

Boletín repaso sistemas de ecuaciones.

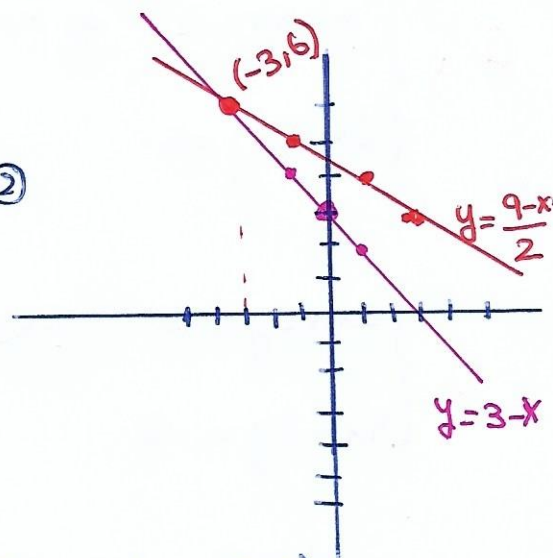
1) a) $\begin{cases} x+y=3 \\ x+2y=9 \end{cases} \rightarrow y=3-x \quad (1)$
 $\rightarrow 2y=9-x \Rightarrow y=\frac{9-x}{2} \quad (2)$

①

x	y
0	3
1	2
-1	4
-	-

②

x	y
1	4
-1	5
3	3
-	-



Solución $(x, y) = (-3, 6)$

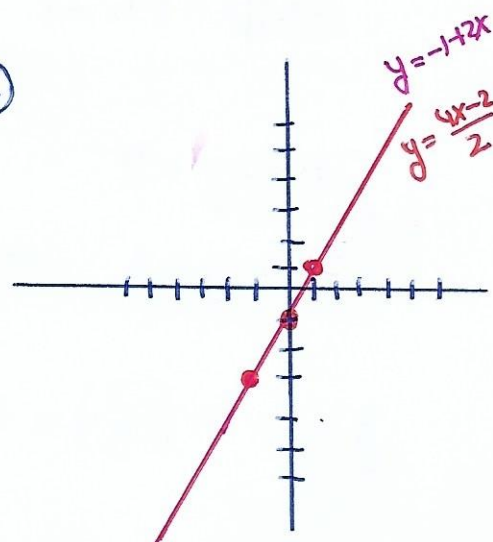
b) $\begin{cases} -2x+y=-1 \\ 4x-2y=2 \end{cases} \rightarrow y=-1+2x \quad (1)$
 $\rightarrow 4x-2=2y \Rightarrow \frac{4x-2}{2}=y \quad (2)$

①

x	y
1	1
0	-1
-1	-3

②

x	y
1	1
0	-1
-1	-3



Sistema con infinitas soluciones.
 Sistema compatible determinado.

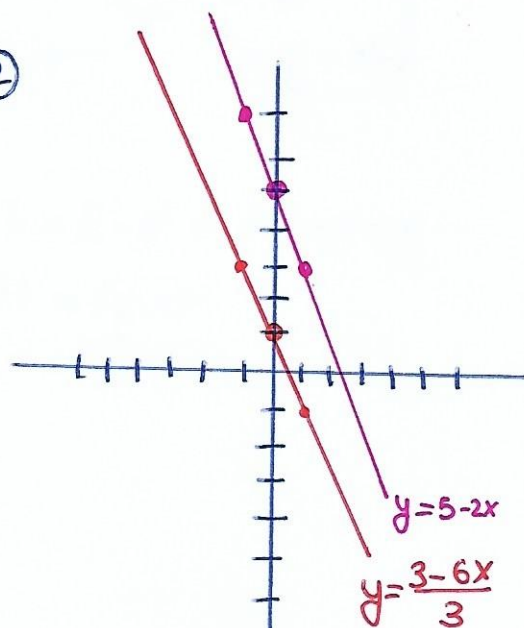
c) $\begin{cases} 2x+y=5 \\ 6x+3y=3 \end{cases} \rightarrow y=5-2x \quad (1)$
 $\rightarrow 3y=3-6x \Rightarrow y=\frac{3-6x}{3} \quad (2)$

