

$$\begin{array}{rcl} \text{(1)} & x^2 - 4y = -8x - y^2 - 16 \\ & +8x + y^2 & +8x + y^2 \end{array}$$

Find the equation for the circle.

Find center and radius

$$\begin{array}{rcl} (x^2 + 8x) + (y^2 - 4y) & = -16 \\ (\frac{8}{2})^2 + 16 & (\frac{-4}{2})^2 + 4 & -16 - 4 \\ 4^2 = 16 & 4 & \end{array}$$

$$(x^2 + 8x + 16) + (y^2 - 4y + 4) - 16 - 4 = -16$$

$$\begin{array}{rcl} (x^2 + 8x + 16) + (y^2 - 4y + 4) - 20 & = -16 \\ \cancel{x^2} \downarrow & \cancel{\sqrt{16}} \quad \cancel{\sqrt{y^2}} & \sqrt{16} + 20 + 20 \\ (x+4)^2 + (y-2)^2 & & = 4 \end{array}$$

$$(x+4)^2 + (y-2)^2 = 4 \quad \text{Equation for circle}$$

$$\text{Center: } (-4, 2) \quad \text{radius} = \sqrt{4} = 2$$

2.) Find the slope between $(4, -8)$ and $(-2, 6)$

$$\text{slope } m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - (-8)}{-2 - 4} = \frac{6 + 8}{-2 - 4} = \frac{14}{-6} = -\frac{7}{3}$$

$\frac{\text{rise}}{\text{run}}$

3.) What is the equation of the line with
a slope of $-\frac{4}{3}$ through $(6, -9)$?

$$\textcircled{1} \quad y = mx + b$$

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$$-9 = \left(-\frac{4}{3}\right)(6) + b$$

$$-9 = -\frac{24}{3} + b$$

$$-9 = -8 + b$$

$$+8 \quad +8$$

$$\boxed{-1 = b}$$

$$\textcircled{2} \quad y - y_1 = m(x - x_1)$$

$$y - (-9) = -\frac{4}{3}(x - 6)$$

$$y + 9 = -\frac{4}{3}x + 8$$

-9

-9

$$\boxed{y = -\frac{4}{3}x - 1}$$

$$y = mx + b$$

$$\boxed{y = -\frac{4}{3}x - 1}$$

4.) Rewrite $2x - 8y = 16$ in slope-intercept form.

$$2x - 8y = 16 \rightarrow y = mx + b$$

$$\begin{array}{rcl} & -2x & -2x \\ -8y & = & -2x + 16 \\ \hline -8 & & -8 \\ y & = & \frac{1}{4}x - 2 \end{array}$$

5.) Find the equation for the line through $(4, -2)$ and $(2, 8)$.

1.) Find slope

$$\textcircled{1} \text{ slope } m = \frac{y_2 - y_1}{x_2 - x_1}$$

2.) Use slope and point to find "b"

