1.8)$, $(60, 4.2)$. First find the slope, then substitute the slope and y-intercept into a linear equation.

$$m = \frac{y_2 - y_1}{x_2 - x_1}, \qquad y = mx + b$$
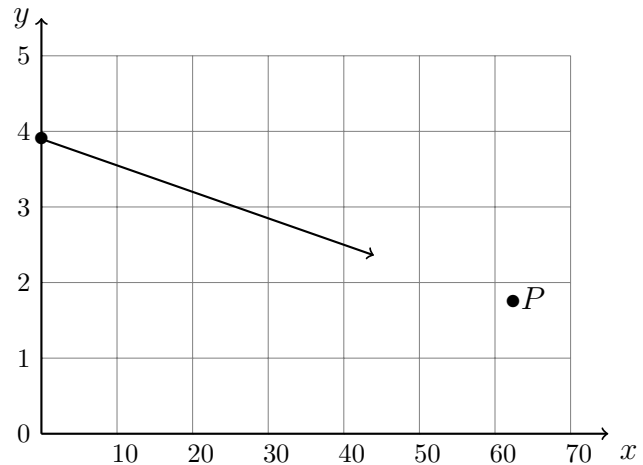
Not to scale

https://graspablemath.com/canvas?load=_76c51984e075c2c2

11. Is the point $P(64, 1.8)$ on the line: $y = -0.035x + 3.90$?

    Support your answer algebraically (substitute P's coordinates into the equation).

Not to scale

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12. Quadrilateral $ABCD$ with vertices $A(0, 4)$, $B(-1, 1)$, $C(5, -1)$, and $D(6, 2)$ is shown.
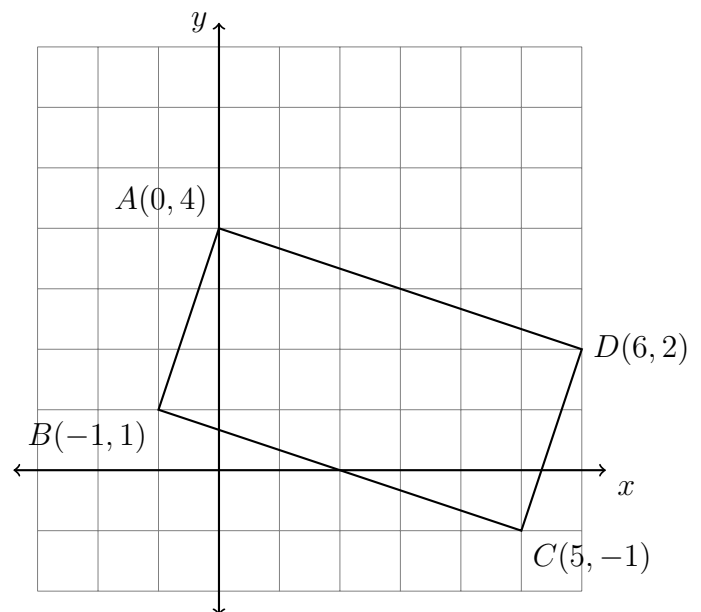
    Write down the slopes of each side.

    Slope of $\overline{AB} =$

    Slope of $\overline{BC} =$

    Slope of $\overline{CD} =$

    Slope of $\overline{AD} =$

    Is $ABCD$ a parallelogram? Is it a rectangle? Justify your answer citing the slopes.

