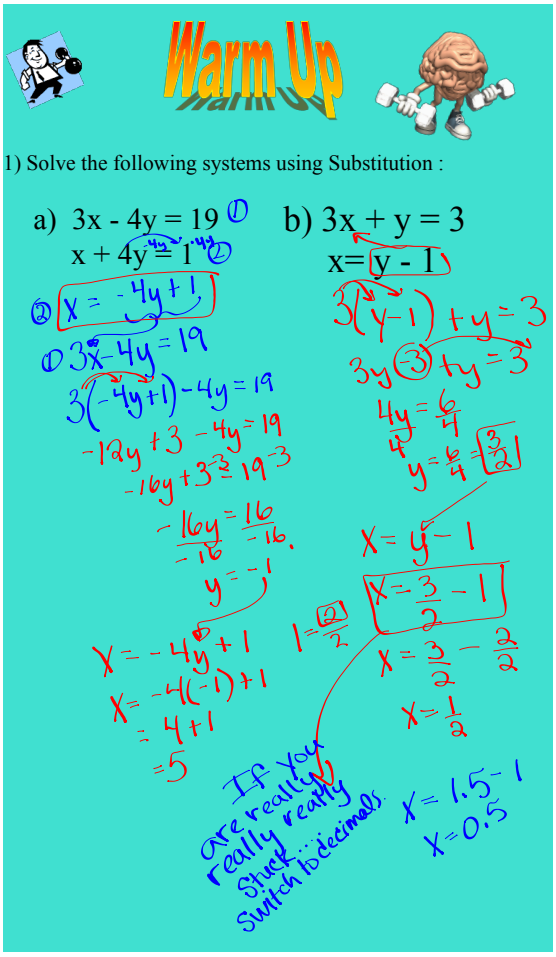
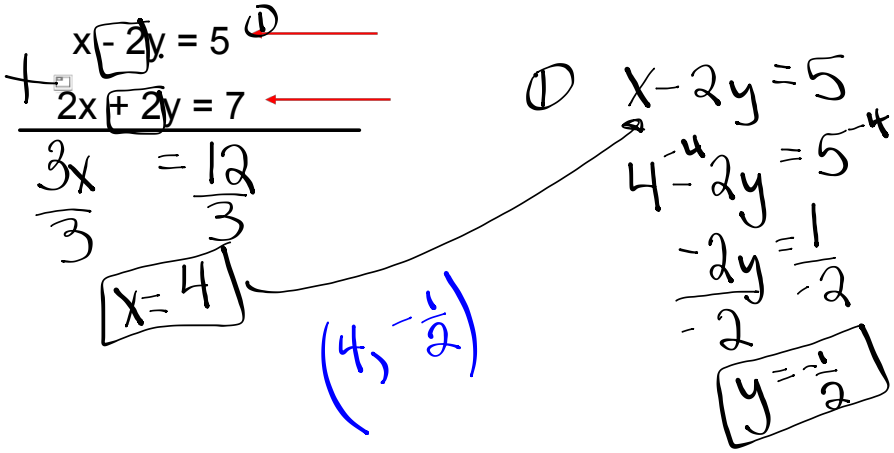


Elimination using Addition

Consider the system



Elimination using Addition

Consider the system

$$x - 2y = 5$$
$$+\ 2x + 2y = 7$$

touch

Lets add both equations to each other

Elimination using Addition

Consider the system

$$x - 2y = 5$$
$$+\ 2x + 2y = 7$$
$$3x \quad = 12$$

Lets add both equations to each other

solve for x

$x = 4$

ANS: (4, y)

Now solve for y (HOW???)
- sub the value of x into one of the equations and solve for y

$$x - 2y = 5$$
$$4 - 2y = 5$$
$$-2y = 1$$
$$y = \frac{-1}{2}$$

intersection point (4, - 0.5)

Elimination using Addition

Same process as before
You can choose to eliminate either x or y

$$x + 3y = 14$$
$$-x + 4y = 7$$

Who would you eliminate??

