

Unit 6 - Solutions

1. $(2, -1)$
 $x \quad y$
 $2x + y = 3$
 $2(2) + (-1) \quad \checkmark$
 $4 - 1$
 $3 \quad \checkmark$

$4x + 3y = 5$
 $4(2) + 3(-1) \quad \checkmark$
 $8 - 3$
 $5 \quad \checkmark$

yes $(2, -1)$ is a solution.

2. $(-2, -4)$
 $x \quad y$
 $2y + x + 10 = 0$
 $2(-4) + (-2) + 10 \quad \checkmark$
 $-8 - 2 + 10$
 $0 \quad \checkmark$

$-4x + y = 13$
 $-4(-2) + (-4) \quad \times$
 $8 - 4$
 $4 \quad \times$

No, $(-2, -4)$ is not a solution.

3. $(-2, 3)$
 $x \quad y$
 $x + 2y = 4$
 $-2 + 2(3) \quad \checkmark$
 $-2 + 6$
 $4 \quad \checkmark$

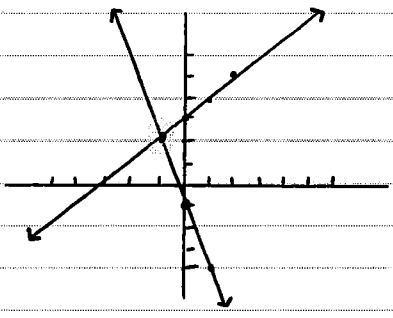
$3x + 2y = 0$
 $3(-2) + 2(3) \quad \checkmark$
 $-6 + 6$
 $0 \quad \checkmark$

yes $(-2, 3)$ is a solution.

4. $3x + y = -1$
 $-3x \quad -3x$
 $y = -3x - 1$

$y = x + 3$

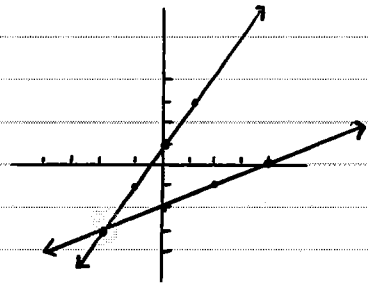
solution: $(-1, 2)$



b) $2x - 4y = 8$
 $-2x \quad -2x$
 $-4y = -2x + 8$
 $-4 \quad -4 \quad -4$
 $y = \frac{1x - 2}{2}$

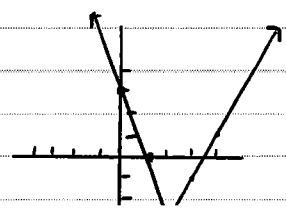
$y = 2x + 1$

solution: $(-2, -3)$



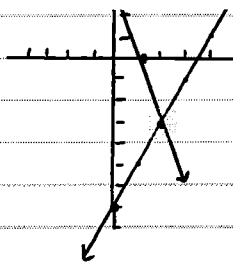
c) $2x - y = 7$
 $-2x \quad -2x$
 $-y = -2x + 7$
 $y = -3x + 3$

$3x + y = 3$
 $-3x \quad -3x$
 $y = -3x + 3$



$$\begin{array}{r} -2x \quad -2x \\ -y = \frac{-2x+7}{-1} \\ y = 2x-7 \end{array}$$

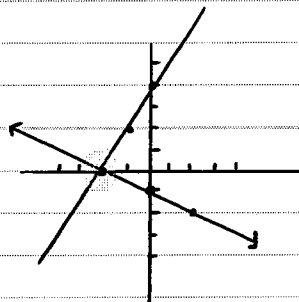
$$\begin{array}{r} -3x \quad -3x \\ y = -3x+3 \end{array}$$



Solution : $(2, -3)$

$$\begin{array}{r} d) \quad x + 2y = -2 \\ -x \quad -x \\ 2y = \frac{-x-2}{2} \\ y = \frac{-1x-2}{2} \end{array}$$

$$\begin{array}{r} -2x + y = 4 \\ +2x \quad +2x \\ y = 2x + 4 \end{array}$$



Solution : $(-2, 0)$

$$\begin{array}{r} 5. a) \quad 4x + y = -6 \\ -4x \quad -4x \\ y = -4x - 6 \end{array}$$

$$-2x + 3y = 24$$

$$b) \quad 2x + y = 9$$

$$\begin{array}{r} x - y = 3 \\ +y \quad +y \\ x = 3 + y \end{array}$$

$$\begin{array}{r} -2x + 3(-4x - 6) = 24 \\ -2x - 12x - 18 = 24 \\ -14x - 18 = 24 \\ +18 \quad +18 \\ -14x = 42 \\ -14 \quad -14 \\ x = -3 \end{array}$$

