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#12

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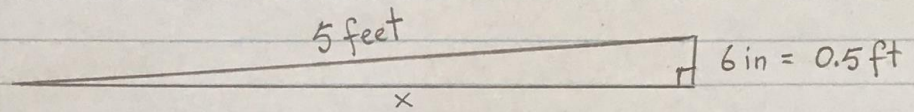
#12. Start by making a diagram.



- the treadmill is 5 feet long
- the diagram shows what it looks like when it rises 6 inches (0.5 ft)

Use the Pythagorean Theorem to find the RUN, x.

$$x^2 + 0.5^2 = 5^2$$
$$x^2 = 5^2 - 0.5^2$$
$$x^2 = 25 - 0.25$$
$$x^2 = 24.75$$
$$x = \sqrt{24.75}$$
$$x = 4.975 \text{ ft}$$

$$\therefore \text{ slope} = \frac{0.5 \text{ ft}}{4.975 \text{ ft}} = \boxed{0.1005}$$

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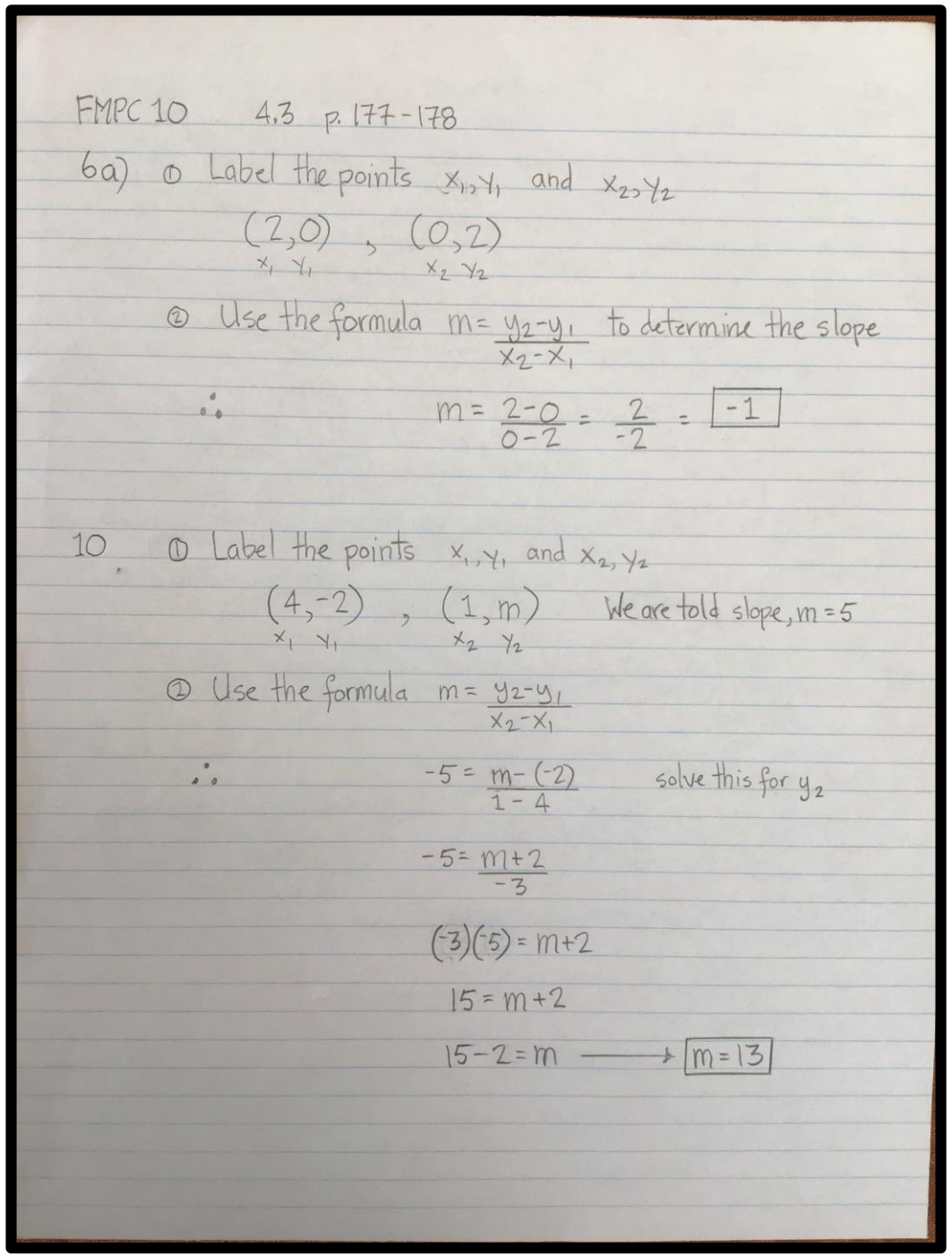
#6a, #10



