3.4 Find and Use Slopes of Lines

Before You used properties of parallel lines to find angle measures.

Now You will find and compare slopes of lines.

Why? So you can compare rates of speed as in Example 4.

RECALL:

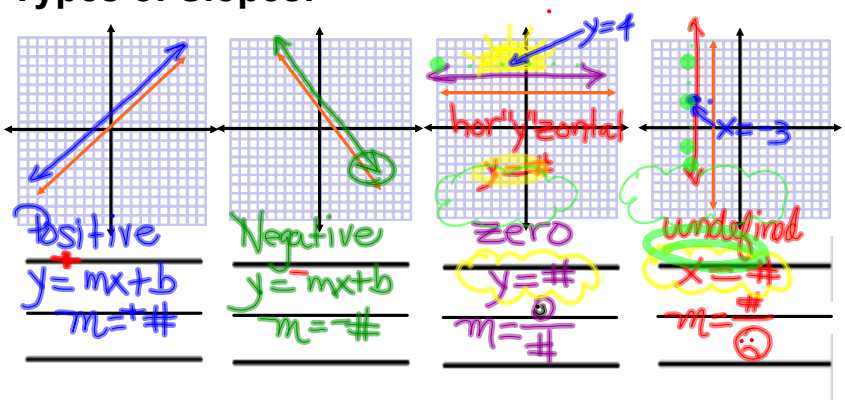
Slope-Intercept: $y = mx + b$ (x, y) = a point on the line; slope; y-intercept

Point Slope Form: $(y - y_1) = m(x - x_1)$

Point: (x_1, y_1) Slope: m

Slope Formula: $m = \frac{rise}{run} = \frac{y_2 - y_1}{x_2 - x_1}$ change "y"; change "x"; rise; run

Types of Slopes:

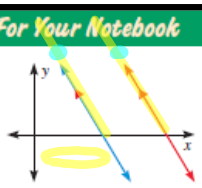


POSTULATES *For Your Notebook*

POSTULATE 17 Slopes of Parallel Lines

In a coordinate plane, two nonvertical lines are parallel if and only if they have the same slope.

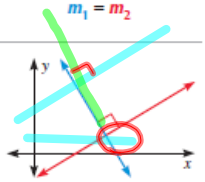
Any two vertical lines are parallel.



POSTULATE 18 Slopes of Perpendicular Lines

In a coordinate plane, two nonvertical lines are perpendicular if and only if the product of their slopes is −1.

Horizontal lines are perpendicular to vertical lines.



y=# x=#

x ⊥ y

Ex.) $m = 2$ → opposite → -2 → reciprocal → $-\frac{1}{2}$ same $\frac{1}{-2} = -\frac{1}{2}$

$m_\perp = -\frac{1}{2}$

Ex.) $m = -\frac{2}{3}$ → opposite → $\frac{2}{3}$ → reciprocal → $\frac{3}{2}$

$m_\perp = \frac{3}{2}$

3.4 Find and Use Slopes of Lines

Find the slope of each line.

"coefficient of x"

$y = mx + b$

1) $y = -3x - 5$

$m = -3$

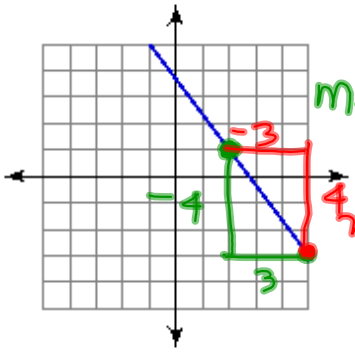
2) $y = -\frac{8}{3}x - 4$

3) $y = 1x - 3$

$m = 1$

4) $y = \frac{1}{5}x - 3$

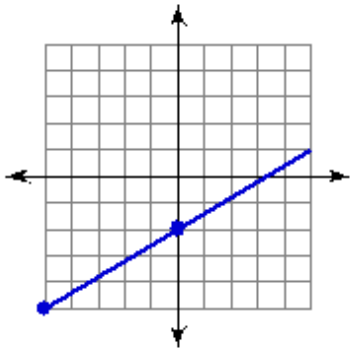
5)