Elimination using Addition

$$x + 3y = 14$$
$$+\ -x + 4y = 7$$

Add this time

Elimination using Addition

$x + 3y = 14$
$-x + 4y = 7$

Add this time

$7y = 21$

$y = 3$

$(x, 3)$

solve for x

$x + 3y = 14$

$x + 3(3) = 14$
$x + 9 = 14$
$x = 14 - 9$
$x = 5$

Solve the system of equations

Example 1)

$$2x + y = 5$$
$$3x - y = 15$$

Example 2)

$$\begin{cases} 6y + x = 11 \\ 2y - x = 5 \end{cases}$$

Elimination Using Subtraction

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

$6x + 11y = -5$ ①

$-(6x + 9y = -3)$ ②

Careful you are subtraction all of the second
(switch all signs on the second equation)

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

$y = -1$

① $6x + 11y = -5$

$6x + 11(-1) = -5$

$6x - 11 = -5$ (+11 +11)

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

$x = 1$

May want to change signs and add

Elimination Using Subtraction

Careful you are subtraction all of the second
(switch all signs on t second equation)

$6x + 11y = -5$

$-(6x + 9y = -3)$

Elimination Using Subtraction

Careful you are subtraction all of the second
(switch all signs on t second equation)

$$6x + 11y = -5$$
$$-6x - 9y = +3$$
$$2y = -2$$

$$y = -1$$

solve for x

$$6x + 11y = -5$$
$$6x + 11(-1) = -5$$
$$6x - 11 = -5$$
$$6x = -5 + 11$$
$$6x = 6$$
$$x = 1$$

Intersection (1, -1)

Use subtraction to eliminate

a) $7x + 7y = 0$
$7x - y = 24$

b) $7x + 6y = -10$
$9x + 6y = -30$

Math 10 (Numbers Relations & Functions) Name_____

Elimination Date_____

Solve each system by elimination.