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6a) ① Label the points x_1, y_1 and x_2, y_2

$(2,0)$, $(0,2)$
$x_1\ y_1$ $x_2\ y_2$

② Use the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$ to determine the slope

$\therefore$ $m = \frac{2-0}{0-2} = \frac{2}{-2} = \boxed{-1}$

10. ① Label the points x_1, y_1 and x_2, y_2

$(4,-2)$, $(1,m)$ We are told slope, $m = 5$
$x_1\ y_1$ $x_2\ y_2$

② Use the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$

$\therefore$ $-5 = \frac{m-(-2)}{1-4}$ solve this for y_2

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

$(-3)(-5) = m+2$

$15 = m+2$

$15-2 = m \longrightarrow \boxed{m = 13}$

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#11, #12

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#11. ① Label the points as x_1, y_1 and x_2, y_2

$(n, 2)$ and $(-3, -1)$ Given: $m = 4$

$x_1 \quad y_1 \qquad x_2 \quad y_2$

② Use the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$

$\therefore 4 = \frac{-1-2}{-3-n} \xrightarrow{1} 4 = \frac{-3}{-3-n} \xrightarrow{2} (-3-n)(4) = -3$

$\xrightarrow{3} -12 - 4n = -3 \xrightarrow{4} -4n = -3 + 12 \xrightarrow{5} -4n = 9$

$\xrightarrow{6} \boxed{n = -\frac{9}{4}}$

#12 Determine the slope of both lines FIRST

for $(x, 2)$ and $(-3, 6)$ — x_1, y_1 and x_2, y_2

$m = \frac{6-2}{-3-x} = \frac{4}{-3-x}$

for $(7, -3)$ and $(-1, 5)$ — x_1, y_1 and x_2, y_2

$m = \frac{5-(-3)}{-1-7} = \frac{5+3}{-8} = \frac{8}{-8} = -1$

We are told both lines have the same slope.

$\therefore \frac{4}{-3-x} = -1$

$4 = (-1)(-3-x)$

$4 = 3 + x$

$4 - 3 = x \longrightarrow \boxed{x = 1}$

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#3g

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#3 g) ① Label the points x_1, y_1 and x_2, y_2 for each pair

$\therefore$ (a,b) and (b,a) | (c,d) and (d,c)

$x_1\ y_1$ $\quad x_2\ y_2$ | $x_1\ y_1$ $\quad x_2\ y_2$

② Use the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$ to find the slope of each line.

so, $m = \frac{a-b}{b-a}$ | $m = \frac{c-d}{d-c}$

* $b-a = -(-b+a) = -(a-b)$ | * $d-c = -(-d+c) = -(c-d)$

$\therefore$ $m = \frac{\cancel{a-b}}{\cancel{-(a-b)}} = \frac{1}{-1} = -1$ | $m = \frac{\cancel{c-d}}{\cancel{-(c-d)}} = \frac{1}{-1} = -1$

Both lines have the same slope $\therefore$ they are PARALLEL.