$$\begin{array}{r} 2(3+y) + y = 9 \\ 6 + 2y + y = 9 \\ 6 + 3y = 9 \\ -6 \quad -6 \\ 3y = 3 \\ 3 \quad 3 \\ y = 1 \end{array}$$

$$\begin{array}{r} y = -4(-3) - 6 \\ = 12 - 6 \\ = 6 \end{array}$$

$$\begin{array}{r} x = 3 + 1 \\ x = 4 \end{array}$$

$(-3, 6)$

$(4, 1)$

$$c) \quad -3x - 4y = -2$$

$$\begin{array}{r} x + 2y = 3 \\ -2y \quad -2y \\ x = 3 - 2y \end{array}$$

$$\begin{array}{r} d) \quad x + 4y = 6 \\ -4y \quad -4y \\ x = 6 - 4y \end{array}$$

$$2x - 3y = 1$$

$$\begin{array}{r} -3(3-2y) - 4y = -2 \\ -9 + 6y - 4y = -2 \\ -9 + 2y = -2 \\ +9 \quad +9 \\ 2y = 7 \\ 2 \quad 2 \end{array}$$

$$\begin{array}{r} 2(6-4y) - 3y = 1 \\ 12 - 8y - 3y = 1 \\ 12 - 11y = 1 \\ -12 \quad -12 \\ -11y = -11 \\ -11 \quad -11 \end{array}$$

$$\begin{array}{r} 2y = 7 \\ 2 \quad 2 \\ y = \frac{7}{2} \end{array}$$

$$\begin{aligned} x &= 3 - 2\left(\frac{7}{2}\right) \\ &= 3 - 7 \\ &= -4 \end{aligned}$$

$$\left(-4, \frac{7}{2}\right)$$

$$\begin{array}{r} -11y = -11 \\ -11 \quad -11 \\ y = 1 \end{array}$$

$$\begin{aligned} x &= 6 - 4(1) \\ &= 6 - 4 \\ &= 2 \end{aligned}$$

$$(2, 1)$$

$$\begin{aligned} \text{e) } 2x - 5y &= 12 & x + 10y &= -9 \\ & & -10y & -10y \\ x &= -9 - 10y \end{aligned}$$

$$\begin{aligned} 2(-9 - 10y) - 5y &= 12 \\ -18 - 20y - 5y &= 12 \\ -18 - 25y &= 12 \\ +18 & \quad +18 \end{aligned}$$

$$\begin{array}{r} -25y = 30 \\ -25 \quad -25 \\ y = -\frac{6}{5} \end{array}$$

$$\begin{aligned} x &= -9 - 10\left(-\frac{6}{5}\right) \\ &= -9 + 12 \\ &= 3 \end{aligned}$$

$$\left(3, -\frac{6}{5}\right)$$

$$\begin{aligned} \text{b. a) } 5(2x + 3y = 6) &\rightarrow 10x + 15y = 30 \\ -2(5x + 10y = 20) &+ (-10x - 20y = -40) \\ \hline & -5y = -10 \\ & -5 \quad -5 \\ & y = 2 \end{aligned}$$

$$\begin{aligned} \text{b) } 3a + 10b = -4 &\rightarrow 3a + 10b = -4 \\ 2(4a - 5b = 13) &\rightarrow + (8a - 10b = 26) \\ \hline 11a &= 22 \\ 11 & \quad 11 \\ a &= 2 \end{aligned}$$

$$\begin{aligned} 2x + 3(2) &= 6 \\ 2x + 6 &= 6 \\ -6 \quad -6 & \\ \hline 2x &= 0 \\ 2 \quad 2 & \\ x &= 0 \end{aligned}$$

$$(0, 2)$$

$$\begin{aligned} 3(2) + 10b &= -4 \\ 6 + 10b &= -4 \\ -6 \quad -6 & \\ \hline 10b &= -10 \\ 10 \quad 10 & \\ b &= -1 \end{aligned}$$

$$(2, -1)$$

$$\frac{2x}{2} = \frac{0}{2}$$

$$x = 0$$

$$\frac{10b}{10} = \frac{-10}{10}$$

$$b = -1$$

c) $2x - 9 = -5y$
 $-2y + 3x = 4$ } rewrite

$$2(2x + 5y = 9) \rightarrow 4x + 10y = 18$$

$$5(3x - 2y = 4) + (15x - 10y = 20)$$

$$\frac{19x}{19} = \frac{38}{19}$$

$$x = 2$$

$$2(2) + 5y = 9$$

$$4 + 5y = 9$$

$$-4 \quad -4$$

$$\frac{5y}{5} = \frac{5}{5}$$

$$y = 1$$

(2, 1)

e) $4(-5x + 2y = 13) \rightarrow -20x + 8y = 52$
 $5(4x - 6y = -6) \rightarrow + (20x - 30y = -30)$

$$\frac{-22y}{-22} = \frac{22}{-22}$$

$$y = -1$$

$$4x - 6(-1) = -6$$

$$4x + 6 = -6$$

$$-6 \quad -6$$

$$\frac{4x}{4} = \frac{-12}{4}$$

$$x = -3$$

(-3, -1)

