

Ejercicios

1) a) (Reducción)

$$\begin{array}{r} 2(6x - 5y = -9) \quad \bullet \text{ los iguale} \\ -3(4x + 3y = 13) \end{array}$$

$$\begin{array}{r} 12x - 10y = -18 \\ -12x - 9y = -39 \\ \hline -19y = -57 \\ y = \frac{-57}{-19} \end{array} \quad \bullet \text{ Cancelo los terminos iguales}$$

$$y = 3$$

• Buscamos el valor de X

$$4x + 3(3) = 13$$

$$4x + 9 = 13$$

$$x = \frac{13-9}{4}$$

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

$$x = 1$$

• Validar los valores de las ecuaciones

$$6(1) - 5(3) = -9$$

$$6 - 15 = -9$$

$$-9 = -9$$

$$4(1) + 3(3) = 13$$

$$4 + 9 = 13$$

$$13 = 13$$

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b) (Reduccion)

$$7x - 15y = 1$$

$$7(-x - 6y = 8)$$

$$7x - 15y = 1$$

$$-7x - 42y = 56$$

$$-57y = 57$$

$$y = \frac{57}{-57}$$

$$y = -1$$

- Buscamos el valor de X

$$7x - 15(-1) = 1$$

$$7x + 15 = 1$$

$$7x = 1 - 15$$

$$x = \frac{-14}{7}$$

$$x = -2$$

Validamos las ecuaciones

$$7(-2) - 15(-1) = 1$$

$$-14 + 15 = 1$$

$$1 = 1$$

$$-(-2) - 6(-1) = 8$$

$$2 + 6 = 8$$

$$8 = 8$$

c) (Reduccion)

$$3x - 4y = 41$$

$$11x + 6y = 47$$

Multiplicamos las ecuaciones para cancelar

$$3(3x - 4y) = 41$$

$$2(11x + 6y = 47)$$

$$9x - 12y = 123$$

$$22x + 12y = 94$$

- se despeja x

$$9x - 12y = 123$$

$$22x + 12y = 94$$

$$31x = 217$$

$$x = \frac{217}{31}$$

$$x = 7$$

- Buscamos el valor de y

$$3x - 4y = 41$$

$$3(7) - 4y = 41$$

$$21 - 4y = 41$$

$$-4y = 41 - 21$$

$$y = -\frac{20}{4}$$

$$y = -5$$

Validamos los datos

$$3x - 4y = 41$$

$$3(7) - 4(-5) = 41$$

$$21 + 20 = 41$$

$$41 = 41$$

$$11x + 6y = 47$$

$$11(7) + 6(-5) = 47$$

$$77 - 30 = 47$$

$$47 = 47$$

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b) (Igualda)

$$9x + 11y = -14$$

$$9x = -14 - 11y$$

$$x = \frac{-14 - 11y}{9}$$

$$6x - 5y = -34$$

$$6x = -34 + 5y$$

$$x = \frac{-34 + 5y}{6}$$

• Despejamos la variable x

• Igualamos los resultados

$$\frac{-14 - 11y}{9} = \frac{-34 + 5y}{6}$$

• Buscamos el m.c.m

$$18 \left(\frac{-14 - 11y}{9} \right) = 18 \left(\frac{-34 + 5y}{6} \right)$$

$$2(-14 - 11y) = 3 \left(\frac{-34 + 5y}{6} \right)$$

$$2(-14 - 11y) = 3(-34 + 5y)$$

$$-28 - 22y = -102 + 15y$$

$$-22y - 15y = -102 + 28$$

$$-37y = -74$$

$$y = \frac{-74}{-37}$$

$$y = 2$$

Buscamos el valor de x

$$9x + 11y = -14$$

$$9x + 11(2) = -14$$

$$9x + 22 = -14$$

$$9x = -14 - 22$$

$$x = \frac{-36}{9}$$

$$x = -4$$

• Validamos las ecuaciones

$$9x + 11y = -14$$

$$9(-4) + 11(2) = -14$$

$$-36 + 22 = -14$$

$$-14 = -14$$

$$6x - 5y = -34$$

$$6(-4) - 5(2) = -34$$

$$-24 - 10 = -34$$

$$-34 = -34$$

e) (Reduccion)