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#4

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#4 ① Label the points x_1, y_1 and x_2, y_2 for each pair

$(-2, c)$ and $(-c, 1)$ | $(-5, c)$ and $(-c, 3)$

x_1, y_1 x_2, y_2 | x_1, y_1 x_2, y_2

Use the formula $m = \frac{y_2 - y_1}{x_2 - x_1}$ to find the slope of each line

$m_1 = \frac{1-c}{-c-(-2)}$ | $m_2 = \frac{3-c}{-c-(-5)}$

$m_1 = \frac{1-c}{-c+2}$ | $m_2 = \frac{3-c}{-c+5}$

for the lines to be parallel, $m_1 = m_2$

$\therefore \quad \frac{1-c}{-c+2} = \frac{3-c}{-c+5}$

CROSS MULTIPLY

$(-c+5)(1-c) = (3-c)(-c+2)$

$-c + c^2 + 5 - 5c = -3c + 6 + c^2 - 2c$

$c^2 - 6c + 5 = c^2 - 5c + 6$

$-6c + 5 = -5c + 6$

$5 - 6 = -5c + 6c$

$-1 = c$

$\boxed{c = -1}$

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#12

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#12 ① Label the points x_1, y_1 and x_2, y_2

$(x, -6)$ and $(-2, -1)$

$x_1 \ y_1$ $x_2 \ y_2$

② We are going to use the equation $m = \frac{y_2 - y_1}{x_2 - x_1}$

where $m = \frac{1}{2}$ (think, a slope of $\frac{1}{2}$ is perpendicular to a slope of -2)

③ Solve the equation

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

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

cross multiply . . .

$$(-2-x)(1) = (-1+6)(2)$$

$$-2-x = -2+12$$

$$-2-x = 10$$

$$-x = 10+2$$

$$-x = 12$$

$$\boxed{x = -12}$$

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#6

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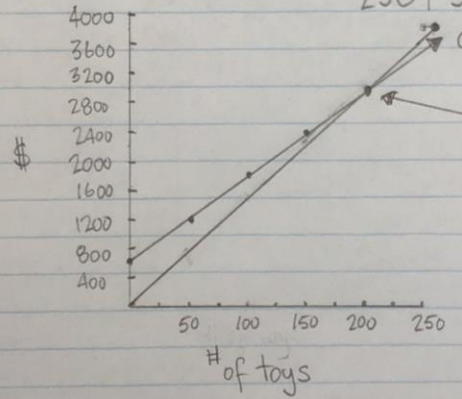
#6. If the cost of producing n toys is a fixed cost plus $12 per toy. Then $C = 12n + 600$

a) Create a table of values for this equation and the selling price $C = 15n$

n	C
0	0
50	750
100	1500
150	2250
200	3000
250	3750

n	C
0	600
50	1200
100	1800
150	2400
200	3000
250	3600



b) this is where the company breaks even. @ 200 toys

Selling 200 toys generates an income of $3000. which is the same as the cost of making 200 toys.

Any number of toys sold after the will generate profit for the company @ $3/toy.

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4.6, page 190

#10

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#10 STEP ① Find the slope of the line passing through $(-2,-4)$ and $(-1,-1)$

label the points → $x_1\ y_1$ $x_2\ y_2$

we know slope, $m = \frac{y_2-y_1}{x_2-x_1} = \frac{-1-(-4)}{-1-(-2)} = \frac{-1+4}{-1+2} = \frac{3}{1} = 3$

STEP ② If the slope of the line is 3, then the slope of the perpendicular line is $-\frac{1}{3}$ (the negative reciprocal)

STEP ③ The other line has the points $(6,-2)$ and $(3,c)$

label the points → $x_1\ y_1$ $x_2\ y_2$

the slope of this line is $-\frac{1}{3}$ use $m = \frac{y_2-y_1}{x_2-x_1}$

Therefore $\frac{-1}{3} = \frac{c-(-2)}{3-6}$

$\frac{-1}{3} = \frac{c+2}{-3}$

$\frac{-1}{3} \cdot -3 = c+2$

$1 = c+2$

$1-2 = c$

$\boxed{c=-1}$