$$\frac{8 - (-2)}{2 - 4} = \frac{8 + 2}{2 - 4} = \frac{10}{-2}$$

3.) Plug into $y = mx + b$

$$\textcircled{2} \quad y = mx + b$$

$$m = \boxed{-5}$$

$$\textcircled{3} \quad y = mx + b$$

$$\boxed{y = -5x + 18}$$

$$-2 = (-5)(4) + b$$

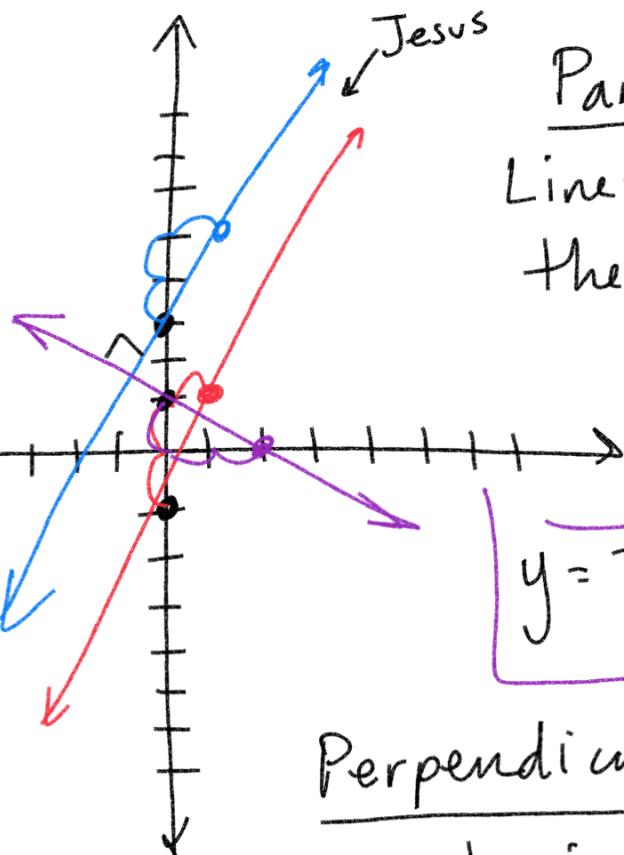
$$-2 = -20 + b$$

$$\begin{array}{rcl} +20 & +20 \\ \hline 18 & = b \end{array}$$

$$y = 2x - 1$$

slope y-int
 $2 = \frac{\text{up } 2}{\text{right}}$

$$y = 2x + 3$$



Parallel lines

Lines that have the same slope

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

Perpendicular Lines

Opposite inverse slopes.

Draw a line parallel to $y = 4x + 3$ that goes through $(2, 5)$ and has equal slope

Given slope = 4

Needed slope = 4

$$\boxed{m=4}$$

$$y = 4x - 3$$

$$y = mx + b$$

$$\downarrow$$

$$5 = (4)(2) + b$$

$$5 = 8 + b$$

$$\begin{array}{r} -8 \\ \hline -3 = b \end{array}$$

Find the line perpendicular to $3x + 2y = 12$
that goes through (1, b).

Given $3x + 2y = 12$

$$Ax + By = C$$

standard form

$$3x + 2y = 12$$

$$-3x \quad -3x$$

$$\frac{2y}{2} = \frac{-3x + 12}{2}$$

$$y = -\frac{3}{2}x + \cancel{+6}$$

Given slope: $-\frac{3}{2}$

perp slope

opposite, inverse

$$\text{Needed: } \boxed{\frac{2}{3} = m}$$

(1, b)

$$y = mx + b$$

$$\downarrow \quad \downarrow \quad \downarrow$$

$$b = \left(\frac{2}{3}\right)1 + b$$

$$b = \frac{2}{3} + b$$

$$\frac{18}{3} = \frac{2}{3} + b$$

$$-\frac{2}{3} \quad -\frac{2}{3}$$

$$\boxed{b = \frac{16}{3}}$$

$$\boxed{y = \frac{2}{3}x + \frac{16}{3}}$$

s varies directly with t

$\uparrow s \ t \uparrow$ numerator $s \propto t$

$\downarrow s \ t \downarrow$ $s = kt$

constant of variation

v varies directly with x^3

$$v = kx^3$$

f varies inversely with λ

directly \rightarrow numerator denominator

$$\text{inversely} \rightarrow \text{denominator} f = \frac{k}{\lambda}$$

F varies directly with w and g

and inversely with L .

$$F = \frac{kwg}{L}$$

$$F = k \frac{wg}{L}$$

Ⓐ A varies directly with square of r

Ⓑ $A = 9\pi$ when $r = 3$

2 part problem Ⓐ Find equation

Ⓑ

$$A = kr^2$$

$$9\pi = k(3)^2$$

$$\frac{A = kr^2}{A = \pi r^2}$$

$$\frac{9\pi}{9} = \frac{9k}{9}$$

$$\pi = k$$