①

x	y
0	5
1	3
-1	7

②

x	y
0	1
1	-1
-1	3



Sistema sin solución
 Sistema incompatible

$$\textcircled{2} \text{ a) } \begin{cases} x - 4y = 5 & \Rightarrow x = 5 + 4y \\ 2x - 8y = 6 \end{cases}$$

$$2 \cdot (5 + 4y) - 8y = 6$$

$$10 + 8y - 8y = 6$$

$$0y = -4$$

Sistema sin solución

$$\text{b) } \begin{cases} 2x + 5y = 12 & \rightarrow 2x = 12 - 5y \\ 4x - 3y = -2 & x = \frac{12 - 5y}{2} \end{cases}$$

$$4 \cdot \left(\frac{12 - 5y}{2} \right) - 3y = -2$$

$$24 - 10y - 3y = -2$$

$$-13y = -2 - 24$$

$$-13y = -26$$

$$y = \frac{-26}{-13} = +2$$

$$x = \frac{12 - 5 \cdot 2}{2} = \frac{12 - 10}{2} = \frac{2}{2} = 1$$

$$(x, y) = (1, 2)$$

$$\text{c) } \begin{cases} 7x + 2y = 4 \\ 5x + y = 1 & \rightarrow y = 1 - 5x \end{cases}$$

$$7x + 2 \cdot (1 - 5x) = 4$$

$$7x + 2 - 10x = 4$$

$$-3x = 4 - 2$$

$$-3x = 2$$

$$x = -\frac{2}{3}$$

$$y = 1 - 5 \cdot \left(-\frac{2}{3} \right) = 1 + \frac{10}{3} = \frac{13}{3}$$

$$(x, y) = \left(-\frac{2}{3}, \frac{13}{3} \right)$$

$$\textcircled{3} \text{ a) } \begin{cases} x + 3y = 4 & \rightarrow x = 4 - 3y \\ 2x - y = 1 & \rightarrow 2x = 1 + y \\ & x = \frac{1 + y}{2} \end{cases}$$

$$4 - 3y = \frac{1 + y}{2}$$

$$8 - 6y = 1 + y$$

$$8 - 1 = 6y + y$$

$$7 = 7y$$

$$y = 1$$

$$x = 4 - 3 \cdot 1 = 4 - 3 = 1$$

$$(x, y) = (1, 1)$$

b)
$$\begin{cases} x - 2y = 1 \\ x + 6y = -1 \end{cases}$$

$$x = 1 + 2y$$

$$1 + 2y = -1 - 6y$$

$$1 + 1 = -2y - 6y$$

$$2 = -8y$$

$$y = -\frac{2}{8} = -\frac{1}{4}$$

$$x = 1 + 2 \cdot \left(-\frac{1}{4}\right) = 1 - \frac{2}{4} = 1 - \frac{1}{2} = \frac{1}{2}$$

$(x, y) = \left(\frac{1}{2}, -\frac{1}{4}\right)$

c)
$$\begin{cases} 5x + 4y = 7 \\ 7x - 6y = 33 \end{cases}$$

$$\rightarrow 5x = 7 - 4y \Rightarrow x = \frac{7 - 4y}{5}$$

$$\rightarrow 7x = 33 + 6y \Rightarrow x = \frac{33 + 6y}{7}$$

$$\frac{7 - 4y}{5} = \frac{33 + 6y}{7}$$

$$49 - 28y = 165 + 30y$$

$$-30y - 28y = 165 - 49$$

$$-58y = 116$$

$$y = -\frac{116}{58} = -2$$

$$x = \frac{7 - 4 \cdot (-2)}{5} = 3$$

$(x, y) = (3, -2)$

④ a)
$$\begin{cases} 5x + 3y = 12 \\ 7x - 6y = 27 \end{cases}$$

$$\begin{array}{rcl} \cdot 2 & \rightarrow & 10x + 6y = 24 \\ \cdot 1 & \rightarrow & 7x - 6y = 27 \\ \hline 17x & = & 51 \\ x & = & \frac{51}{17} = 3 \end{array}$$

$$5 \cdot 3 + 3y = 12$$

$$15 + 3y = 12$$

$$3y = 12 - 15$$

$$3y = -3$$

$$y = -\frac{3}{3} = -1$$

$(x, y) = (3, -1)$

b)
$$\begin{cases} 2x - 3y = 9 \\ 5x + 4y = 11 \end{cases}$$

$$\begin{array}{rcl} \cdot 4 & \rightarrow & 8x - 12y = 36 \\ \cdot 3 & \rightarrow & 15x + 12y = 33 \\ \hline 23x & = & 69 \\ x & = & \frac{69}{23} = 3 \end{array}$$