$$10x - 3y = 36$$

$$-5(2x + 5y = -4)$$

Nivelamos las ecuaciones

$$10x - 3y = 36$$

$$\underline{-10x - 25y = 20}$$

$$-28y = 56$$

$$y = -\frac{56}{28}$$

$$y = -2$$

Reemplazamos en la segunda ecuacion el valor de y

$$2x + 5y = -4$$

$$2x + 5(-2) = -4$$

$$2x - 10 = -4$$

$$2x = -4 + 10$$

$$x = \frac{6}{2}$$

$$x = 3$$

• Validamos las ecuaciones

$$10x - 3y = 36$$

$$10(3) - 3(-2) = 36$$

$$30 + 6 = 36$$

$$36 = 36$$

$$2x + 5y = -4$$

$$2(3) + 5(-2) = -4$$

$$6 - 10 = -4$$

$$-4 = -4$$

2) a) (igualdad)

$$x + 3y = 6$$

$$5x - 2y = 13$$

despejamos la variable x

$$x = 6 - 3y$$

$$5x = 13 + 2y$$

$$x = \frac{13 + 2y}{5}$$

• Igualamos los resultados

$$6 - 3y = \frac{13 + 2y}{5}$$

Hallamos el m.c.m

$$5(6 - 3y) = 5\left(\frac{13 + 2y}{5}\right)$$

$$30 - 15y = 13 - 2y$$

$$-15y - 2y = 13 - 30$$

$$-17y = -17$$

$$y = \frac{-17}{-17}$$

$$y = 1$$

Reemplazamos el valor de y

$$x + 3y = 6$$

$$x + 11(2) = -14$$

$$x + 3 = 6$$

$$x = 6 - 3$$

$$x = 3$$

• Validamos los resultados

$$x + 3y = 6$$

$$5x - 2y = 13$$

$$3 + 3(1) = 6$$

$$5(3) - 2(1) = 13$$

$$3 + 3 = 6$$

$$15 - 2 = 13$$

$$6 = 6$$

$$13 = 13$$

$$b) 3(5x + 7y = -1)$$

$$3(-3x + 4y = -24)$$

$$15x + 21y = -3$$

$$-18x + 20y = -120$$

$$\hline 41y = -123$$

$$y = -\frac{123}{41}$$

$$y = -3$$

Buscamos el valor de X

$$-3x + 4y = -24$$

$$-3x + 4(-3) = -24$$

$$-3x - 12 = -24$$

$$-3x = -24 + 12$$

$$x = -\frac{12}{3}$$

$$x = 4$$

Validamos que las ecuaciones queden bien

$$5x + 7y = -1$$

$$5(4) + 7(-3) = -1$$

$$20 - 21 = -1$$

$$-1 = -1$$

• Nivelamos las ecuaciones

$$-3x + 4y = -24$$

$$-3(4) + 4(-3) = -24$$

$$-12 - 12 = -24$$

$$-24 = -24$$

c) (Igualdad)

$$4y + 3x = 8$$

$$8x - 9y = -77$$

• Despejamos x en ambas ecuaciones

$$4y + 3x = 8$$

$$8x - 9y = -77$$

$$3x = 8 - 4y$$

$$8x = -77 + 9y$$

$$x = \frac{8 - 4y}{3}$$

$$x = \frac{-77 + 9y}{8}$$

• Igualamos las dos ecuaciones y buscamos el m.c.m

$$24 \left(\frac{8 - 4y}{3} \right) = 24 \left(\frac{-77 + 9y}{8} \right)$$

$$8(8 - 4y) = 3(-77 + 9y)$$

$$64 - 32y = -231 + 27y$$

• Despejamos y

$$-32y - 27y = -231 - 64$$

$$-59y = -295$$

$$y = \frac{-295}{-59}$$

$$y = 5$$

Despejamos x

$$4y + 3x = 8$$

$$4(5) + 3x = 8$$

$$20 + 3x = 8$$

$$3x = 8 - 20$$

$$x = \frac{-12}{3}$$

$$x = -4$$

• Validamos los valores

$$4y + 3x = 8$$

$$8x - 9y = -77$$

$$4(5) + 3(-4) = 8$$

$$8(-4) - 9(5) = -77$$

$$20 - 12 = 8$$

$$-32 - 35 = -77$$

$$8 = 8$$

$$-77 = -77$$

D) (Reduccion)

