§1.4

(1) The change in y-coords between two points is RISE.

(2) Two lines with slopes m_1, m_2 are PERPENDICULAR iff $m_1 m_2 = -1$.

$m_2 = -\frac{1}{m_1}$

#s 3–5
Find the slope, if it exists

(3) $(-12,5), (-9,9)$:

$(x_1,y_1) \quad (x_2,y_2)$ ⟹

$m = \frac{y_2-y_1}{x_2-x_1} = \frac{9-5}{-9-(-12)} = \frac{4}{-9+12} = \frac{4}{3} = m$

(4) $\left(\frac{7}{8}, -4\right) \& \left(-\frac{1}{4}, -\frac{1}{4}\right)$

$(x_1,y_1) \quad (x_2,y_2)$

$m = \frac{y_2-y_1}{x_2-x_1} = \frac{-\frac{1}{4}-(-4)}{-\frac{1}{4}-\frac{7}{8}} = \frac{-\frac{1}{4}+\frac{4}{1}\cdot\frac{4}{4}}{-\frac{1}{4}\cdot\frac{2}{2}-\frac{7}{8}} = \frac{\frac{-1+16}{4}}{\frac{-2-7}{8}} = \frac{\frac{15}{4}}{\frac{-9}{8}} = \frac{15}{4}\cdot\frac{8}{-9} = \frac{5}{1}\cdot\frac{2}{-3} = \frac{10}{-3}$

$= -\frac{10}{3} = m$

(5) $(x_1,y_1), (x_2,y_2)$

$(8,-9) \& (8,-10)$

$m = \frac{y_2-y_1}{x_2-x_1} = \frac{-10-(-9)}{8-8} = \frac{-10+9}{0}$ ∄

#56 Find an Equation of the line thru the given points.

(6) $(-2,-4)$ & $(-7,-6)$
(x_1,y_1) (x_2,y_2)

$m = \frac{y_2-y_1}{x_2-x_1} = \frac{-6-(-4)}{-7-(-2)} = \frac{-6+4}{-7+2}$

$= \frac{-2}{-5} = \frac{2}{5} = m \Rightarrow$

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

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

Point-Slope

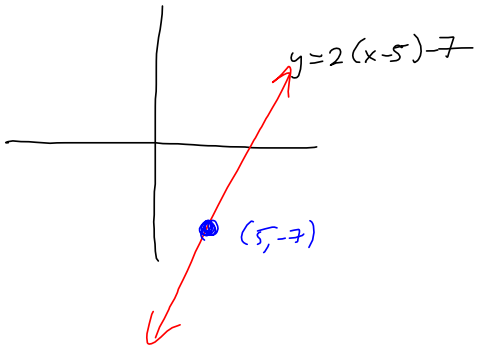
$y = \frac{2}{5}(x+2)-4$

$= \frac{2}{5}x + \frac{4}{5} - 4$

Slope-Intercept form $\rightarrow$ $y = \frac{2}{5}x - \frac{16}{5}$

$\frac{4}{5} - 4 = \frac{4}{5} - \frac{4}{1}\cdot\frac{5}{5} = \frac{4-20}{5}$

$= \frac{-16}{5}$



POINT-SLOPE

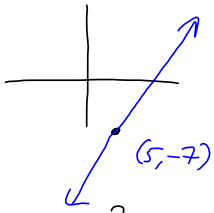
The slope of the line thru (x_1,y_1) & (x_2,y_2) is

$m = \frac{y_2-y_1}{x_2-x_1}$. & if (x,y) & (x_1,y_1) are on the line, then

$\left(\frac{y-y_1}{x-x_1} = m\right)(x-x_1)$

Point-slope by the book: $y-y_1 = m(x-x_1)$

MY WAY: $y = m(x-x_1)+y_1$ I prefer this



$y = 2(x-5)-7$ is line of slope $m=2$, passing thru $(5,-7)$

$\rightarrow$ Can be stuffed directly into a computer without going all the way to $y=mx+b$

(7) $(-4,12)$ & $(5,12)$

$m = \frac{y_2-y_1}{x_2-x_1} = \frac{12-12}{5+4} = \frac{0}{9} = 0$

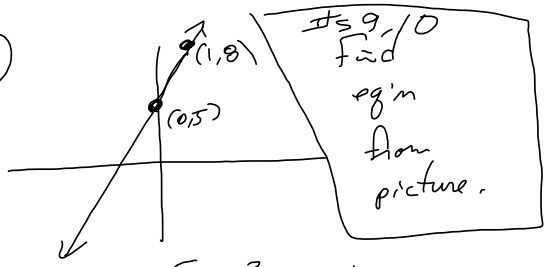
Horizontal line! $y=12$

$y = 0(x-(-4)) + 12$

$y = 12$

(8) $(7,-1)$ & $(7,-6)$ $x=7$

(9)

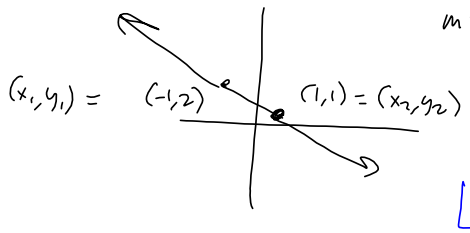


$m = \frac{8-5}{1-0} = \frac{3}{1} = 3 = m$

$y = mx+b$, gave us b.