$$2 \cdot 3 - 3y = 9$$

$$6 - 3y = 9$$

$$-3y = 9 - 6$$

$$-3y = 3$$

$$y = -1$$

$(x, y) = (3, -1)$

c)
$$\begin{cases} 3x - 4y = 3 \\ 5x + 4y = 11 \end{cases}$$

$$\begin{array}{rcl} \cdot 1 & \rightarrow & 3x - 4y = 3 \\ \cdot 1 & \rightarrow & 5x + 4y = 11 \\ \hline 8x & = & 14 \\ x & = & \frac{14}{8} = \frac{7}{4} \end{array}$$

$$3 \cdot \frac{7}{4} - 4y = 3$$

$$\frac{21}{4} - 4y = 3$$

$$21 - 16y = 12$$

$$-16y = 12 - 21$$

$$-16y = -9$$

$$y = \frac{9}{16}$$

$(x, y) = \left(\frac{7}{4}, \frac{9}{16}\right)$

⑤ a)
$$\begin{cases} 3(5x-2) - 7(2y+3) = 2 \\ 2(3x-y) - 23 = 3(4-9x) \end{cases} \Rightarrow \begin{cases} 15x - 6 - 14y - 21 = 2 \\ 6x - 2y - 23 = 12 - 27x \end{cases}$$
 Reducción

$$\Rightarrow \begin{cases} 15x - 14y = 29 & \cdot 1 \rightarrow 15x - 14y = 29 \\ 33x - 2y = 35 & \cdot (-7) \rightarrow -231x + 14y = -245 \end{cases}$$

$$\begin{array}{r} 15x - 14y = 29 \\ -231x + 14y = -245 \\ \hline -216x = -216 \\ x = \frac{-216}{-216} = 1 \end{array}$$

$$\begin{aligned} 33 \cdot 1 - 2y &= 35 \\ 33 - 2y &= 35 \\ -2y &= 2 \\ y &= -1 \end{aligned}$$

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

b)
$$\begin{cases} \frac{3x+y}{6} + \frac{x+2}{3} = 4 \\ 2 - 3(x+y) = 0 \end{cases} \Rightarrow \begin{cases} 3x+y+2x+y=24 \\ 2-3x-3y=0 \end{cases} \Rightarrow \begin{cases} 5x+y=20 \\ -3x-3y=-2 \end{cases}$$
 Sustitución

$$5x+y=20 \Rightarrow y=20-5x$$

$$\begin{aligned} -3x-3 \cdot (20-5x) &= -2 \\ -3x-60+15x &= -2 \end{aligned}$$

$$y = 20 - 5 \cdot \frac{29}{6} = 20 - \frac{145}{6} = \frac{120}{6} - \frac{145}{6} = -\frac{25}{6}$$

$$\begin{aligned} 12x &= 58 \\ x &= \frac{58}{12} = \frac{29}{6} \end{aligned}$$

$$(x, y) = \left(\frac{29}{6}, -\frac{25}{6}\right)$$

c)
$$\begin{cases} x - \frac{y-4}{3} = 1 \\ y - \frac{x+4}{3} = -\frac{1}{3} \end{cases} \Rightarrow \begin{cases} 3x - y + 4 = 3 \\ 3y - x - 4 = -1 \end{cases} \Rightarrow \begin{cases} 3x - y = -1 \\ -x + 3y = 3 \end{cases}$$
 Igualación

$$\rightarrow 3x = y - 1 \Rightarrow x = \frac{y-1}{3}$$

$$\frac{y-1}{3} = 3y-3$$

$$x = 3 \cdot 1 - 3$$

$$\rightarrow 3y - 3 = x \Rightarrow x = 3y - 3$$

$$y - 1 = 9y - 9$$

$$x = 3 - 3$$

$$x = 0$$

$$-1 + 9 = 9y - y$$

$$8 = 8y$$

$$y = 1$$

$$(x, y) = (0, 1)$$

$$d) \begin{cases} \frac{x-4}{2} - \frac{y-5}{3} = 0 \\ \frac{x}{3} + \frac{y}{4} = 2x - y \end{cases} \Rightarrow \begin{cases} 3x - 12 - 2y + 10 = 0 \\ 4x + 3y = 24x - 12y \end{cases} \Rightarrow \begin{cases} 3x - 2y = 2 \\ -20x + 15y = 0 \end{cases}$$

$$\cdot 15 \rightarrow 45x - 30y = 30$$

$$3 \cdot 6 - 2y = 2$$

$$\cdot 2 \rightarrow \frac{-20x + 30y = 0}{5x = 30}$$

$$18 - 2 = 2y$$

$$16 = 2y$$

$$y = 8$$

$$(x, y) = (6, 8)$$

$$x = 6$$

⑥

x: precio de la camiseta

y: precio del pantalón

$$\begin{cases} 2x + y = 22 \text{ (Aitana)} \\ 3x + 2y = 39 \text{ (Jael)} \end{cases}$$

