

# Equation Perpendicular to Line Through a Point

Part I.

*3 Model Problems Answered step by step*

Part II.

*Practice Problems*

Part III.

*Homework (mixed questions on linear equations)*

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# Perpendicular

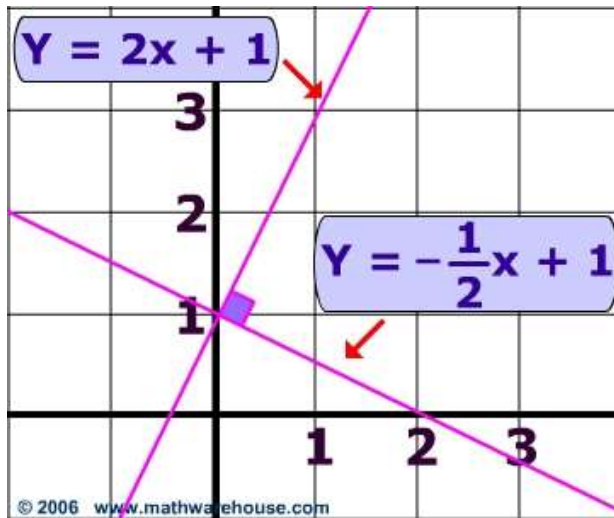
Warm Up → What is the negative reciprocal of the following numbers?

A)  $\frac{3}{2}$

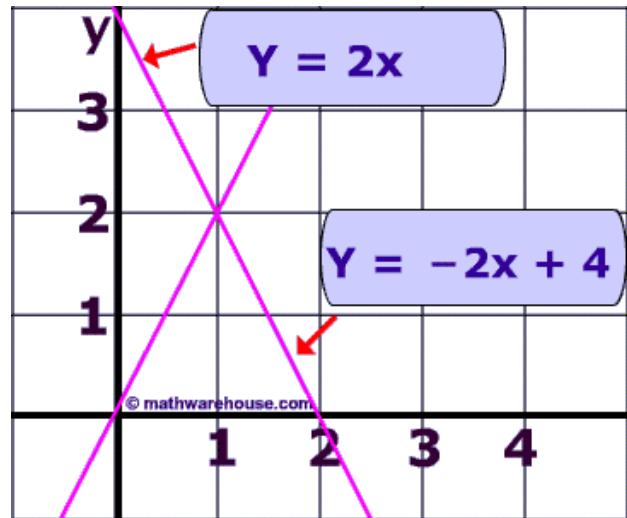
B) 5

C)  $-\frac{1}{2}$

Perpendicular Lines



Not Perpendicular



## Model Problems

1. Write the equation of a line that is perpendicular to  $y = -5x + 2$  that passes through the point (10,6)?

2. Write the equation of a line that is perpendicular to  $y = \frac{1}{2}x - 6$  that passes through the point  $(6, 4)$

3. Write the equation of a line that is perpendicular to  $y = -\frac{1}{8}x + 2$  that passes through the point  $(-4, 2)$ .

**Model Problem 1)****answer**

Write the equation of a line that is perpendicular to  $y = -5x + 2$  that passes through the point  $(10,6)$ ?

**Step 1) find the negative reciprocal of the slope**

$$\text{Slope} = -5 \text{ or } -\frac{5}{1}$$

$$\text{Negative reciprocal } \frac{1}{5}$$

**2) Plug the  $x$  and  $y$  given in the question into the point slope formula**

$$6 = \frac{1}{5}(10) + b$$

**3) Solve for  $b$** 

$$6 = 2 + b$$

$$\begin{array}{r} -2 \quad -2 \\ \hline 6 = b \end{array}$$

**4) Substitute  $b$  into slope intercept equation**

$$y = \frac{1}{5}x + 6$$

**Model Problem 2)****Answer**

Write the equation of a line that is perpendicular to  $y = \frac{1}{2}x - 6$  and passes through the point  $(6,4)$  ?

**Step 1) find the negative reciprocal of the slope**

$$\text{Slope} = \frac{1}{2}$$

Negative reciprocal  $-2$

**2) Plug the  $x$  and  $y$  given in the question into the point slope formula**

$$4 = -2(6) + b$$

**3) Solve for  $b$**

$$4 = -12 + b$$

$$\begin{array}{r} +12 \\ +12 \\ \hline \end{array}$$

$$16 = b$$

**4) Substitute  $b$  into slope intercept equation**

$$y = -2x + 16$$

**Model Problem 3)****Answer**

Write the equation of a line that is perpendicular to  $y = -\frac{1}{8}x + 2$  and passes through the point  $(-4, 2)$ .

**Step 1) find the negative reciprocal of the slope**

$$\text{Slope} = -\frac{1}{8}$$

Negative reciprocal 8

**2) Plug the x and y given in the question into the point slope formula**

$$2 = 8(-4) + b$$

**3) Solve for b**

$$2 = -32 + b$$

$$\begin{array}{r} +32 \quad +32 \\ \hline \end{array}$$

$$34 = b$$

**4) Rewrite equation with only slope and y-intercept**

$$y = 8x + 34$$

## Part II.

1. Write the equation of a line that is perpendicular to  $y = -\frac{3}{2}x - 3$  that passes through the point  $(6,7)$  ?

2. Write the equation of a line that is perpendicular to  $y = -2x + 4$  that passes through the point  $(8, 8)$

*\*\*The next questions are a bit different. Read them carefully.*

3. Write the equation of a line perpendicular to  $y = -\frac{5}{6}x - 3$  and whose y-intercept is  $(0,11)$ .

4. Write the equation of a line perpendicular to  $y = \frac{3}{8}x - 3$  and whose y-intercept is  $(0,12)$ .

5. Write the equation of a line that is perpendicular to  $y = -\frac{4}{5}x - 3$  that passes through the point  $(5,-10)$

## Homework

1) The two lines below are **not** parallel. Explain why

a.  $y - 2x = 3$

b.  $2y + 4x = 6$

2) Write the equation of a line perpendicular to  $y = -\frac{11}{12}x + 12$  and whose y-intercept is  $(0, 5)$ .

3) Write the equation of a line parallel to  $y = \frac{3}{4}x + 12$  and whose y-intercept is  $(0, 5)$ .

4) Find the slope of the line that passes through the points  $(1,1)$  and  $(3,5)$ ?

5) Find the slope of the line that passes through the points  $(1,3)$  and  $(2,4)$ ?

6) What is the equation of a line with a slope of 4 that goes through the point  $(1,9)$ ?



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