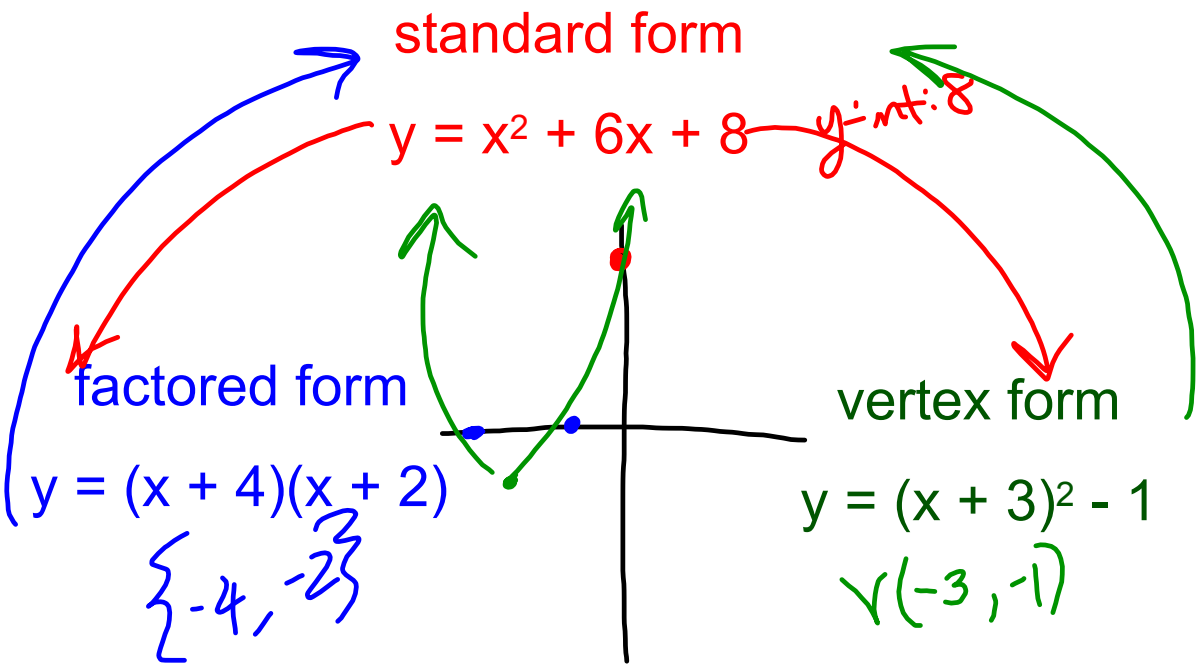
2-4 Writing Linear Equations

Forms of Equations

- standard form $Ax+By=C$ $2x+3y=6$
- slope-intercept form $y=mx+b$ $y=2x-3$ $m=2$ y-int: -3
- point-slope form $y-y_1=m(x-x_1)$ $y-3=4(x+1)$ $m=4$ $(-1,3)$

Methods of Graphing

- t-table pick x
- x-intercept and y-intercept sketch $Ax+By=C$
- slope and y-intercept pt. & slope to accurate



Writing an equation given slope and a point

slope-intercept form

- use the form $y = mx + b$
- plug in slope (m)
- plug in the point (x, y)
- solve for b, rewrite or rearrange for desired form

OR

point-slope form

- use the form $y - y = m(x - x)$
- plug in slope (m)
- plug in point (x, y)
- distribute slope and rearrange for desired form

Example 1: ***Write the slope-intercept form of the equation of the line that has a slope of 2 and passes through (-1, 3).***

y=mx+b m=2 x y

using slope-intercept form

$y = mx + b$

$3 = 2(-1) + b$

$3 = -2 + b$

$5 = b$

$y = 2x + 5$

using point-slope form

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

$y - 3 = 2(x + 1)$

$y - 3 = 2x + 2$

$y = 2x + 5$

Writing an equation given two points

- find slope
- plug in slope (m) and one of the given points (x, y) into ***slope-intercept form*** OR ***point-slope form***
- rewrite/rearrange to desired form

Ex 2. Write the standard form equation of the line that passes through (2, 3) and (1, 5).