$$7(x - 5y = 8)$$

$$-7x + 8y = 25$$

$$-7x - 35y = 56$$

$$-7x + 8y = 25$$

$$-27y = 81$$

$$y = -\frac{81}{27}$$

$$y = -3$$

• Buscamos el valor X

$$-7x + 8y = 25$$

$$-7x + 8(-3) = 25$$

$$-7x - 24 = 25$$

$$-7x = 25 + 24$$

$$x = -\frac{49}{7}$$

$$x = -7$$

Validamos los valores

$$x - 5y = 8$$

$$-7 - 5(-3) = 8$$

$$-7 + 15 = 8$$

$$8 = 8$$

$$-7x + 8y = 25$$

$$-7(-7) + 8(-3) = 25$$

$$49 - 24 = 25$$

$$25 = 25$$

E) Igualdad

$$15x + 11y = 32$$

$$11y = 32 - 15x$$

$$y = \frac{32 - 15x}{11}$$

$$7y - 9x = 8$$

$$7y = 8 + 9x$$

$$y = \frac{8 + 9x}{7}$$

Despejamos y en las ecuaciones

• Igualamos las ecuaciones y buscamos el m.c.m

$$\frac{32 - 15x}{11} = \frac{8 + 9x}{7}$$

$$77 \left(\frac{32 - 15x}{11} \right) = 77 \left(\frac{8 + 9x}{7} \right)$$

$$7(32 - 15x) = 11(8 + 9x)$$

$$224 - 105x = 88 + 99x$$

• Despejamos x

$$-105x - 99x = 88 - 224$$

$$-204x = -136$$

$$x = \frac{136}{204} = \frac{68}{102} = \frac{34}{51}$$

• Despejamos y

$$7y - 9x = 8$$

$$7y - 9\left(\frac{34}{51}\right) = 8$$

$$7y = 8 + 6$$

$$y = \frac{14}{7}$$

$$y = 2$$

• Validamos las ~~dos~~ ecuaciones

$$15x + 11y = 32$$

$$15\left(\frac{34}{51}\right) + 11(2) = 32$$

$$\frac{510}{51} + 22 = 32$$

$$10 + 22 = 32$$

$$32 = 32$$

$$7y - 9x = 8$$

$$7(2) - 9\left(\frac{34}{51}\right) = 8$$

$$14 - \frac{306}{51} = 8$$

$$14 - 6 = 8$$

$$8 = 8$$

③ 9) (Igualación)

$$X + 6y = 27$$

$$X = 27 - 6y$$

$$7x - 3y = 9$$

• despejamos la variable x

$$7x = 9 + 3y$$

$$x = \frac{9 + 3y}{7}$$

• Buscamos el m.c.m y despejamos y

$$7(27 - 6y) = 7\left(\frac{9 + 3y}{7}\right)$$

$$189 - 42y = 9 + 3y$$

$$189 - 9 = 3y + 42y$$

$$180 = 45y$$

$$\frac{180}{45} = y \rightarrow \text{espesito}$$

$$y = 4$$

• Buscamos el valor de x

$$X + 6y = 27$$

$$X + 6(4) = 27$$

$$X + 24 = 27$$

$$X = 27 - 24$$

$$X = 3$$

• Validamos los resultados

$$X + 6y = 27$$

$$3 + 6(4) = 27$$

$$3 + 24 = 27$$

$$27 = 27$$

$$7x + 3y = 9$$

$$7(3) - 3(4) = 9$$

$$21 - 12 = 9$$

$$9 = 9$$

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8) (Reduccion)