13. Plot a parallelogram (not a rectangle) using Geogebra (use the grid). The legs must not be horizontal or vertical. Paste an image of your work in this Classkick slide from the clipboard or by using the "camera" tool.
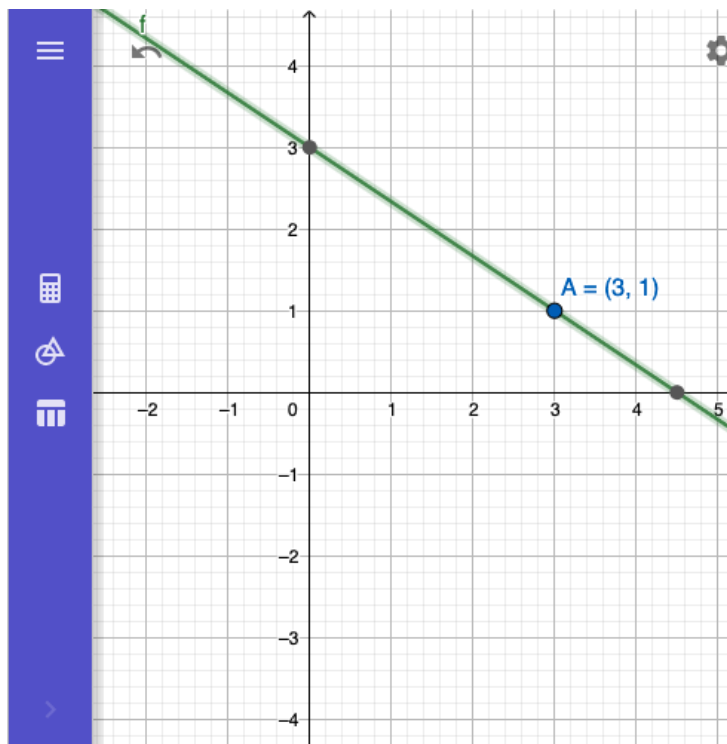
Spicy: Show the measures the slopes of the quadrilateral sides.

14. A line through the point $A(3, 1)$ has a y-intercept of 3.

    (a) Write down the equation of the line.

    (b) What slope is perpendicular to the line?

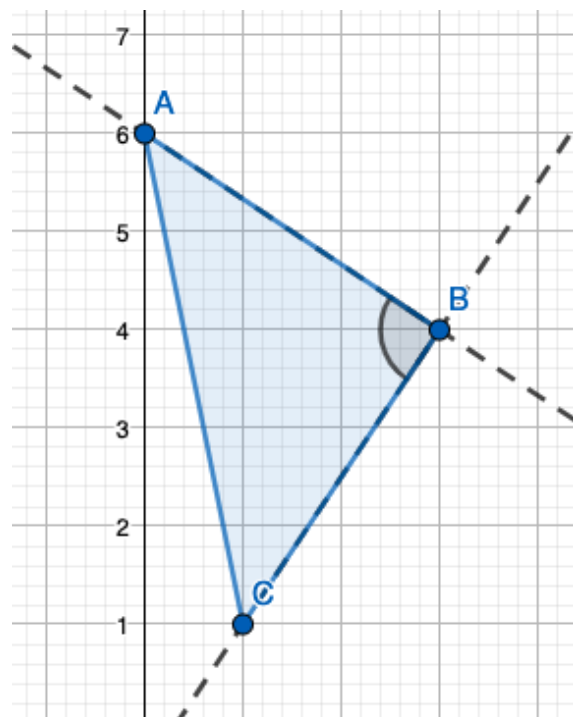   (c) Spicy: What is the equation of the perpendicular line through A?

$A = (3, 1)$

$y = mx + b$

15. Given $\triangle ABC$ as shown with $A(0, 1)$, $B(4, 4)$, $C(1, 7)$.

16.   (a) Write down the equation of $\overleftrightarrow{AB}$.

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

    (c) Is $\overleftrightarrow{AB} \perp \overleftrightarrow{BC}$?