7. a) $y = \frac{5}{3}x + 2$ $5x - 3y - 12 = 0$

$$\frac{-3y}{-3} = \frac{-5x + 12}{-3}$$

$$y = \frac{5}{3}x - 4$$

same slope different x-intercept

→ parallel lines

→ no solution

b) $5x - 3y = 12$ $10x - 6y - 24 = 0$

$$\frac{-3y}{-3} = \frac{-5x + 12}{-3}$$

$$y = \frac{5}{3}x - 4$$

same slope and x-intercept

→ same line

→ infinite number of solutions

d) $5x + 2y = -11 \rightarrow 5x + 2y = -11$
 $-1(3x + 2y = -9) \rightarrow + (-3x - 2y = 9)$

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

$$x = -1$$

$$5(-1) + 2y = -11$$

$$-5 + 2y = -11$$

$$+5 \quad +5$$

$$\frac{2y}{2} = \frac{-6}{2}$$

$$y = -3$$

(-1, -3)

c) $2x + y = 5$ $4x + y = 9$

$$-2x \quad -2x \quad -4x \quad -4x$$

$$y = -2x + 5$$

$$y = -4x + 9$$

diff. slopes

→ intersecting lines

→ only one solution

$$8. a) \quad \begin{aligned} 4x + 10y &= 0 \\ 6x + 7y &= 16 \end{aligned}$$

* elimination because no variable has a coefficient = 1.

$$\begin{aligned} 6(4x + 10y = 0) &\rightarrow 24x + 60y = 0 \\ -4(6x + 7y = 16) &\rightarrow +(-24x - 28y = -64) \\ \hline 32y &= -64 \\ 32 & \quad 32 \\ \hline y &= -2 \end{aligned}$$

$$\begin{aligned} 4x + 10y &= 0 \\ 4x + 10(-2) &= 0 \\ 4x - 20 &= 0 \\ +20 & \quad +20 \\ \hline 4x &= 20 \\ 4 & \quad 4 \\ \hline x &= 5 \end{aligned}$$

(5, -2)

$$b) \quad \begin{aligned} 10\left(\frac{1}{2}x + y = \frac{3}{10}\right) &\rightarrow 5x + 10y = 3 \\ 5(-x + 2y = \frac{3}{5}) &\rightarrow +(-5x + 10y = 3) \end{aligned}$$

remove fractions

$$\begin{aligned} 20y &= 6 \\ 20 & \quad 20 \\ \hline y &= \frac{3}{10} \end{aligned}$$

* Elimination because the terms in "x" are the same but opposite

$$\begin{aligned} 5x + 10\left(\frac{3}{10}\right) &= 3 \\ 5x + 3 &= 3 \\ -3 & \quad -3 \\ \hline 5x &= 0 \\ 5 & \quad 5 \\ \hline x &= 0 \end{aligned}$$

(0, $\frac{3}{10}$)

$$c) \quad \begin{aligned} 3\left(x - \frac{1}{3}y = \frac{4}{3}\right) &\rightarrow 3x - y = 4 \\ 6\left(\frac{5}{6}x + \frac{1}{2}y = \frac{3}{2}\right) &\rightarrow 5x + 3y = 9 \end{aligned}$$

remove fractions

*

* Substitution because "y" in the equation has a coefficient of -1.

$$\begin{array}{r}
 3(3x - y = 4) \rightarrow 9x - 3y = 12 \\
 5x + 3y = 9 \rightarrow + (5x + 3y = 9) \\
 \hline
 14x \quad = 21 \\
 14 \quad \quad 14 \\
 \hline
 x = \frac{3}{2}
 \end{array}$$

* Elimination because the 2nd equation is a multiple of the first equation and the "y" have opposite signs.

