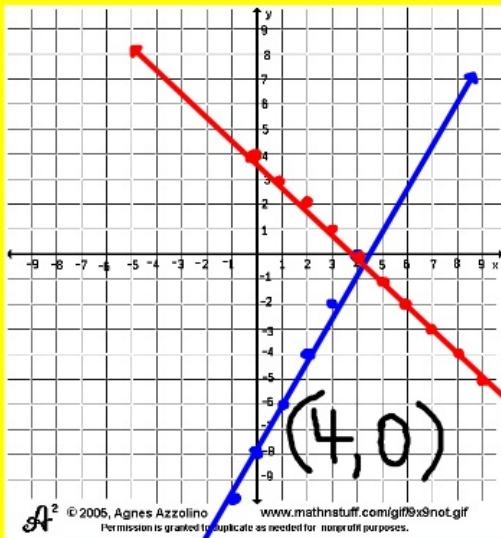Solve the system of equation using graphing, substitution, and elimination.

Graphing

$$2x - y = 8$$

$$x + y = 4$$

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$(4,0)$

$$2x - y = 8 \rightarrow y = 2x - 8$$
$$x + y = 4 \rightarrow y = -x + 4$$

Substitution

$$X + y = 4 \qquad 2(4-y) - y = 8$$
$$\underline{-y \quad -y} \qquad 8 - 2y - y = 8$$
$$X = 4 - y \qquad 8 - 3y = 8$$
$$\underline{-8 \qquad -8}$$
$$\frac{-3y}{-3} = \frac{0}{-3}$$
$$y = 0$$

$$X + y = 4$$
$$X + 0 = 4 \qquad (4,0)$$
$$X = 4$$

$$X + y = 4$$
$$4 + y = 4 \qquad (4,0)$$
$$\underline{-4 \qquad -4}$$
$$y = 0$$

Elimination

$$+\begin{array}{r} 2X - y = 8 \\ X + y = 4 \end{array}$$
$$\frac{3X}{3} = \frac{12}{3}$$
$$X = 4$$

Systems Word Problems

| DEFINE VARIABLES! | → | SET UP EQUATIONS & SOLVE! | → | IDENTIFY THE ANSWER! |

1. The sum of two numbers is 30 and their difference is 12. Find the two numbers.

$x = 1^{st} \#$

$y = 2^{nd} \#$

$$(-) \quad x + y = 30$$
$$\quad\quad x - y = 12$$
$$\quad\quad \frac{2y}{2} = \frac{18}{2}$$
$$\quad\quad y = 9$$

How will you determine which method to use?

Substituion or Elimination?

$$x + y = 30$$
$$x + 9 = 30$$
$$x = 21$$

$$(21, 9)$$

3. The difference between two numbers is 9. The first number plus twice the other number is 27. Find the two numbers.

Use the opposite method that you used in #1.

$X = 1^{st} \#$
$y = 2^{nd} \#$

$X - y = 9$
$X + 2y = 27$

① $X - y = 9$
$\underline{+y \quad +y}$
$X = y + 9$

② $(y + 9) + 2y = 27$

③ $3y + 9 = 27$
$\underline{-9 \quad -9}$
$\dfrac{3y}{3} = \dfrac{18}{3}$
$y = 6$

④ $X - y = 9$

⑤ $X - 6 = 9$
$X = 15$

$(15, 6)$

7. The cost of 3 boxes of envelopes and 4 boxes of notebook paper is $13.25. Two boxes of envelopes and 6 boxes of notebook paper cost $17. Find the cost of each.

Which method works best?

x = cost for envelopes

y = cost for nb paper

$2(3x + 4y = 13.25)$
$3(2x + 6y = 17.00)$

$(-) \quad 6x + 8y = 26.50$
$ 6x + 18y = 51.00$
$$\frac{-10y = -24.50}{-10 \qquad -10}$$
$$y = 2.45$$

$3x + 4(2.45) = 13.25$
$3x + 9.80 = 13.25$
$3x = 3.45$
$x = 1.15$

The cost of one box of envelopes is $1.15.
The cost of one box of notebook paper is $2.45.

13. A group of (40 children) attended a baseball game on a field trip. (Each child) received (either) a hot dog or bag of popcorn. Hot dogs were ($2.25) and popcorn was ($1.75). If the total bill was ($83.50), how many hotdogs and bags of popcorn were purchased?

only

$$2.25x + 1.75y = 83.50$$
$$x + y = 40$$

$x = $ hotdogs
$y = $ popcorns

Which method works best?

① $x + y = 40$
$ - y -y$
$\overline{ x = 40 - y}$

② $2.25(40 - y) + 1.75y = 83.50$
$90 - 2.25y + 1.75y = 83.50$
$90 - .5y = 83.50$
$-90 -90$
$\overline{ -.5y = -6.50}$
$ \overline{-.5} \overline{-.5}$

$y = 13$
$x = 27$

There were 27 hotdogs and 13 bags of popcorn.

15. Adult tickets for the school musical sold for $3.50 and student tickets sold for $2.50. On a given night, 321 tickets were sold for $937.50. How many of each kind of ticket were sold?

$X = $ adults
$y = $ students

$$3.50X + 2.50y = 937.50$$
$$X + y = 321$$

Which method works best?

$$(-) \quad 3.50X + 2.50y = 937.50$$
$$3.50X + 3.50y = 1123.50$$
$$\frac{-y}{-1} = \frac{-186}{-1}$$
$$y = 186$$

$$X + y = 321$$
$$X + 186 = 321$$
$$X = 135$$

There were 135 adult and 186 student tickets sold.

Systems Word Problems Cheat Sheet

(17, 8)

($8.50, $6.50)   ~~($1.15, $2.45)~~   ($8.50, $6.50)

(14, 22)   (16, 4)   (321, 227)   ~~(15, 6)~~   ~~(135, 180)~~

($1.19, $1.39)   (13, 11)

(30, 8)   ~~(21, 9)~~   ($0.26, $0.32)

(24, 18)   (19, 11)

(76, 24)   (10, 15)

(28, 14)   ~~(27, 13)~~

(Answers to #1- 20)