$y = 3x+5$, since the y gave us $(0,5)$ = y-intercept.

(10) Same as #9



$m = \frac{y_2-y_1}{x_2-x_1} = \frac{1-2}{1-(-1)} = \frac{-1}{2} = m$

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

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

"an equation of the line" is full credit.

MyLab wants slope-intercept form
I hate them.

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

$y = -\frac{1}{2}x + \frac{3}{2}$ → Book Answer.

#s 11, 12 Write eq'n in slope-intercept form
Identify slope & y-intercept,

(11) $2x+5y=4$

x	y
0	4/5
2	0

Book wants a #, → Nope. Book wants an ordered pair, also,
Teacher wants ordered pairs -

m, (0,b) is what I like

$2x+5y=4$

$5y = -2x+4$

$y = \frac{-2x+4}{5} = -\frac{2}{5}x + \frac{4}{5}$

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

$Ax+By=C$ →

$m = -\frac{A}{B}$

Pf:

$By = -Ax + C$

$y = -\frac{Ax}{B} + \frac{C}{B}$

$= mx+b$

(11) (12) $y - 10 = 0$

$y = 10$

(13) Eq'n of line thru $(-3, 8)$ with slope $m = \frac{1}{3}$ in slope-intercept form

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

$y = \frac{1}{3}(x + 3) + 8$ → I like this

$y = \frac{1}{3}x + 1 + 8$

$y = \frac{1}{3}x + 9$ → what Book wanted

(15) $-3x+y=6$

#15- Find m, (0,6), then graph

$y = 3x + 6$

$m = 3$, $(0,6) = (0,6)$

Book-ish

(1,9)

(0,6)

Steve-ish

$-3x+y=6$

$-3x = 6$

$x = -2$

$-3x+y=6$

x	y
0	6
-2	0

$-3x+y=6$

(0,6)

(-2,0)

Steve-ish

#s 16 –

write eq'n in Standard form.

$Ax + By = C$, $A, B, C \in \mathbb{Z} = \{\ldots, -2, -1, 0, 1, 2, \ldots\}$

↑ Integers

$(-5, 0)$, $(0, 3)$.

$m = \frac{3-0}{0+5} = \frac{3}{5}$

$y = \frac{3}{5}(x+5)$

$y = \frac{3}{5}x + 3$ (5)

$5y = 3x + 15$

$-3x + 5y = 15$

(17) Slope of line perpendicular to $4x-6y=5$ $\quad m = -\frac{A}{B} = \frac{4}{6} = \frac{2}{3} = m$

$-6y = -4x + 5$

$y = \frac{-4}{-6}x + \frac{5}{-6} \Rightarrow m = \frac{2}{3}$

$m = \frac{2}{3} \Longrightarrow$

$m_{\perp} = -\frac{1}{m} = -\frac{1}{\frac{2}{3}} = -1 \cdot \frac{3}{2}$

$y = \frac{2}{3}x - \frac{5}{6}$

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

(18) Write eqn in standard form using only integers, for line thru $(5,-2)$ w/ slope $m=2$

(x_1, y_1)

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

$y = 2(x-5) - 2$

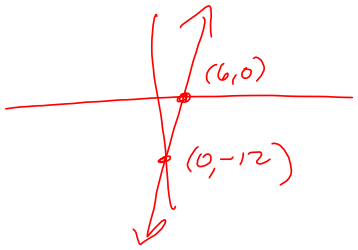
$y = 2x - 10 - 2$

$y = 2x - 12$

$-2x + y = -12$

$2x \bigcirc = 12$

x	y
0	-12
6	0



(19) Want eq'n, standard form, only integer (coefficients) of line thru $(5,-6)$ perpendicular to $y=\frac{5}{6}x+3$

$m=\frac{5}{6} \Rightarrow \boxed{m_1=-\frac{6}{5}}$

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

$y=-\frac{6}{5}(x-5)-6$ (5)

$5y=-6(x-5)-30$

$5y=-6x+30-30$

$6x+5y=0$

Goes thru origin.

Intercept method only yields one point.

x	y
0	0

Farenheit to Celsius

$(C_1, F_1) = (0, 32) = (x_1, y_1)$

$(C_2, F_2) = (100, 212)$

$m = \frac{F_2 - F_1}{C_2 - C_1} = \frac{212 - 32}{100 - 0} = \frac{180}{100} = \frac{9}{5}$

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

$y = \frac{9}{5}(C - 0) + 32 \longrightarrow y = \frac{9}{5}C + 32$

$y = \frac{9}{5}(C - 100) + 212$

$F = \frac{9}{5}C - 180 + 212$

$F = \frac{9}{5}C + 32$

C = cost per person on tour

n = # of people on tour

want C as function of n

(n, C)

How much for 19 people?

$n = 19$

$C = -2(19) + 54$

$= -38 + 54$

$= 16$ is cost per person. NOW multiply by 19 people.

$(19)(16)$

$$\begin{array}{r} 54 \\ -38 \\ \hline 16 \end{array}$$

$$\begin{array}{r} 516 \\ 19 \\ \hline 144 \\ 160 \\ \hline 304 \end{array}$$

Given $(n_1, C_1) = (1, 52)$

$C = C_1 - 2n$

$m = -2$

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

$C = m(n - n_1) + C_1$

$C = -2(n - 1) + 52$

$C = -2n + 2 + 52$

$C = -2n + 54$