$$3x - 2y = -2$$

$$5x + 2y = -60$$

• Restamos y buscamos el valor de X

$$3x - 2y = -2$$

$$5x + 2y = -60$$

$$8x = -62$$

$$x = \frac{-62}{8} = -\frac{31}{4}$$

• Hayamos el valor de y en la primera ecuacion

$$3\left(-\frac{31}{4}\right) - 2y = -2$$

$$-\frac{93}{4} - 2y = -2$$

$$-2y = -2 + \frac{93}{4}$$

$$-2y = \frac{85}{4}$$

$$y = \frac{85}{4}$$

$$y = -\frac{85}{8}$$

• Validamos las ecuaciones

$$3x - 2y = -2$$

$$3\left(-\frac{31}{4}\right) - 2\left(-\frac{85}{8}\right) = -2$$

$$-\frac{93}{4} + \frac{170}{8} = -2$$

$$-\frac{69}{8} = -2$$

$$-2 = -2$$

$$5\left(-\frac{31}{4}\right) + 2\left(-\frac{85}{8}\right) = -60$$

$$-\frac{155}{4} - \frac{170}{8} = -60$$

$$-\frac{1920}{32} = -60$$

$$-60 = -60$$

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c) (Igualación)

$$X + 6y = 27$$

$$X = 27 - 6y$$

$$7x - 3y = 9 \quad \bullet \text{Despejamos } x$$

$$7x = 9 + 3y$$

$$x = \frac{9 + 3y}{7}$$

• Igualamos las ecuaciones buscamos el m.c.m

$$27 - 6y = \frac{9 + 3y}{7}$$

$$7(27 - 6y) = 7\left(\frac{9 + 3y}{7}\right)$$

$$189 - 42y = 9 + 3y$$

$$189 - 9 = 3y + 42y$$

$$180 = 45y$$

$$\frac{180}{45} = y$$

$$4 = y \rightarrow \text{espesito}$$

$$y = 4$$

Buscamos el valor de x

$$X + 6y = 27$$

$$X + 6(4) = 27$$

$$X + 24 = 27$$

$$X = 27 - 24$$

$$X = 3$$

• Validamos los datos

$$X + 6y = 27$$

$$3 + 6(4) = 27$$

$$3 + 24 = 27$$

$$27 = 27$$

$$7x - 3y = 9$$

$$7(3) - 3(4) = 9$$

$$21 - 12 = 9$$

$$9 = 9$$

D) (Reduccion)

$$7x - 4y = 5$$

$$9x + 8y = 13$$

• Igualamos las ecuaciones

$$2(7x - 4y = 5)$$

$$9x + 8y = 13$$

$$14x - 8y = 10$$

$$9x + 8y = 13$$

$$23x = 23$$

$$x = \frac{23}{23}$$

$$x = 1$$

Buscamos el valor de y

$$7x - 4y = 5$$

$$7(1) - 4y = 5$$

$$7 - 4y = 5$$

$$-4y = 5 - 7$$

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

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

• Validamos las ecuaciones

$$7x - 4y = 5$$

$$7(1) - 4\left(\frac{1}{2}\right) = 5$$

$$7 - 2 = 5$$

$$5 = 5$$

$$5 = 5$$

$$9x + 8y = 13$$

$$9(1) + 8\left(\frac{1}{2}\right) = 13$$

$$9 + 4 = 13$$

$$13 = 13$$

e) (Igualdad)

$$9x + 16y = 7$$

$$16y = 7 - 9x$$

$$y = \frac{7 - 9x}{16}$$

$$4y - 3x = 0 \quad \bullet \text{Despejamos } y$$

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

• Igualamos los resultados y hallamos el m.c.m

$$\frac{7 - 9x}{16} = \frac{3x}{4}$$

$$16 \left(\frac{7 - 9x}{16} \right) = 16 \left(\frac{3x}{4} \right)$$

$$7 - 9x = 12x$$

$$7 - 9x - 12x = 0$$

$$7 - 21x = 0$$

$$-21x = -7$$

$$x = \frac{-7}{-21} = \frac{1}{3}$$

$$x = \frac{1}{3}$$

• Buscamos del valor de y

$$4y - 3x = 0$$

$$4y - 3\left(\frac{1}{3}\right) = 0$$

$$4y - 1 = 0$$

$$4y = 1$$

$$y = \frac{1}{4}$$

• Validamos el valor de las ecuaciones

$$9x + 16y = 7$$

$$9\left(\frac{1}{3}\right) + 16\left(\frac{1}{4}\right) = 7$$

$$3 + 4 = 7$$

$$7 = 7$$

$$4y - 3x = 0$$

$$4\left(\frac{1}{4}\right) - 3\left(\frac{1}{3}\right) = 0$$

$$1 - 1 = 0$$

$$0 = 0$$

4) a) (Reduccion)