$$\begin{cases} 2x + y = 22 \\ 3x + 2y = 39 \end{cases} \Rightarrow y = 22 - 2x$$

$$3x + 2 \cdot (22 - 2x) = 39$$

$$\begin{cases} 3x + 2y = 39 \\ y = 22 - 2x \end{cases} \Rightarrow y = 22 - 2 \cdot 5$$

$$3x + 44 - 4x = 39$$

$$-x = -5$$

$$x = 5$$

$$y = 12$$

Cada camiseta cuesta 5 € y cada pantalón 12 €

⑦

x: Libros de 15€

y: Libros de 12€

$$\begin{cases} x + y = 125 \text{ (número de libros)} \\ 15x + 12y = 1680 \text{ (dinero)} \end{cases}$$

$$\begin{cases} x + y = 125 \\ 15x + 12y = 1680 \end{cases} \rightarrow x = 125 - y$$

$$15 \cdot (125 - y) + 12y = 1680$$

$$x = 125 - 65$$

$$1875 - 15y + 12y = 1680$$

$$x = 60$$

$$-3y = 1680 - 1875$$

$$-3y = -195$$

$$y = 65$$

Vende 60 libros de 15€ y 65 libros de 12€

8 x : conejos y : gallinas

$$\begin{cases} x + y = 25 & (\text{cabezas}) \\ 4x + 2y = 80 & (\text{patas}) \end{cases}$$

(conejos 4 patas gallinas 2)

$$\begin{cases} x + y = 25 \\ 4x + 2y = 80 \end{cases} \Rightarrow \begin{aligned} x &= 25 - y \\ x &= 25 - 10 \\ x &= 15 \end{aligned}$$

$$\begin{aligned} 4 \cdot (25 - y) + 2y &= 80 \\ 100 - 4y + 2y &= 80 \\ -2y &= -20 \\ y &= \frac{-20}{-2} = 10 \end{aligned}$$

Hay 15 conejos y 10 gallinas.

9 x : chicos y : chicas

$$\begin{cases} x + y = 30 \\ 2x + y = 49 \end{cases}$$

$$\begin{array}{rcl} \xrightarrow{+1} & x + y & = 30 \\ \xrightarrow{(-1)} & -2x - y & = -49 \\ \hline & -x & = -19 \\ & x & = 19 \end{array}$$

$$19 + y = 30 \Rightarrow y = 30 - 19 = 11$$

Hay 19 chicos y 11 chicas.

10 x : número de alumnas internas y : número de alumnas externas.

$$\begin{cases} x + y = 364 & (\text{nº de alumnas}) \\ 4 \cdot (x + 6) = y - 5 & (\text{aumentos y disminuciones}) \end{cases}$$

$$\begin{cases} x + y = 364 \\ 4x + 24 = y - 5 \end{cases} \Rightarrow \begin{cases} x + y = 364 \\ 4x - y = -29 \end{cases} \Rightarrow \begin{aligned} y &= 364 - x \\ y &= 4x + 29 \end{aligned}$$

$$364 - x = 4x + 29$$

$$364 - 29 = 4x + x$$

$$335 = 5x$$

$$x = \frac{335}{5} = 67$$

$$y = 364 - 67 = 297$$

Hay 297 alumnas externas y 67 alumnas internas.

(11)

Cantidad	Precio/litro	Precio
x	60	$60 \cdot x$
y	35	$35 \cdot y$
200	50	10000

$$\begin{cases} x + y = 200 \\ 60x + 35y = 10000 \end{cases}$$

$$x = 200 - y$$

$$60 \cdot (200 - y) + 35y = 10000$$

$$12000 - 60y + 35y = 10000$$

$$x = 200 - 80$$

$$12000 - 10000 = 60y - 35y$$

$$x = 120$$

$$2000 = 25y$$

$$y = 80$$

Se necesitan 120 litros de vino de 60 €/l y 80 litros de vino de 35 €/l.

(12)

Cantidad	Precio (€/l)	Precio
x	0,50	$0,5x$
y	0,80 l	$0,8y$
300	0,70 l	210

$$\begin{cases} x + y = 300 \\ 0,5x + 0,8y = 210 \end{cases}$$

$$x = 300 - y$$

$$0,5 \cdot (300 - y) + 0,8y = 210$$

$$150 - 0,5y + 0,8y = 210$$

$$x = 300 - 200$$

$$0,3y = 60$$

$$x = 100$$

$$y = 200$$

Se necesitan 100 litros de 0,50 €/l y 200 litros de 0,80 €/l.