Formulas for the Day:

$$Slope:\ m = \frac{y_2 - y_1}{x_2 - x_1} \quad \frac{\Delta y}{\Delta x}$$

$$Slope-intercept\ form:\ y = mx + b,\ \ where\ b\ is\ the\ y-intercept$$

$$Standard\ form:\ Ax + By = C,\ \ where\ A, B, and\ C\ are\ intergers$$

Find the **slope** between the two points given. Leave your answers in **simplified fractional** form.

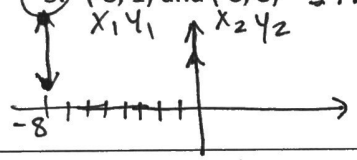
1. (6,-11) and (-16,-13)
$x_1\ y_1 \quad x_2\ y_2$
$m = \frac{-13+11}{-16-6} = \frac{2}{22} = \boxed{\frac{1}{11}}$

2. (14,9) and (7,-12)
$x_1 y_1 \quad x_2 y_2$
$m = \frac{-12-9}{7-14} = \frac{+21}{+7} = \frac{3}{1}$

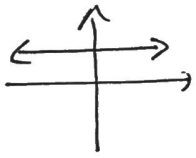
3. (6,5) and (16, -10)
$x_1\ y_1 \quad x_2\ y_2$
$m = \frac{-10-5}{16-6} = \frac{-15}{10} = \boxed{\frac{-3}{2}}$

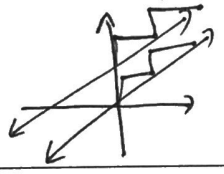
4. (16, -7) and (8, 11)
$x_1\ y_1 \quad x_2\ y_2$
$m = \frac{11+7}{8-16} = \frac{18}{-8} = \boxed{\frac{9}{-4}}$

5. (-8, 1) and (-8, 8)
$x_1\ y_1 \quad x_2\ y_2$
$m = \frac{8-1}{-8+8} = \frac{7}{0}$
undefined



6. (-7,-16) and (11,-16)
$x_1\ y_1 \quad x_2\ y_2$
$m = \frac{-16+16}{11+7} = \frac{0}{18} = \boxed{0}$

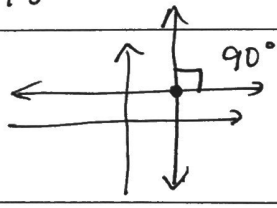




Parallel Lines have the *SAME* Slopes.

Perpendicular Lines have *Opposite Reciprocal* Slopes.

Quick test for perpendicular lines: $m_1 \bullet m_2 = -1$



Find the **slope** of the lines that would be parallel and perpendicular to the given points.

7. (-2, 6) and (-13, -16)
$x_1 y_1 \quad x_2\ y_2$
$m = \frac{-16-6}{-13+2} = \frac{-22}{-11} = \frac{2}{1}$

Slope of parallel line: $m_{\parallel} = 2$

Slope of perpendicular line: $m_{\perp} = -\frac{1}{2}$

8. (9, 22) and (-12, 7)
$x_1 y_1 \quad x_2 y_2$
$m = \frac{7-22}{-12-9} = \frac{-15}{-21} = \frac{5}{7}$

Slope of parallel line: $m_{\parallel} = 5/7$

Slope of perpendicular line: $m_{\perp} = -\frac{7}{5}$

9. (6, -5) and (2, -5)
$x_1 y_1 \quad x_2 y_2$
$m = \frac{-5+5}{2-6} = \frac{0}{-4} = 0$

Slope of parallel line: $m_{\parallel} = 0$

Slope of perpendicular line: $m_{\perp}$ = undefined

10. (16, -7) and (16, 11)
$x_1 y_1 \quad x_2 y_2$
$m = \frac{11+7}{16-16} = \frac{18}{0}$

Slope of parallel line: $m_{\parallel}$ = undefined

Slope of perpendicular line: $m_{\perp} = 0$

Recall How to Write an Equation in Slope - Intercept Form: $y = mx + b$

1. **Identify the slope needed for the equation (slope formula may be needed)**
2. **Substitute: *m* which is the** slope **and (x, y) which is the coordinate of a** point
3. **Solve for b.**
4. **Write the equation in $y = mx + b$ with m and b.**

11. Line *m* is parallel to the line $y = -\frac{1}{2}x + 2$ and contains the point (–6,1). What is the equation of Line *m* in slope-intercept form?

$y = mx + b$ (x, y)

$m = -\frac{1}{2}$, $(-6, 1)$

$1 = -\frac{1}{2}(-6) + b$

$1 = 3 + b$, $b = -2$

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

12. Write an equation to the line parallel to $y = 3x - 9$ and that passes through the point (2,1).

$m = 3$, $(2, 1)$

$1 = 3(2) + b$

$1 = 6 + b$, $b = -5$

$y = mx + b$

$y = 3x - 5$

13. Write the equation of the line that passes through (-3,-2) and is parallel to the equation $2x - 8y = 16$.

$m = \frac{1}{4}$, $(-3, -2)$

$-2 = \frac{1}{4}(-3) + b$

$-2 = -\frac{3}{4} + b$, $b = 1\frac{1}{4}$

$y = \frac{1}{4}x + \frac{11}{4}$

$-2x \quad -2x$

$\frac{-8y}{-8} = \frac{-2x + 16}{-8}$

$y = \frac{1}{4}x - 8$

Use the relationship between slopes of **perpendicular lines** to answer the following questions.

14. Line *m* has the equation, $y = \frac{5}{4}x + 1$. What is the slope of a line perpendicular to Line *m*?

$m = \frac{5}{4}$

opp. / reciprocal

$m_\perp = -\frac{4}{5}$

15. Write the equation of the line perpendicular to $y = \frac{5}{4}x + 1$ and whose y-intercept is 3.

$m_\perp = -4/5$

$b = 3$

$y = -\frac{4}{5}x + 3$

16. Write the equation of the line perpendicular to $y = -2x + 5$ whose y-intercept is 12.

$m = -2$

$m_\perp = 1/2$

$y = \frac{1}{2}x + 12$

17. Write the equation of the line perpendicular to $y = \frac{1}{5}x - 6$ which passes through the point (1, –3).

$m = \frac{1}{5}$

$m_\perp = -\frac{5}{1}$

$y = mx + b$ (x, y)

$-3 = -5(1) + b$

$-3 = -5 + b$, $b = 2$

$y = -5x + 2$

18. The line perpendicular to $\frac{2}{2}y = \frac{1}{2}x + \frac{5}{2}$ that passes through (2,1).

$y = \frac{1}{2}x + \frac{5}{2}$

$m = \frac{1}{2}$

$m_\perp = -2$

$1 = -2(2) + b$

$1 = -4 + b$

$5 = b$

$y = -2x + 5$

19. The line perpendicular to $3x + y = 8$ that passes through (0,-2)

$-3x \quad -3x$

$y = -3x + 8$

$m = -\frac{3}{1}$

$m_\perp = \frac{1}{3}$

$y = mx + b$ (x, y)

$-2 = \frac{1}{3}(0) + b$

$-2 = b$

$y = \frac{1}{3}x - 2$