

Name: SOLUTIONS.

Date: _____

1. Which of the following statements about the system of equations below is true?

Eq. 1) $\frac{2y}{2} = \frac{10x}{2} - \frac{20}{2}$

$y = 5x - 10$

Eq. 2) $4y - 12x - 24 = 0$

$+12x + 24 \quad +12x + 24$

$\frac{4y}{4} = \frac{12x + 24}{4}$

$y = 3x + 6$

slopes are different, therefore these lines will cross once and only once!

- A) The system has **one** solution
- B) The system has **two** solutions
- C) The system has **no** solutions
- D) The system has **infinite** solutions

2. What is the slope of a line that is **perpendicular** to: $3x + 6y - 12 = 0$

neg. recip. slopes

$-3x + 12$

$\frac{6y}{6} = \frac{-3x + 12}{6}$

$y = -0.5x + 2$

neg. recip. of -0.5 $\rightarrow \frac{1}{0.5} = 2$

- A) $-\frac{1}{2}$
- B) 2
- C) -2
- D) $\frac{1}{2}$

3. Line 1 is defined by the equation $6x + 2y - 12 = 0$.

Which of the following slopes is **parallel** to line 1?

same slope

$-6x + 12$

$\frac{2y}{2} = \frac{-6x + 12}{2}$

$y = -3x + 6$

- A) $-\frac{1}{3}$
- C) -3
- B) 3
- D) $\frac{1}{3}$

4. Line AB is represented by the equation: $4.5x - 9y + 27 = 0$
 What is the x-intercept of line AB?

STEP ①

$$\begin{array}{r|l}
 4.5x - 9y + 27 = 0 & \\
 -4.5x & -27 \\
 \hline
 -9y & = -4.5x - 27 \\
 \frac{-9y}{-9} & \\
 y & = 0.5x + 3
 \end{array}$$

STEP ② X-intercept means the "y" is 0!

$$\begin{aligned}
 y &= 0.5x + 3 \\
 \downarrow \\
 0 &= 0.5x + 3 \\
 -0.5x & \quad -0.5x \\
 \hline
 -0.5x &= \frac{3}{-0.5} \\
 \boxed{x} &= \boxed{-6}
 \end{aligned}$$

ANSWER: (-6 , 0)

5. Line CD is represented by the equation $12x + 8y - 68 = 0$
 What is the y-intercept of line CD?

$$\begin{array}{r|l}
 12x + 8y - 68 = 0 & \\
 -12x & +68 \\
 \hline
 8y & = -12x + 68 \\
 \frac{8y}{8} & \\
 y & = -1.5x + 8.5
 \end{array}$$

the y-intercept is "b" in $y = ax + b$
 At the y-intercept, "x" is always 0!

ANSWER: (0 , 8.5)

this is "b",
 which is the y-intercept.

Part C (Long Answer)

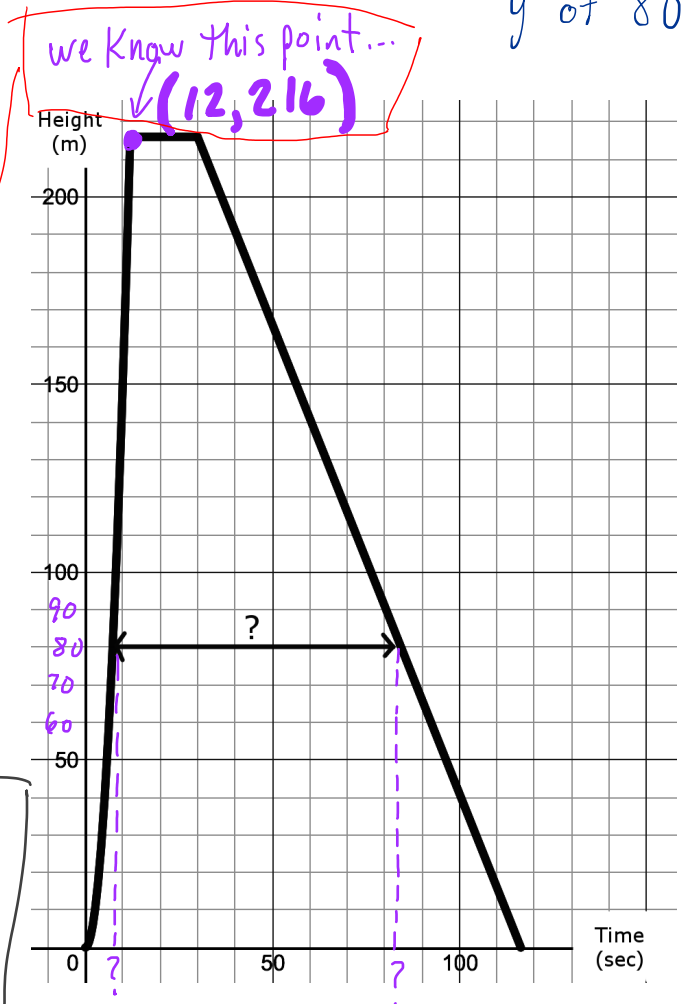
9. A guinea pig is fired into the air on a rocket, and falls back to the ground with a parachute.

The guinea pig's height as a function of time is represented by the piecewise function below.