1) $2x + 8y = 8$
$-3x - 8y = -4$

2) $-x + 4y = 7$
$x + 4y = 25$

3) $-9x + 8y = 15$
$-9x + 6y = 27$

4) $-x - 5y = -3$
$-x + 3y = 13$

5) $-5x + 2y = 9$
$6x - 2y = -8$

6) $5x + 5y = 30$
$5x + 2y = 12$

7) $-10x + 8y = -28$
$9x + 4y = 14$

8) $-6x + y = -15$
$-12x - 3y = -15$

9) $-5x + 10y = -10$
$-7x - 5y = -14$

10) $-5x + 10y = 5$
$10x - 4y = 6$

11) $7x - 2y = 24$
$3x + 9y = 30$

12) $-3x - 2y = 2$
$-5x - 3y = 6$

13) $3x - 6y = 30$
$-10x - 9y = -13$

14) $7x - 10y = 0$
$-9x - 4y = 0$

15) $-10x + 7y = 12$
$-3x + 6y = -12$

16) $-3x + 4y = 2$
$-5x + 3y = 29$

17) $-10x - 6y = -14$
$8x + 5y = 11$

18) $-3x - 2y = 8$
$-8x - 7y = 18$

1) $2x + 8y = 8$
$-3x - 8y = -4$
$(-4, 2)$

2) $-x + 4y = 7$
$x + 4y = 25$
$(9, 4)$

3) $-9x + 8y = 15$
$-9x + 6y = 27$
$(-7, -6)$

4) $-x - 5y = -3$
$-x + 3y = 13$
$(-7, 2)$

5) $-5x + 2y = 9$
$6x - 2y = -8$
$(1, 7)$

6) $5x + 5y = 30$
$5x + 2y = 12$
$(0, 6)$

7) $-10x + 8y = -28$
$9x + 4y = 14$
$(2, -1)$

8) $-6x + y = -15$
$-12x - 3y = -15$
$(2, -3)$

9) $-5x + 10y = -10$
$-7x - 5y = -14$
$(2, 0)$

10) $-5x + 10y = 5$
$10x - 4y = 6$
$(1, 1)$

11) $7x - 2y = 24$
$3x + 9y = 30$
$(4, 2)$

12) $-3x - 2y = 2$
$-5x - 3y = 6$
$(-6, 8)$

13) $3x - 6y = 30$
$-10x - 9y = -13$
$(4, -3)$

14) $7x - 10y = 0$
$-9x - 4y = 0$
$(0, 0)$

15) $-10x + 7y = 12$
$-3x + 6y = -12$
$(-4, -4)$

16) $-3x + 4y = 2$
$-5x + 3y = 29$
$(-10, -7)$

17) $-10x - 6y = -14$
$8x + 5y = 11$
$(2, -1)$

18) $-3x - 2y = 8$
$-8x - 7y = 18$
$(-4, 2)$

Homework:

Math 10B Name_____

System of Equations: Elimination (Add & Sub) Date_____

Solve each system by elimination.

1) $8x - 8y = 0$
$-5x + 8y = -3$

2) $6x - 4y = 6$
$-8x + 4y = 0$

3) $-3x + 8y = -15$
$9x - 8y = -3$

4) $x + 3y = 18$
$3x - 3y = -6$

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

6) $-5x + 3y = 10$
$5x - 5y = 10$

7) $-4x + 5y = 25$
$-4x + 6y = 22$

8) $-3x + 5y = 12$
$-5x + 5y = 0$

11) $5x - y = 19$
$-9x - y = -9$

12) $-2x + y = 0$
$-6x + y = 20$

13) $10x = 18 + 8y$
$-8y = -5x - 27$

14) $8y + 13 = 3x$
$-8y = 9x + 25$

15) $4 + x = -2y$
$16 + 8y - x = 0$

16) $-12 + 8x = 6y$
$-5y - 10 = 4x$

Homework:

Math 10B Name_____

System of Equations: Elimination (Add & Sub) Date_____

Solve each system by elimination.

1) $8x - 8y = 0$
$-5x + 8y = -3$

2) $6x - 4y = 6$
$-8x + 4y = 0$ (-3, -6) add

3) $-3x + 8y = -15$
$9x - 8y = -3$

4) $x + 3y = 18$
$3x - 3y = -6$ (3, 5) add

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

6) $-5x + 3y = 10$
$5x - 5y = 10$ (-8, -10) add

7) $-4x + 5y = 25$
$-4x + 6y = 22$

8) $-3x + 5y = 12$
$-5x + 5y = 0$ (6, 6) sub

9) $-4x - 7y = -15$
$-4x - 9y = -17$

10) $-5x - 3y = 7$
$-2x - 3y = -8$ (-5, 6) sub

11) $5x - y = 19$
$-9x - y = -9$

12) $-2x + y = 0$
$-6x + y = 20$ (-5, -10) sub

13) $10x = 18 + 8y$
$-8y = -5x - 27$

14) $8y + 13 = 3x$
$-8y = 9x + 25$ (-1, -2) sub

15) ~~$4 + x = -2y$~~
~~$16 + 8y - x = 0$~~

16) ~~$-12 + 8x = 6y$~~
~~$-5y - 10 = 4x$~~ (0, -2)

