6.4 Part 2

Name: KEY

Topic: Writing Eq's of Perpendicular Lines Date: _____

Summary:

SLOPE FORMULA	SLOPE-INTERCEPT FORM	POINT-SLOPE FORM
$m = \frac{y_2 - y_1}{x_2 - x_1}$	$y = mx + b$	$y - y_1 = m(x - x_1)$

How do we know if two lines are perpendicular?

Their slopes (m) are opposite (+-) reciprocals ($\frac{a}{b} \to \frac{b}{a}$).

Determine if the two lines are perpendicular.

1) Line 1: through (-1, 0) and (0, 4)
   Line 2: through (-2, -6) and (-1, -2)

No, not perpendicular.

$m_1 = \frac{4-0}{0-(-1)} = \frac{4}{1} = 4$

$m_2 = \frac{-2-(-6)}{-1-(-2)} = \frac{4}{1} = 4$

They are parallel. (Same Slopes)

2) Line 1: y = 3x -9
   Line 2: $y = -\frac{1}{3}x + 7$

$y = mx + b$

$m_1 = 3$

$m_2 = -\frac{1}{3}$

Yes, ⊥. Slopes are opposite reciprocals.

3) Line 1: $y = -\frac{1}{2}x$
   Line 2: $y = 2x + 5$

$m_1 = -\frac{1}{2}$ $m_2 = 2$

Yes, the lines are perpendicular.

*Change to Slope-Int. Form. $y = mx + b$

4) Line 1: $3x + 2y = 6$
   Line 2: $12x - 18y = -1$

Yes ⊥

Line 1: $2y = -3x + 6$

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

$\boxed{m = -\frac{3}{2}}$

Line 2: [illegible]

5) Line 1: $-0.5x - y = 1$
   Line 2: $-4x + 2y = -2$

Line 1: $-y = 0.5x + 1$

$y = -0.5x - 1$

$\boxed{m = -0.5} \to \boxed{m = -\frac{1}{2}}$

Line 2: $2y = 4x - 2$

$y = 2x - 1$

Yes,

6.4 Part 2

Steps:

1) Identify $y=mx+b$, OR calculate $m=\frac{Y_2-Y_1}{X_2-X_1}$ Slope (m) of original line. $m=?$

2) Identify perpendicular Slope. $m_\perp$ *opposite reciprocal

3) Use $m_\perp$ and point of $\perp$ line and plug into Point-Slope Form. $y-y_1=m(x-x_1)$.

4) Simplify and write in Slope-Intercept Form. $y=mx+b$.

EX: Write an equation of a line that passes through (2, -3) and is perpendicular to the line $y = 2x - 3$.

① $m=2$

② $m_\perp=-\frac{1}{2}$

③ $y-y_1=m(x-x_1)$

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

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

④ $\boxed{y=-\frac{1}{2}x-2}$

TRY: Write an equation of a line that passes through (4, -1) and is perpendicular to the line $y = -x + 4$.

① $m=-1$

② $m_\perp=1$

③ $y-y_1=m(x-x_1)$

$y+1=1(x-4)$

$y+1=x-4$

④ $\boxed{y=x-5}$

EX: Write an equation of a line that passes through (3, -2) and is perpendicular to the line that passes through (3, 0) and (-3, 1).

① $m=\frac{Y_2-Y_1}{X_2-X_1}$

$m=\frac{1-0}{-3-3}=\frac{1}{-6}$

② $m_\perp=6$

③ $y-y_1=m(x-x_1)$

$y+2=6(x-3)$

$y+2=6x-18$

④ $\boxed{y=6x-20}$

TRY: Write an equation of a line that passes through (-1, 3) and is perpendicular to the line that passes through (1, 5) and (4, 2).

① $m=\frac{Y_2-Y_1}{X_2-X_1}$

$m=\frac{2-5}{4-1}=\frac{-3}{3}=-1$

② $m_\perp=1$

③ $y-y_1=m(x-x_1)$

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

$y-3=x+1$

④ $\boxed{y=x+4}$