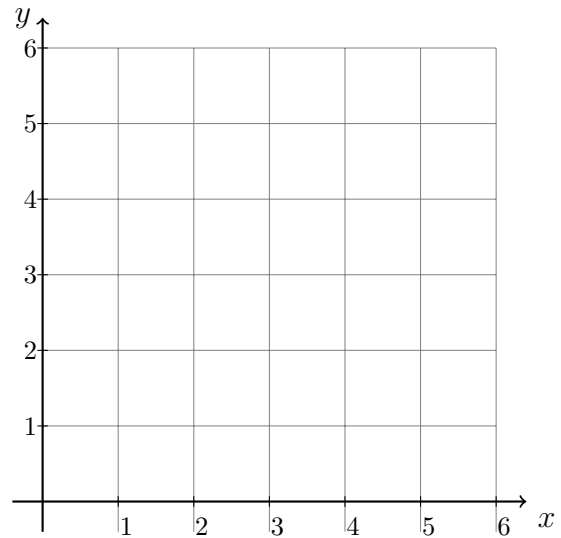   Show the product of their slopes is or is not -1.
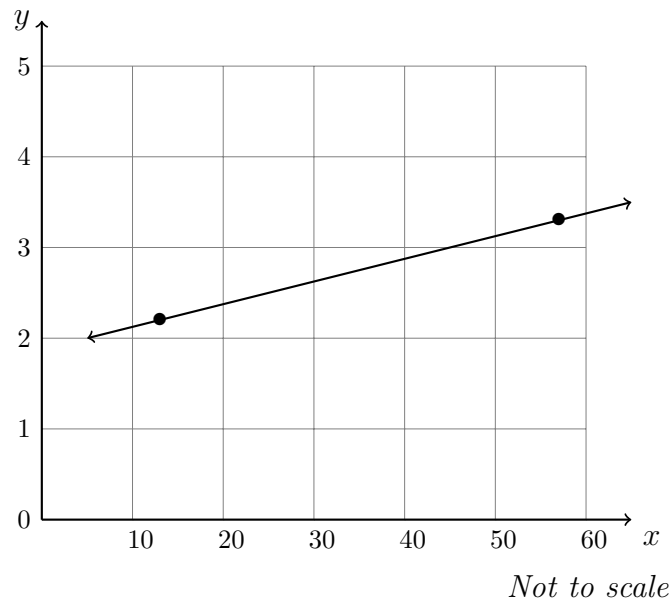
https://www.geogebra.org/calculator/zghcdfhe

17. Plot the points and the line $\overleftrightarrow{PQ}$, $P(1,3)$, $Q(4,5)$. Calculate its slope:

$$m = \frac{y_Q - y_P}{x_Q - x_P}$$

18. Find the slope of the line $\overleftrightarrow{AB}$, $A(13, 2.2)$, $B(57, 3.3)$. Express the value as a percent (the percent grade).
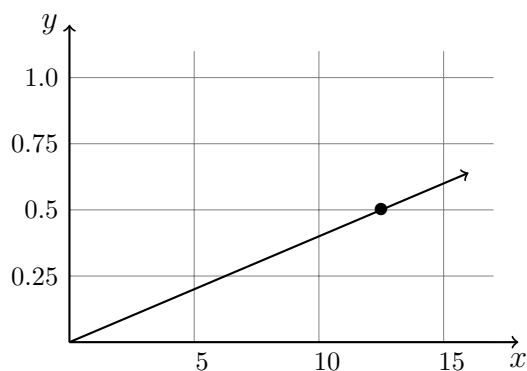

Not to scale

19. Find the slope (or "grade") for a six inch rise over a run of $12\frac{1}{2}$ feet.

Express your result as follows: (c) Percentage

(a) Fraction

(b) Decimal

Not to scale

20. Complete each statement about linear equations.

    (a) What is the y-intercept of the line $y = 0.75x - 1.25$?

    (b) What is the slope of a vertical line?

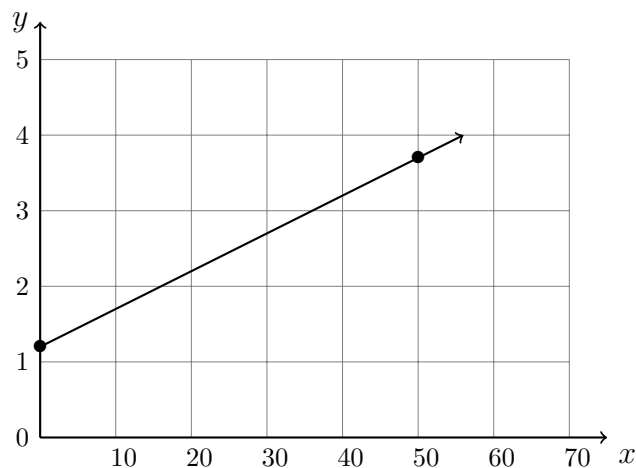   (c) What is the percent grade of the line $y = 0.035x + 5.0$?