Ax+By=C

$m = \frac{y-y}{x-x}$

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

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

$y = mx + b$

$3 = -2(2) + b$

$3 = -4 + b$

$7 = b$

$y = -2x + 7$

$2x + y = 7$

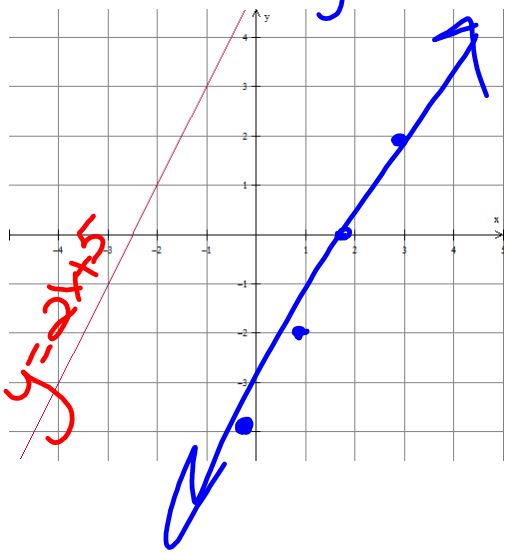
Parallel and Perpendicular Lines

- Parallel Lines have **the same** slope.
- Perpendicular lines have **negative reciprocal** slopes.

$m = 2 \quad \parallel m = 2 \quad \perp m = -\frac{1}{2}$

$m = -\frac{3}{4} \quad \parallel m = -\frac{3}{4} \quad \perp m = \frac{4}{3}$

Ex 3. Write the slope-intercept form equation of the line that passes through (3, 2) and is parallel to the line y = 2x + 5.



x y

$m = 2 \quad \parallel m = 2$

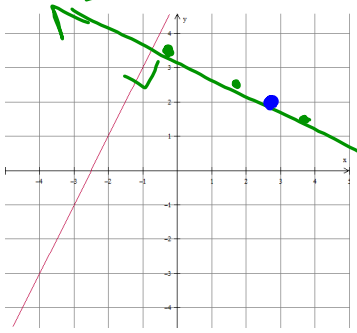
$y - y = m(x - x)$

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

$y - 2 = 2x - 6$

$y = 2x - 4$

Ex 4. Write the standard form equation of the line that passes through (3, 2) and is perpendicular to the line y = 2x + 5.



$m=2 \quad \perp m = -\frac{1}{2}$

$y = mx + b$

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

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

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

$\frac{7}{2} = b$

$y = -\frac{1}{2}x + \frac{7}{2}$

$2\left(\frac{1}{2}x + y\right) = 2\left(\frac{7}{2}\right)$

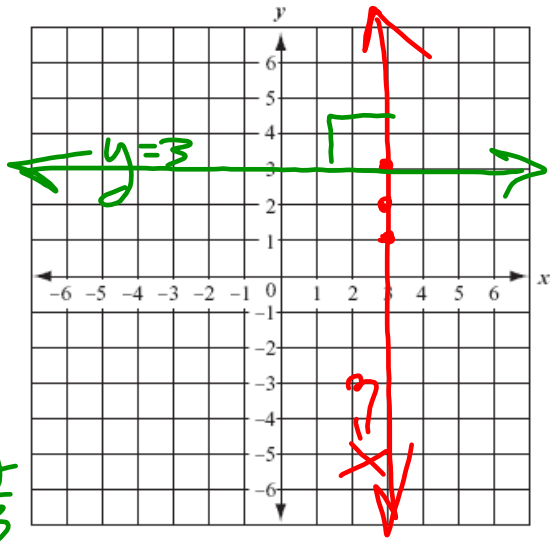
$x + 2y = 7$

Vertical Lines

- undefined slope
- equations of the form x + 0y = C
- all vertical lines are parallel

$x = 3$

x	y
3	1
3	2
3	3



Horizontal Lines

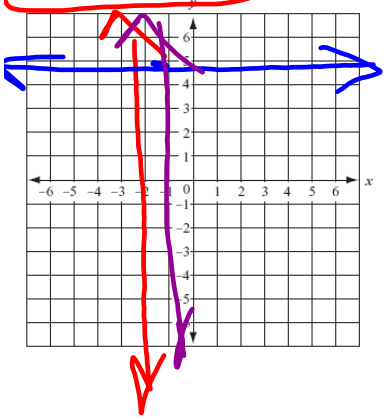
- zero slope
- equations of the form 0x + y = C
- all horizontal lines are parallel

$y = 3$

x	y
1	3
2	3
3	3

☆ **all vertical &horizontal lines are perpendicular to each other** ☆

Ex. 5 Write the standard form of the equation of the line perpendicular to the line x = -2 that goes through the point (-1, 5).



vertical

$y = 5$

$\parallel$

$x = -1$