$$x - y = 1$$

- Igualamos las ecuaciones

$$x + y = 7$$

$$2x = 8$$

$$x = \frac{8}{2}$$

$$x = 4$$

• Encontramos el valor de y

$$x - y = 1$$

$$4 - y = 1$$

$$-y = 1 - 4 \quad (-1)$$

$$y = 3$$

• Validamos los valores de las ecuaciones

$$x - y = 1$$

$$x + y = 7$$

$$4 - (3) = 1$$

$$4 + 3 = 7$$

$$4 - 3 = 1$$

$$7 = 7$$

$$1 = 1$$

5) (Igualación)

$$X - 2y = 10$$

$$\bullet X = 10 + 2y$$

$$2x + 3y = -8$$

$$X = \frac{-8 - 3y}{2}$$

 \bullet Despejamos X en las ecuaciones \bullet Igualamos y buscamos el m.c.m

$$10 + 2y = \frac{-8 - 3y}{2}$$

$$2(10 + 2y) = 2\left(\frac{-8 - 3y}{2}\right)$$

$$20 + 4y = -8 - 3y$$

$$4y + 3y = -8 - 20$$

$$7y = -28$$

$$y = \frac{-28}{7}$$

$$y = -4$$

 \bullet Buscamos el valor de X

$$X - 2y = 10$$

$$X - 2(-4) = 10$$

$$X + 8 = 10$$

$$X = 10 - 8$$

$$X = 2$$

 \bullet Validamos las ecuaciones

$$X + 2y = 10$$

$$2 - 2(-4) = 10$$

$$2 + 8 = 10$$

$$10 = 10$$

$$2x + 3y = -8$$

$$2(2) + 3(-4) = -8$$

$$4 - 12 = -8$$

$$-8 = -8$$

a) (Reduccion)

$$5x - 3y = 0$$

$$-3(7x - y = -16)$$

$$5x - 3y = 0$$

$$-21x + 3y = 48$$

$$-16x = 48$$

$$x = \frac{-48}{16}$$

$$x = -3$$

• Buscamos el valor de y

$$5x - 3y = 0$$

$$5(-3) - 3y = 0$$

$$-15 - 3y = 0$$

$$-3y = 15$$

$$y = \frac{15}{-3}$$

$$y = -5$$

• Validamos los valores de las ecuaciones

$$5x - 3y = 0$$

$$5(-3) - 3(-5) = 0$$

$$-15 + 15 = 0$$

$$0 = 0$$

$$7x - y = -16$$

$$7(-3) - (-5) = -16$$

$$-21 + 5 = -16$$

$$-16 = -16$$

D) (Igualación)

$$3x = -4y$$

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

$$5x - 6y = 38$$

• Buscamos el valor de X

$$x = \frac{38 + 6y}{5}$$

• Igualamos las dos ecuaciones y hallamos el m.c.m

$$\frac{-4y}{3} = \frac{38 + 6y}{5}$$

$$15 \left(\frac{-4y}{3} \right) = 15 \left(\frac{38 + 6y}{5} \right)$$

$$5(-4y) = 3(38 + 6y)$$

$$-20y = 114 + 18y$$

$$-20y - 18y = 114$$

$$-38y = 114$$

$$y = \frac{-114}{38} = -3$$

Hallamos el valor de X

$$3x = 4y$$

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

$$x = \frac{12}{3}$$

$$x = 4$$

• Validamos los valores de la ecuaciones

$$3x = 4y$$

$$3(4) = 4(-3)$$

$$12 = 12$$

$$5x - 6y = 38$$

$$5(4) - 6(-3) = 38$$

$$20 + 18 = 38$$

$$38 = 38$$

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c) Reducción

$$3x + 4y = 15$$

• Dividamos las ecuaciones

$$-4(-2x + y = 5)$$

$$3x + 4y = 15$$

$$-8x - 4y = -20$$

$$-5x = -5$$

$$x = \frac{-5}{-5} \quad x = 1$$

• Buscamos el valor de y

$$3x + 4y = 15$$

$$3(1) + 4y = 15$$

$$3 + 4y = 15$$

$$3 + 4y = 15$$

$$4y = 15 - 3$$

$$y = \frac{12}{4}$$

$$y = 3$$

• Validamos los valores de las ecuaciones

$$3x + 4y = 15$$

$$2x + y = 5$$

$$3(1) + 4(3) = 15$$

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

$$3 + 12 = 15$$

$$2 + 3 = 5$$

$$15 = 15$$

$$5 = 5$$

5) (Reduccion)