    (d) What is the slope of the line $y = \frac{1}{2}$?

    (e) If $m = 0.75$ then $m_\perp =$

    (f) Lines p and q have slopes $m_p = -5$ then $m_q = 0.20$. Are they parallel, perpendicular, or neither? Justify your answer by showing the product of their slopes.

21. Find the equation of the line through the points $(0, 1.2)$, $(50, 3.7)$. First find the slope, then substitute the slope and y-intercept into a linear equation.

$$m = \frac{y_2 - y_1}{x_2 - x_1}, \qquad y = mx + b$$
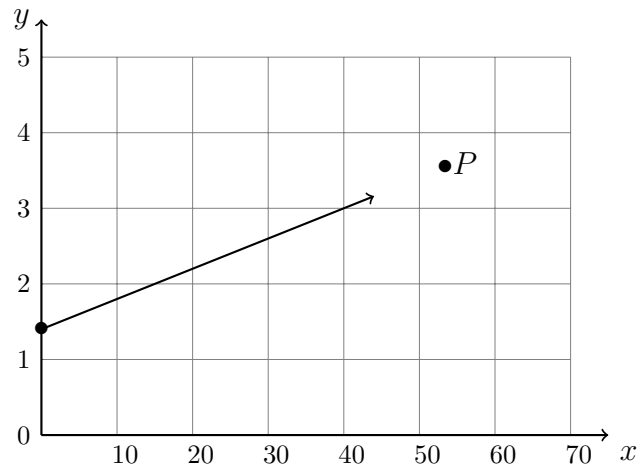
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22. Is the point $P(55, 3.6)$ on the line: $y = 0.04x + 1.40$?

    Support your answer algebraically (substitute P's coordinates into the equation).

    Not to scale

https://graspablemath.com/canvas?load=_ecee681f9b231be0

23. Quadrilateral $ABCD$ with vertices $A(3,7)$, $B(-1,1)$, $C(2,-1)$, and $D(6,5)$ is shown.

    Write down the slopes of each side.

    Slope of $\overline{AB} =$

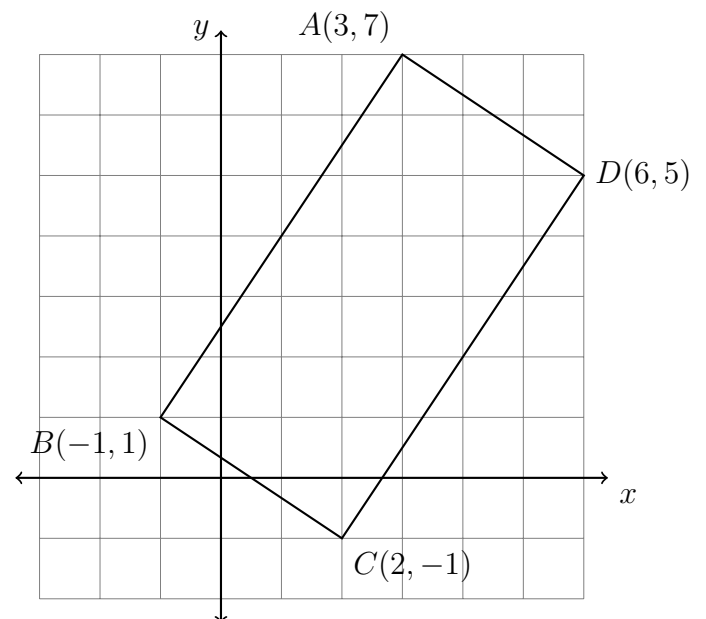   Slope of $\overline{BC} =$

    Slope of $\overline{CD} =$

    Slope of $\overline{AD} =$

    Is $ABCD$ a parallelogram?