2) $6x - 4y = 6$ ①

$+ \quad -8x + 4y = 0$ ②

$-2x + 0 = 6$

$-2x = 6$

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

$\boxed{x = -3}$

$6x - 4y = 6$

$6(-3) - 4y = 6$

$-18 - 4y = 6$

$-4y = 6 + 18$

$-4y = 24$

$y = \frac{24}{-4}$

$\boxed{y = -6}$

2) $6x - 4y = 6$ ①

$+ \quad -8x + 4y = 0$ ②

$-2x + 0 = 6$

$-2x = 6$

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

$\boxed{x = -3}$

$6x - 4y = 6$

$6(-3) - 4y = 6$

$-18 - 4y = 6$

$-4y = 6 + 18$

$-4y = 24$

$y = \frac{24}{-4}$

$\boxed{y = -6}$

8) $-3x+5y=12$ ①

$-(-5x+5y=0)$ ②

$(-3x++5x)+0=12-0$

$2x=12$

$x=\frac{12}{2}$

$\boxed{x=6}$

$-3x+5y=12$

$-3(6)+5y=12$

$-18+5y=12$

$5y=12+18$

$5y=30$

$\boxed{y=6}$

8) $-3x+5y=12$

$-(-5x+5y=0)$

8) $-3x+5y=12$

$+\ 5x-5y=0$

$2x=12$

$\boxed{x=6}$

10) $-5x - 3y = 7$

$-(-2x - 3y = -8)$

$(-5x + 2x) - 3y + 3y = 7 + 8$

$-3x = 15$

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

$\boxed{x = -5}$

$-5x - 3y = 7$

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

$25 - 3y = 7$

$-3y = 7 - 25$

$-3y = -18$

$y = \frac{-18}{-3}$

$\boxed{y = +6}$

Elimination using Multiplication

Consider the system

$x + 2y = 6$ ①

$3x + 3y = -6$ ②

How are they related?

What could we do to equation 1 to make the "x" equal?

answer

① X 3

$3(x + 2y = 6)$

$3x + 6y = 18$ ①

$-3x + 3y = -6$ ②

$3y = 24$

$\frac{3y}{3} = \frac{24}{3}$

$\boxed{y = 8}$

$18 - (6)$

① $x + 2y = 6$

$x + 2(8) = 6$

$-16 \quad -16$

$x + 16 = 6$

$\boxed{x = -10}$

Elimination using Multiplication

Consider the system

$x + 2y = 6$

$3x + 3y = -6$

How are they related?

What could we do to equation 1 to make the "x" equal?

multiply equation 1 by 3

Elimination using Multiplication

Consider the system

$3x + 6y = 18$

$3x + 3y = -6$

Now subtract the equations

Elimination using Multiplication

Consider the system

$$3x + 6y = 18$$
$$-3x - 3y = +6$$

Now subtract the equations

Answer

Elimination using Multiplication

Consider the system

$$3x + 6y = 18$$
$$-3x - 3y = +6$$

Now subtract the equations

$$3y = 24$$

$$y = 8$$

Sub into equation 1 (original) or the above

$$x + 2y = 6$$
$$x + 2(8) = 6$$
$$x + 16 = 6$$
$$x = 6 - 16$$
$$x = -10$$

(-10, 6)

You Try

1)

$x + 2y = 5$

$2x + 6y = 12$

ANS:

2)

$x + 2y = 4$

$x - 4y = 16$

ANS:

Warm-Up:

Solve the following system of equations:

$$\frac{x}{2}+\frac{y}{3}=1 \quad (1)$$
$$\frac{x}{4}-\frac{2y}{3}=-1 \quad (2)$$

① X 6
$6\left(\frac{x}{2}+\frac{y}{3}=1\right)$
$\frac{6x}{2}+\frac{6y}{3}=6$
$3x+2y=6$ ①

② X 12
$12\left(\frac{x}{4}-\frac{2y}{3}=-1\right)$
$\frac{12x}{4}-\frac{24y}{3}=-12$
$3x-8y=-12$ ②

$3x-8y=-12$ ②

$\frac{10y}{10}=\frac{18}{10}$

$y=\frac{18}{10}=\boxed{\frac{9}{5}}$

① $3x+2y=6$
$3x+2\left(\frac{9}{5}\right)=6$
$3x+\frac{18}{5}=6$

$3x=\frac{6}{1}\cdot\frac{5}{5}-\frac{18}{5}$

$3x=\frac{30}{5}-\frac{18}{5}$

$\frac{3x}{3}=\frac{12}{5}\cdot\frac{1}{3}$

$x=\frac{12}{15}$