$$8x + 3y = 30$$

$$5x - 3y = 9$$

$$13x = 39$$

$$x = \frac{39}{13}$$

$$x = 3$$

• Buscamos el valor de y

$$8x + 3y = 30$$

$$8(3) + 3y = 30$$

$$24 + 3y = 30$$

$$3y = 30 - 24$$

$$y = \frac{6}{3}$$

$$y = 2$$

• Validamos los datos de la ecuacion

$$8x + 3y = 30$$

$$8(3) + 3(2) = 30$$

$$24 + 6 = 30$$

$$30 = 30$$

$$5x - 3y = 9$$

$$5(3) - 3(2) = 9$$

$$15 - 6 = 9$$

$$9 = 9$$

E) (Reduccion)

$$9x + 5y = 83$$

$$- + (4x + 5y = 48)$$

$$9x + 5y = 83$$

$$-4x - 5y = -48$$

$$5x = 35$$

$$x = \frac{35}{5}$$

$$x = 7$$

• Buscamos el valor de y

$$4x + 5y = 48$$

$$4(7) + 5y = 48$$

$$28 + 5y = 48$$

$$5y = 48 - 28$$

$$y = \frac{20}{5}$$

$$y = 4$$

• Validamos las ecuaciones

$$9x + 5y = 83$$

$$9(7) + 5(4) = 83$$

$$63 + 20 = 83$$

$$83 = 83$$

$$4x + 5y = 48$$

$$4(7) + 5(4) = 48$$

$$28 + 20 = 48$$

$$48 = 48$$

C) Reduccion

$$13x - 9y = 50$$

$$10x + 9y = 26$$

$$23x = 76$$

$$x = \frac{76}{23}$$

• Buscamos el valor de y

$$13x - 9y = 50$$

$$13\left(\frac{76}{23}\right) - 9y = 50$$

$$\frac{988}{23} - 9y = 50$$

$$-9y = \frac{50 \cdot 23 - 988}{23} = \frac{(50 \times 23) - (988)}{23} = \frac{1150 - 988}{23} = \frac{162}{23}$$

$$-9y = \frac{162}{23}$$

$$y = \frac{162}{23} \cdot \left(\frac{-1}{9} \right) = \frac{162}{-207}$$

D) Reduccion

$$3(3x + 5y = 28)$$

$$5(4x - 3y = 18)$$

$$9x + 15y = 84$$

$$20x - 15y = 90$$

$$29x = 174$$

$$x = \frac{174}{29} = 6$$

• Buscar el valor de x en la ecuacion

$$3x + 5y = 28$$

$$3(6) + 5y = 28$$

$$18 + 5y = 28$$

$$5y = 28 - 18$$

$$y = \frac{10}{5} = 2$$

• Validamos las ecuaciones

$$3x + 5y = 28$$

$$3(6) + 5(2) = 28$$

$$28 = 28$$

$$4x - 3y = 18$$

$$4(6) - 3(2) = 18$$

$$18 = 18$$

e) (Reduccion)

$$-4(16x - 5y = 125)$$

$$5(7x - 4y = 42)$$

$$-64x + 20y = -500$$

$$35x = 20y = 210$$

$$-29x = -290$$

$$x = \frac{-290}{-29} = 10$$

Buscamos el valor de y

$$7x - 4y = 42$$

$$7(10) - 4y = 42$$

$$70 - 4y = 42$$

$$-4y = 42 - 70$$

$$y = \frac{-28}{-4} = 7$$

• Validamos las ecuaciones

$$16x - 5y = 125$$

$$16(10) - 5(7) = 125$$

$$125 = 125$$

$$7x - 4y = 42$$

$$7(10) - 4(7) = 42$$

$$42 = 42$$