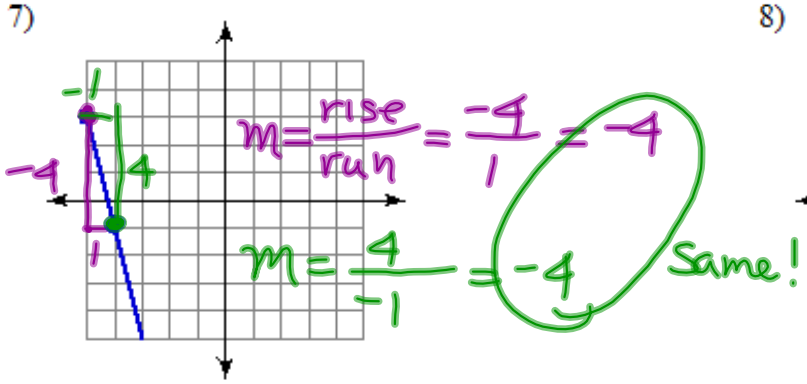
$m = \frac{\text{rise}}{\text{run}} = \frac{-4}{3}$

$m = \frac{4}{-3}$ Same!

6)



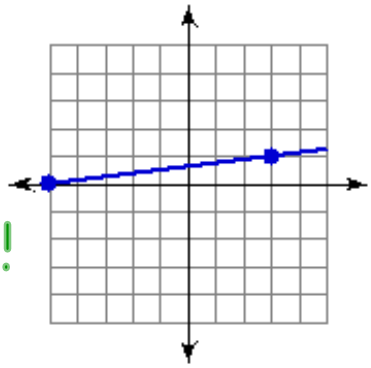
7)



$m = \frac{\text{rise}}{\text{run}} = \frac{-4}{1} = -4$

$m = \frac{4}{-1} = -4$ Same!

8)



Find the slope of the line through each pair of points.

$x_1\ y_1\ x_2\ y_2$

9) (6, 1), (5, –9)

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

$m = \frac{-9 - 1}{5 - 6} = \frac{-10}{-1} = 10$

10) (17, 5), (17, 2)

$x_1\ y_1\ x_2\ y_2$

11) (1, –12), (–3, –13)

$m = \frac{-13 + 12}{-3 - 1} = \frac{-1}{-4} = \frac{1}{4}$

12) (–9, 0), (1, 0)

Find the slope of a line parallel to each given line.

13) $y = -\frac{1}{5}x + 4$

14) $x = 5$

15) $y = -2x + 5$

16) $y = -x - 5$

Find the slope of a line perpendicular to each given line.

17) $y = -7x - 3$

18) $y = \frac{1}{4}x - 5$

19) $x = 4$

20) $y = 5x$

Write the slope-intercept form of the equation of the line through the given point with the given slope.

21) through: $(4, 0)$, slope $= 1$

22) through: $(3, -5)$, slope $= \frac{5}{2}$

23) through: $(-4, -4)$, slope $= \frac{6}{5}$

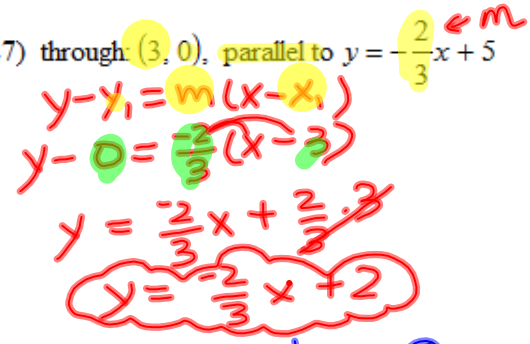
24) through: $(4, -3)$, slope $= -\frac{3}{5}$

Write the slope-intercept form of the equation of the line described.