$$\begin{array}{r}
 3\left(\frac{3}{2}\right) - y = 4 \\
 \frac{9}{2} - y = 4
 \end{array}$$

$$\begin{array}{r}
 -\frac{9}{2} \quad -\frac{9}{2} \\
 \hline
 \end{array}$$

$$-y = \frac{4^{x^2} - 9}{1^{x^2} \quad 2}$$

$$-y = \frac{8 - 9}{2 \quad 2}$$

$$\begin{array}{r}
 -y = \frac{-1}{2} \\
 -1 \quad \quad -1 \\
 \hline
 \end{array}$$

$$y = \frac{1}{2}$$

$\left(\frac{3}{2}, \frac{1}{2}\right)$

9. a) $x =$ price of a DVD
 $y =$ price of an Xbox

$$3x + 2y = 72$$

$$x + 3y = 52$$

$$\begin{array}{r}
 x + 3y = 52 \\
 -3y \quad -3y \\
 \hline
 x = 52 - 3y
 \end{array}$$

$$3(52 - 3y) + 2y = 72$$

$$156 - 9y + 2y = 72$$

$$156 - 7y = 72$$

$$-156 \quad -156$$

$$\begin{array}{r}
 -7y = \frac{-84}{-7} \\
 \hline
 \end{array}$$

$$y = 12$$

A DVD costs 16\$ and an Xbox costs 12\$.

$$\begin{array}{r}
 x = 52 - 3(12) \\
 = 52 - 36 \\
 = 16
 \end{array}$$

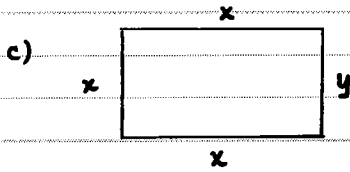
b) Let $x =$ 1st number
 Let $y =$ 2nd number

$$\begin{array}{r}
 \swarrow \text{sum} \\
 x + y = 64 \\
 x - y = 14 \\
 \nwarrow \text{difference}
 \end{array}$$

$$\begin{array}{r} x + y = 64 \\ + (x - y = 14) \\ \hline 2x = 78 \\ \hline x = 39 \end{array}$$

The first number is 39
and the second number is 25

$$\begin{array}{r} x + y = 64 \\ 39 + y = 64 \\ -39 \quad -39 \\ \hline y = 25 \end{array}$$



Let x = length
Let y = width

$$\begin{array}{l} x + y + x + y = 384 \rightarrow 2x + 2y = 384 \\ x = 82 + y \rightarrow x = 82 + y \end{array}$$

$$\begin{array}{r} 2(82 + y) + 2y = 384 \\ 164 + 2y + 2y = 384 \\ 164 + 4y = 384 \\ -164 \quad -164 \\ \hline 4y = 220 \\ \hline 4 \quad 4 \\ y = 55 \end{array}$$

The length of rectangle
is 137m and the width
is 55m

$$\begin{array}{l} x = 82 + y \\ = 82 + 55 \\ = 137 \end{array}$$

d) Let x = value of part A of exam
Let y = value of part B of exam

$$\begin{array}{l} x + y = 85 \quad \left. \begin{array}{l} \} \text{total value of exam} \\ \} \text{Frank's total score} \end{array} \right\} \\ 0.80x + 0.70y = 61 \end{array}$$

$$\begin{array}{r} x + y = 85 \\ -y \quad -y \\ \hline x = 85 - y \end{array}$$

$$\begin{array}{r} 0.80(85 - y) + 0.70y = 61 \\ 68 - 0.80y + 0.70y = 61 \\ 68 - 0.10y = 61 \\ -68 \quad -68 \\ \hline -0.10y = -7 \\ \hline -0.10 \quad -0.10 \end{array}$$

La valeur de partie A
est 15 et la valeur

$$\begin{array}{r} -0.10y = -7 \\ -0.10 \quad -0.10 \\ \hline y = 70 \end{array}$$

The value of Part A is 15 and the value of part B is 70.

$$\begin{aligned} x &= 85 - y \\ &= 85 - 70 \\ &= 15 \end{aligned}$$

e) let x = amount placed at 3%
let y = amount placed at 2%

$$\begin{aligned} x + y &= 6000 \\ 0.03x + 0.02y &= 145 \end{aligned}$$

$$\begin{aligned} x + y &= 6000 \\ -y \quad -y \\ \hline x &= 6000 - y \end{aligned}$$

$$\begin{aligned} 0.03(6000 - y) + 0.02y &= 145 \\ 180 - 0.03y + 0.02y &= 145 \\ 180 - 0.01y &= 145 \\ -180 \quad -180 \\ \hline -0.01y &= -35 \\ -0.01 \quad -0.01 \\ \hline y &= 3500 \end{aligned}$$

Frank placed 2500\$ at 3% interest and 3500\$ at 2% interest

$$\begin{aligned} x &= 6000 - 3500 \\ &= 2500 \end{aligned}$$