For how much time was the adorable little guy at or above a height of 80 m?

this is a "y" of 80

$$f(x) \begin{cases} ax^2 & , 0 \leq x \leq 12 \\ 216 & , 12 \leq x \leq 30 \\ -2.5x + 291 & , 30 \leq x \leq 116.4 \end{cases}$$



Step 1 Find "a" in the quadratic

$$y = ax^2$$

$$216 = a \cdot 12^2$$

$$\frac{216}{144} = \frac{a \cdot 144}{144}$$

$$1.5 = a$$

$$y = 1.5x^2$$

1st time at 80 m is in the quadratic

so...

$$y = 1.5x^2$$

$$\frac{80}{1.5} = \frac{1.5x^2}{1.5}$$

$$\sqrt{53.3} = \sqrt{x^2}$$

$$7.3 = x$$

2nd time at 80 m is in the linear ...

$$y = -2.5x + 291$$

$$80 = -2.5x + 291$$

$$\frac{-291}{-2.5} = \frac{-2.5x + 291}{-2.5}$$

$$\frac{-211}{-2.5} = \frac{-2.5x}{-2.5}$$

$$84.4 = x$$

Difference between the two times it's at 80 m :

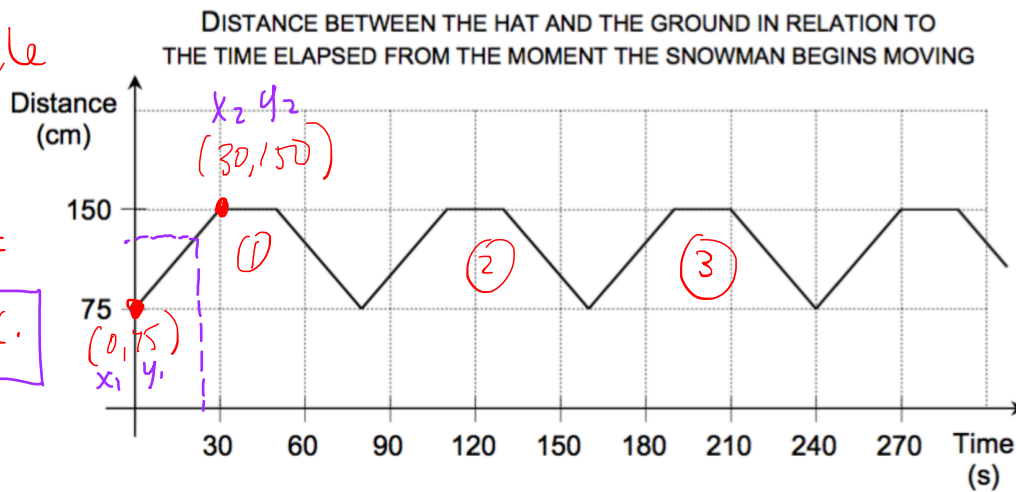
$$\begin{array}{r} 84.4 \\ - 7.3 \\ \hline 77.1 \end{array}$$

Answer: The guinea pig was at or above a height of 80 m for 77.1 seconds

Question 10.

- A snowman decoration raises his hat above the ground, holds it up high for 20 seconds, then lowers it back toward the ground.
- He repeats this process over and over again.

If the snowman is turned on at 4:00 PM and is turned off exactly 7 minutes later, how far above the ground will his hat be?



Convert to seconds because it's measured in seconds on the x-axis

$$7 \times 60 = 420 \text{ seconds}$$

420 seconds til we stop

$$420 \div 80 = 5.25 \rightarrow 0.25 \times 80 = 20 \leftarrow \text{we stop 20 seconds into a new cycle.}$$

line equation where 20 seconds hits the

$$\text{graph: } a = \frac{y_2 - y_1}{x_2 - x_1} = \frac{150 - 75}{30 - 0} = \frac{75}{30} = 2.5$$

$$y = ax + b$$

$$75 = 2.5(0) + b$$

$$75 = b$$

$$y = 2.5x + 75$$

$$y = 2.5(20) + 75$$

$$y = 50 + 75$$

$$y = 125$$

Answer: The distance between the hat and the ground will be 125 cm

3 cycles takes 240 seconds so each cycle is 240 ÷ 3 = 80 sec.

11. Carter gets a job at *Footlocker* selling **shoes** and **shirts**.

He keeps a record of his sales in a table but spilled coffee on it and lost some of the data.

	Shoes	Shirts	Total sales (\$)
Day 1	12 x	+ 3 y	= 2040
Day 2	6 x	+ 18 y	= 4320
Day 3		7	4280

x : \$ per pair of shoes
 y : \$ per shirt

How many shirts did Carter sell on day 3?

$$\textcircled{1} \begin{array}{r} 12x + 3y = 2040 \\ -12x \\ \hline 3y = 2040 - 12x \end{array}$$

$$\frac{3y}{3} = \frac{-12x + 2040}{3}$$

$$y = -4x + 680$$

$$\begin{aligned} y &= -4x + 680 \\ y &= -4(120) + 680 \\ y &= -480 + 680 \\ y &= 200 \end{aligned}$$

\$ for each shirt

solve for 'x'...

$$\begin{array}{r} -4x + 680 = -0.3x + 240 \\ +0.3x \\ \hline -3.7x + 680 = 240 \\ -680 \\ \hline -3.7x = -440 \\ -3.7 \\ \hline x = 120 \end{array}$$

$$x = 120$$

\$ for each pair of shoes

$$\textcircled{2} \begin{array}{r} 6x + 18y = 4320 \\ -6x \\ \hline 18y = 4320 - 6x \end{array}$$

$$\frac{18y}{18} = \frac{-6x + 4320}{18}$$

$$y = -0.3x + 240$$

DAY 3

$$\begin{aligned} ?(120) + 7(200) &= 4280 \\ ?(120) + 1400 &= 4280 \\ -1400 &-1400 \\ \hline ?(120) &= 2880 \\ \frac{?}{120} &= \frac{2880}{120} \end{aligned}$$

$$? = 24$$

Answer: Carter sold 24 shoes on day 3.