Geometry Ch 3-4 Exercises pg 167 #1-10, 13-18, 23-24

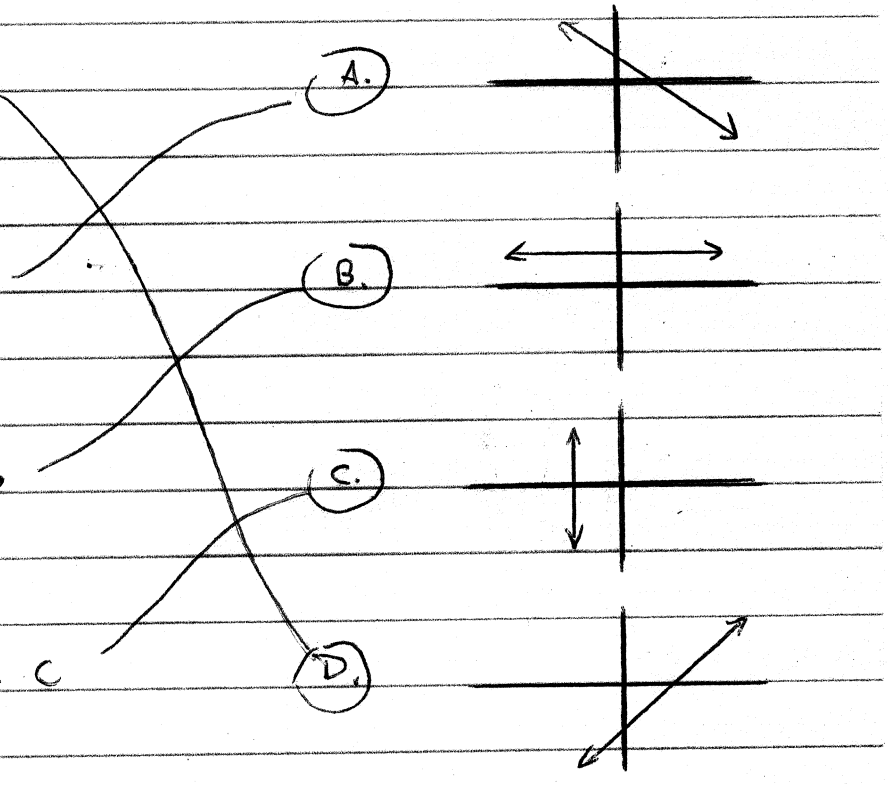
1. Describe the meaning of the slope of a nonvertical line.

Slope is the ratio of the vertical change (rise) versus the horizontal change (run) between any two points on the line.

2. What happens when you apply the slope formula to
   - a horizontal line? Slope is zero.
   - a vertical line? Slope is undefined.

Match description of slope of a line with its graph.

3. m is positive D
4. m is negative A
5. m is zero B
6. m is undefined. C



Slope, $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{Rise}}{\text{Run}}$

Find the slope of the line passing through the points.

7. $(3,5), (5,6)$

$m = \frac{6-5}{5-3} = \frac{1}{2}$

8. $(-2,2), (2,-6)$

$m = \frac{-6-2}{2-(-2)} = \frac{-8}{4} = -2$

9. $(-5,-1), (3,-1)$

$m = \frac{-1-(-1)}{3-(-5)} = \frac{0}{8} = 0$

10. $(2,1), (0,6)$

$m = \frac{6-1}{0-2} = \frac{5}{-2}$

Tell whether the lines through the given points are PARALLEL, PERPENDICULAR, or NEITHER. Justify.

13. Line 1: $(1,0), (7,4)$ $m = \frac{4-0}{7-1} = \frac{4}{6} = \frac{2}{3}$

Line 2: $(7,0), (3,6)$ $m = \frac{6-0}{3-7} = \frac{6}{-4} = -\frac{3}{2}$

PERPENDICULAR

14. Line 1: $(-3,1), (-7,-2)$ $m = \frac{-2-1}{-7-(-3)} = \frac{-3}{-4} = \frac{3}{4}$

Line 2: $(2,-1), (8,4)$ $m = \frac{4-(-1)}{8-2} = \frac{5}{6}$

NEITHER

15. Line 1: $(-9,3), (-5,7)$ $m = \frac{7-3}{-5-(-9)} = \frac{4}{4} = 1$

Line 2: $(-11,6), (-7,2)$ $m = \frac{2-6}{-7-(-11)} = \frac{-4}{+4} = -1$

PERPENDICULAR

PARALLEL lines would have the same slope

PERPENDICULAR lines have slopes that multiply to -1

[Negative reciprocals]

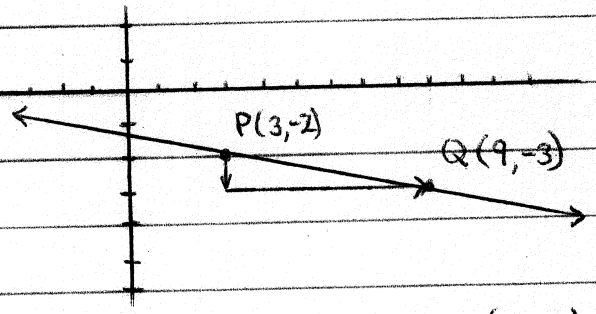
Graph the line through the given point, with given slope.

