

Writing Equations

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Recall: parallel lines: same slope

perpendicular lines: negative reciprocal ex $\frac{2}{3}$ and $-\frac{3}{2}$

Ex. Determine the equation of the line:

$$y = mx + b$$

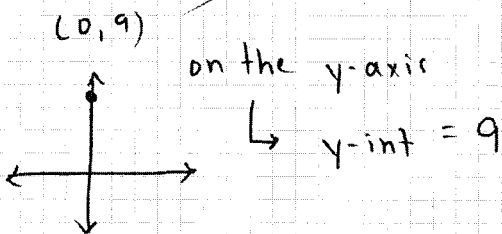
a) parallel to $y = \frac{1}{3}x + 4$ and same y-int as $y = 6x - 7$

parallel (same slope)

New line: $m = \frac{1}{3}$ $b = -7$

$$y = \frac{1}{3}x - 7$$

b) passing through $(0, 9)$ and perpendicular to a line segment that passes through $(2, -6)$ and $(-5, 0)$



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

$$m = \frac{0 - (-6)}{-5 - 2} = \frac{6}{-7} = -\frac{6}{7}$$

Find slope

New line: $b = 9$

$m = \frac{7}{6}$

$$y = \frac{7}{6}x + 9$$

Ex. The lines $3x - 4y + 8 = 0$ and $5x - ky - 6 = 0$ have the same y-int. Solve for k.

⊗ Rewrite both equations in $y = mx + b$

$$\begin{array}{r} 3x - 4y + 8 = 0 \\ -3x \quad -8 \quad -3x - 8 \\ -4y = -3x - 8 \end{array}$$

$$\begin{array}{r} 5x - ky - 6 = 0 \\ -5x \quad +6 \quad -5x + 6 \end{array}$$

$$-4y = -3x - 8$$

$$-ky = -5x + 6$$

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

$$y = \frac{3}{4}x + 2$$

y-int

$$\frac{-ky}{-k} = \frac{-5x + 6}{-k}$$

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

y-int

same y-int: $k \cdot 2 = \frac{-6}{k}$

$$\frac{2k}{2} = \frac{-6}{2}$$

$$k = -3$$

Ex. Are these lines parallel or perpendicular or neither?

$$4x - 2y + 9 = 0$$

and

$$x + 2y - 12 = 0$$

• Rearrange
 $y = mx + b$

$$\frac{-2y}{-2} = \frac{-4x - 9}{-2}$$

$$y = 2x + \frac{9}{2}$$

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

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

$$y = -\frac{1}{2}x + 6$$

slope = $-\frac{1}{2}$

• Compare
slopes

Perpendicular lines. Slopes are neg. reciprocals.

Page 565 # 1, 2, 4, 6

Page 574 # 4-7