

Solutions Key

Name: _____

Date: _____

Chapter 6 - Linear Systems Problem Solving

Show all work. Round all answers to the nearest tenth. Place answers in the "Answer" box and remember units.

1) Determine the x-value of the point of intersection for the system represented by:

$y = 3$ and $y = \frac{5}{2}x + 1$

$$3 = \frac{5}{2}x + 1$$

$$\begin{matrix} -1 & & -1 \\ (2)^{\times 2} & = & (\frac{5}{2}x)^{\times 2} \end{matrix}$$

$$\frac{4}{\cancel{2}} = \frac{5x}{\cancel{2}}$$

$$x = \frac{4}{5}$$

ANSWER:
 $x = \frac{4}{5}$ or 0.8

2) Which of the following ordered pairs represents the solution to the following linear system?

$y = 7x - 37$ and $7x + 10y = 92$

$$7x + 10(7x - 37) = 92$$

$$7x + 70x - 370 = 92$$

$$\frac{77x}{77} = \frac{462}{77}$$

- A. (5, 6)
- B. (6, 5)**
- C. (-5, 6)
- D. (-6, 5)

$x = 6$

$y = 7x - 37$
 $y = 7(6) - 37$
 $y = 42 - 37$
 $y = 5$

(6, 5)

ANSWER:
B

3) Solve for x:

$$3x + 4y = -16$$

$x = 4y$

$$3(4y) + 4y = -16$$

$$12y + 4y = -16$$

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

$y = -1$

But we are asked for x

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

ANSWER:
 $x = -4$

to get +30a and -30a!

- 4) A package of 12 hex bolts and 10 anchor bolts weighs 7 pounds. A second package of 5 hex bol. and 15 anchor bolts weighs 4 pounds. How much does a **single hex bolt weigh**? (Answer in pounds to one decimal place) *hint: let h = weight of 1 hex bolt, let a = weight of one anchor bolt*

$$\begin{aligned} \textcircled{1} (12h + 10a = 7) \times 3 &\rightarrow \textcircled{1} 36h + 30a = 21 \\ \textcircled{2} (5h + 15a = 4) \times -2 &\rightarrow \textcircled{2} -10h - 30a = -8 \\ \hline 26h &= 13 \end{aligned}$$

$$h = \frac{13}{26} = \frac{1}{2}$$

$$h = \frac{1}{2} = 0.5$$

ANSWER: $\frac{1}{2}$ lbs
1 hex bolt weighs 0.5 lbs

- 5) A boat took 3 hours to travel 24km with the current. On the return trip, the boat took 5 hours to travel 24km against the current. Determine the **speed of the current**.

let b = speed of boat in still water
let c = speed of current

trip	D (km)	V (km/hr)	T (hrs)	Equation ($V = \frac{D}{T}$)
with current	24	b+c	3	$b+c = \frac{24}{3} (=8)$
against current	24	b-c	5	$b-c = \frac{24}{5} (=4.8)$

$$\begin{aligned} \textcircled{1} b+c &= 8 \\ + \textcircled{2} b-c &= 4.8 \end{aligned}$$

$$2b = 12.8$$

$b = 6.4$ but we need c!

$$\begin{aligned} \textcircled{1} b+c &= 8 \\ (6.4)+c &= 8 \end{aligned}$$

$$c = 8 - 6.4 \rightarrow c = 1.6 \text{ km/hr}$$

ANSWER:
Speed of current = 1.6 km/hr



Velocity = Speed

- 6) The sum of two numbers is 152. One number is 4 less than 3 times the other number. What are the two numbers? let x = one number, let y = other #

$$\textcircled{1} x + y = 152$$

$$\textcircled{2} x = 3y - 4$$

$$\textcircled{1} (3y - 4) + y = 152$$

$$4y = 156$$

$$y = 39$$

$$\textcircled{2} x = 3y - 4$$

$$x = 3(39) - 4$$

$$x = 117 - 4$$

$$x = 113$$

ANSWER: The two numbers are 113 and 39

- 7) Arthur ^① invested a total of \$1500 between two bonds. ^② One bond earned 8% per annum (per year) and the other bond earned 10% per annum. In one year, Arthur earned \$132 on his investments. How much did he invest in the bond that earned 10%?

let $x = \text{\$ invested @ 8\%}$
 let $y = \text{\$ invested @ 10\%}$

↪ value for y here!

$$\textcircled{1} x + y = 1500 \rightarrow 3) x = -y + 1500$$

$$\textcircled{2} 0.08x + 0.10y = 132$$

$$0.08(-y + 1500) + 0.1y = 132$$

$$-0.08y + 120 + 0.1y = 132$$

$$\frac{0.02y}{0.02} = \frac{12}{0.02}$$

$$\rightarrow y = 600 \dots y = \text{\$ invested @ 10\%}$$

he also invested
 \$900 @ 8%



ANSWER: he invested
 \$600 @ 10%

- 8) For the following system:

$$\textcircled{1} 4x + 2y = 8$$

$$\textcircled{2} (-3x + y = -1) \times -2$$

∴ answer is

\$600

- a) Find the solution: (by Addition or Substitution)

$$\textcircled{1} 4x + 2y = 8$$

$$+ \textcircled{2} 6x - 2y = 2$$

$$10x = 10$$

$$x = 1$$

choose $\textcircled{1}$

$$\textcircled{1} 4x + 2y = 8$$

$$4(1) + 2y = 8$$

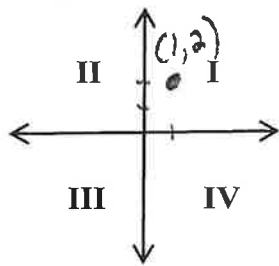
$$4 + 2y = 8$$

$$2y = 4$$

$$y = 2$$

Solution (1, 2)

- b) Determine which Quadrant contains the solution (I, II, III, or IV)



ANSWER:

a) (1, 2)

b) Quadrant I