25) through: $(4, -4)$, parallel to $y = 7x - 5$

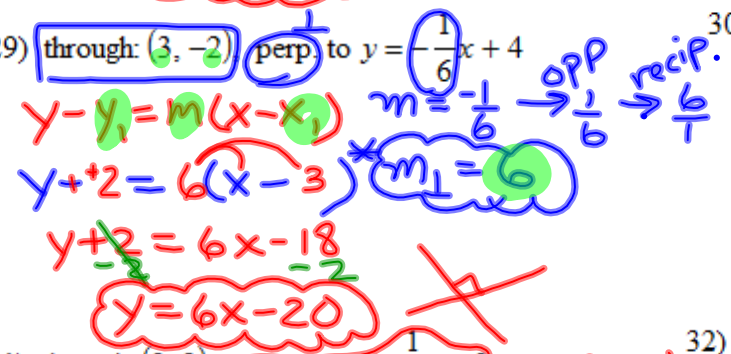
26) through: $(4, -1)$, parallel to $y = -\frac{1}{2}x - 4$

27) through: $(3, 0)$, parallel to $y = -\frac{2}{3}x + 5$



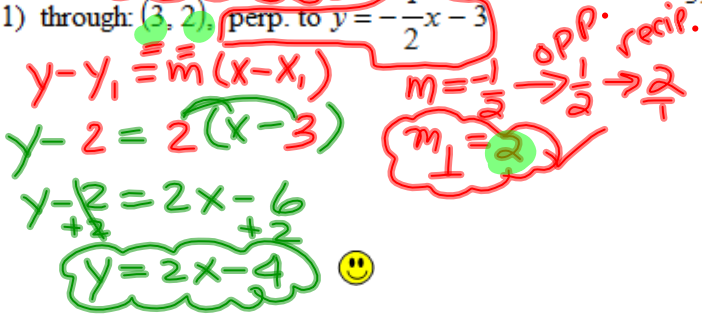
28) through: $(3, 4)$, parallel to $y = \frac{1}{3}x + 5$

29) through: $(3, -2)$, perp. to $y = -\frac{1}{6}x + 4$



30) through: $(-5, 0)$, perp. to $y = x + 3$

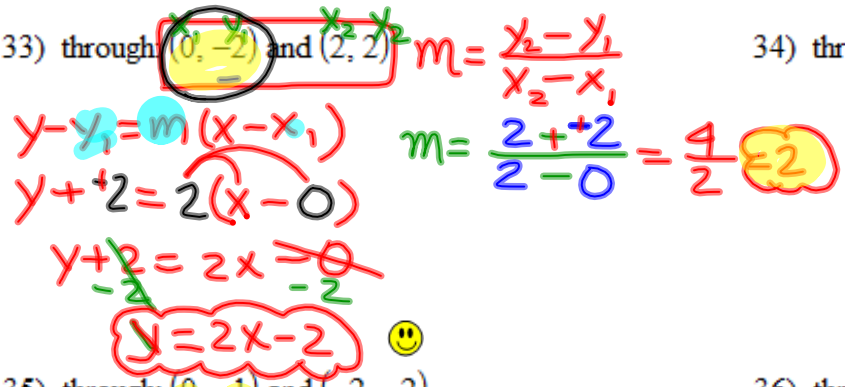
31) through: $(3, 2)$, perp. to $y = -\frac{1}{2}x - 3$



32) through: $(-4, -1)$, perp. to $y = 2x + 3$

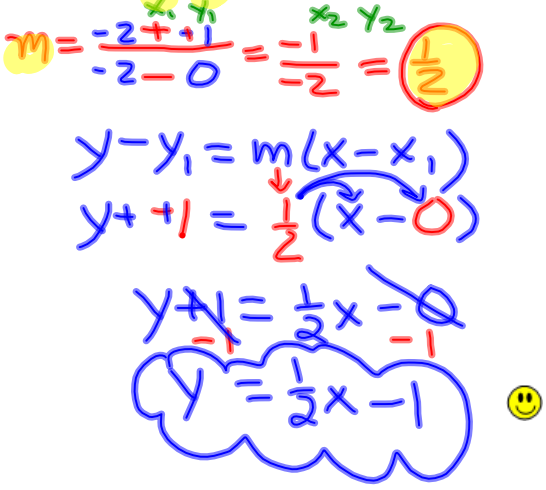
Write the slope-intercept form of the equation of the line through the given points.

33) through: $(0, -2)$ and $(2, 2)$



34) through: $(4, -5)$ and $(0, -3)$

35) through: $(0, -1)$ and $(-2, -2)$



36) through: $(-5, -5)$ and $(0, 0)$