16. $P(3,-2)$, slope $= -\frac{1}{6}$

Start at $P(3,-2)$

"Rise" -1 to $(3,-3)$

"Run" $+6$ to $(9,-3)$



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

$y - (-2) = -\frac{1}{6}(x - 3)$

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

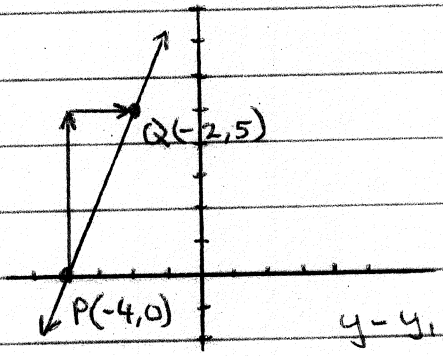
$\boxed{y = -\frac{1}{6}x - \frac{3}{2}}$

17. $P(-4,0)$, slope $= \frac{5}{2}$

Start at $P(-4,0)$

"Rise" 5 to $(-4,5)$

"Run" 2 to $(-2,5)$



$y - y_1 = m(x - x_1)$

$y - 0 = \frac{5}{2}(x - (-4))$

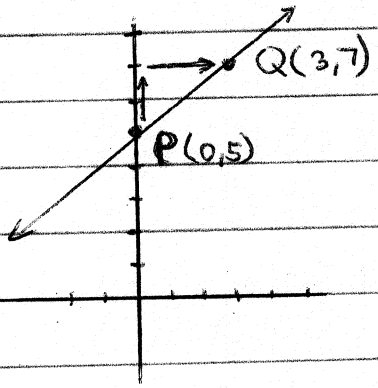
$\boxed{y = \frac{5}{2}x + 10}$

18. $P(0,5)$, $m = \frac{2}{3}$

Start at $P(0,5)$

"Rise" 2 to $(0,7)$

"Run" 3 to $(3,7)$



$y - y_1 = m(x - x_1)$

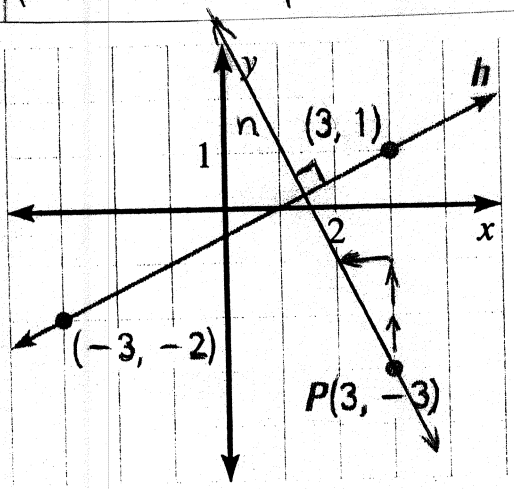
$y - 5 = \frac{2}{3}(x - 0)$

$y - 5 = \frac{2}{3}x$

$\boxed{y = \frac{2}{3}x + 5}$

Find the slope of line n that is perpendicular to line h, and passes thru point P. Graph line n, determine its equation.

23.



Slope of h: $\frac{-2-1}{-3-3} = \frac{-3}{-6} = \frac{1}{2}$

Slope of n: -2, [neg reciprocal of $\frac{1}{2}$]

Start at P(3, −3)

Rise +2 to (3, −1)

Run −1 to (2, −1)

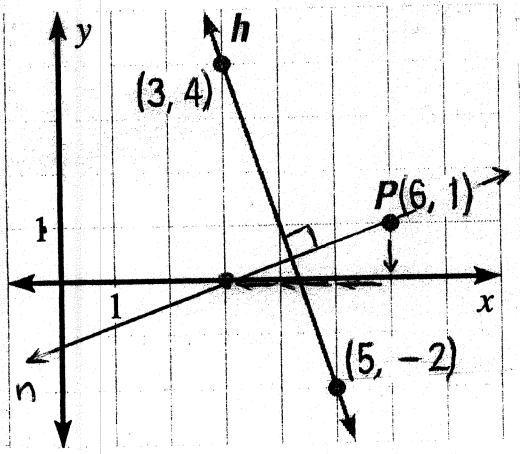
Equation of n: $y - y_1 = m(x - x_1)$

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

$y + 3 = -2x + 6$

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

24.



slope of h: $\frac{-2-4}{5-3} = \frac{-6}{2} = -3$

slope on n: $\frac{1}{3}$, [neg reciprocal of -3]

Given space on graph doesn't allow a +1 Rise and +3 Run.

Instead, do a −1 Rise and −3 Run

Start at P(6, 1)

Rise −1 to (6, 0)

Run −3 to (3, 0)

Equation of n: $y - y_1 = m(x - x_1)$

$y - 1 = \frac{1}{3}(x - 6)$

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

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