    Is it a rectangle?

   Justify your answers below, citing the slopes and their relationships.

24. Plot a parallelogram (not a rectangle) using Geogebra (use the grid). The legs must not be horizontal or vertical. Paste an image of your work in this Classkick slide from the clipboard or by using the "camera" tool.

    Spicy: Show the measures the slopes of the quadrilateral sides.

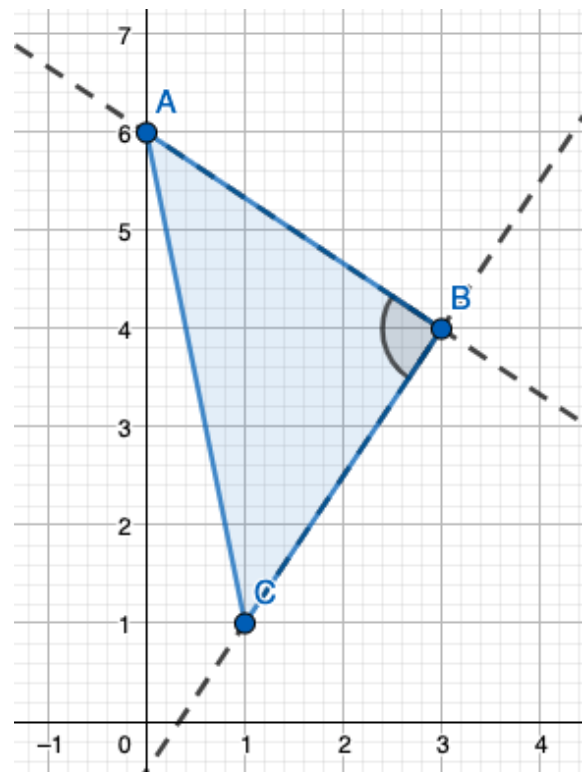25. A line through the point $A(2, 2)$ has a y-intercept of 6.

    (a) Write down the equation of the line.

    (b) What slope is perpendicular to the line?

    (c) Spicy: What is the equation of the perpendicular line through A?
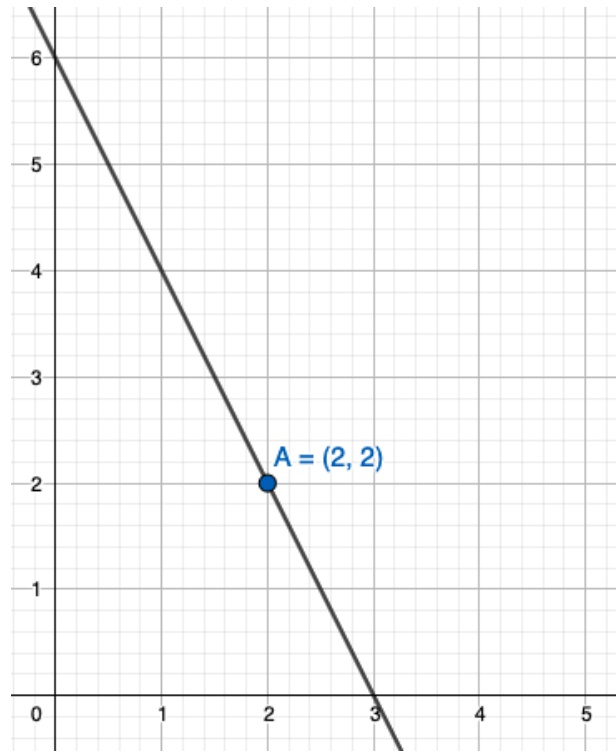
26. Given $\triangle ABC$ as shown with $A(0, 6)$, $B(3, 4)$, $C(1, 1)$.

27. (a) Write down the equation of $\overleftrightarrow{AB}$.

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

    (c) Is $\overleftrightarrow{AB} \perp \overleftrightarrow{BC}$?

        Show the product of their slopes is or is not -1.

https://www.geogebra.org/calculator/myk4wwbj