Lesson 5: Further Practice with Linear Equations

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Equations of Linear Relations Lesson #5: Further Practice with Linear Equations

Writing Linear Equations

Linear equations can be written in different forms:

$Ax + By + C = 0$	→	General form of a linear equation.
$y = mx + b$	→	Slope y-intercept form of a linear equation.
$y - y_1 = m(x - x_1)$	→	Point-slope form of a linear equation.

The slope y-intercept form is used when we are given the slope of a line and the y-intercept.
The point-slope form is used when we are given the slope of a line and any point on the line.
In many cases, either the point or the slope of the line must be determined from the information given before the equation can be used.

Given $P(3, -1)$ and $Q(-2, -6)$, determine the equation, in general form, of a line passing through the two points.

need slope

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{-1-(-6)}{3-(-2)}$$

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

$$m = 1$$

Use point-slope form: $m=1$ and $P(3,-1)$

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

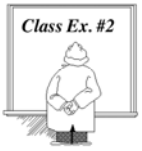
$$y + 1 = 1(x - 3)$$

$$y + 1 = x - 3$$

$$y = x - 4$$

$$0 = x - y - 4$$

or $\boxed{x - y - 4 = 0}$



Determine the equation, in general form, of a line through the point $(5, 0)$ and perpendicular to the line with equation $3x - 5y + 17 = 0$.

Find slope of:

$$3x - 5y + 17 = 0$$

$$\frac{3x}{5} + \frac{17}{5} = \frac{5y}{5}$$

$$y = \frac{3}{5}x + \frac{17}{5}$$

slope

perpendicular slope is $-\frac{5}{3}$

Use point-slope form: $m = -\frac{5}{3}$ $(5,0)$

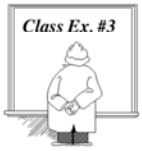
$$y - y_1 = m(x - x_1)$$

$$y - 0 = -\frac{5}{3}(x - 5)$$

$$3y = -5(x - 5)$$

$$3y = -5x + 25$$

$$\boxed{5x + 3y - 25 = 0}$$



Find the equation, in general form, of the line perpendicular to the line $5x - 7y - 10 = 0$ and with the same x-intercept as $x - 2y - 12 = 0$.

① Find slope of: $5x - 7y - 10 = 0$

$\frac{5x}{7} - \frac{10}{7} = \frac{7y}{7}$

$y = \frac{5}{7}x - \frac{10}{7}$

slope

perpendicular line has slope $-\frac{7}{5}$

② Find x-int of: $y = 0$

$x - 2y - 12 = 0$

$x - 2(0) - 12 = 0$

$x - 12 = 0$

$x = 12$

$(12, 0)$

③ Use point-slope form:

$m = -\frac{7}{5}$ point $(12, 0)$

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

$y - 0 = -\frac{7}{5}(x - 12)$

$5y = -7(x - 12)$

$5y = -7x + 84$

$7x + 5y - 84 = 0$

Complete Assignment Questions #1 - #14

Assignment

1. Find the equation, in general form, of the line through each pair of points.

a) (7, 5) and (6, 1)

b) (3, –7) and (–5, 9)

c) (–3, 4) and (11, 25)

d) (10, –15) and (–2, –12)

e) (4, –7) and (3, –7)

f) (–5, –8) and (–4, –10)