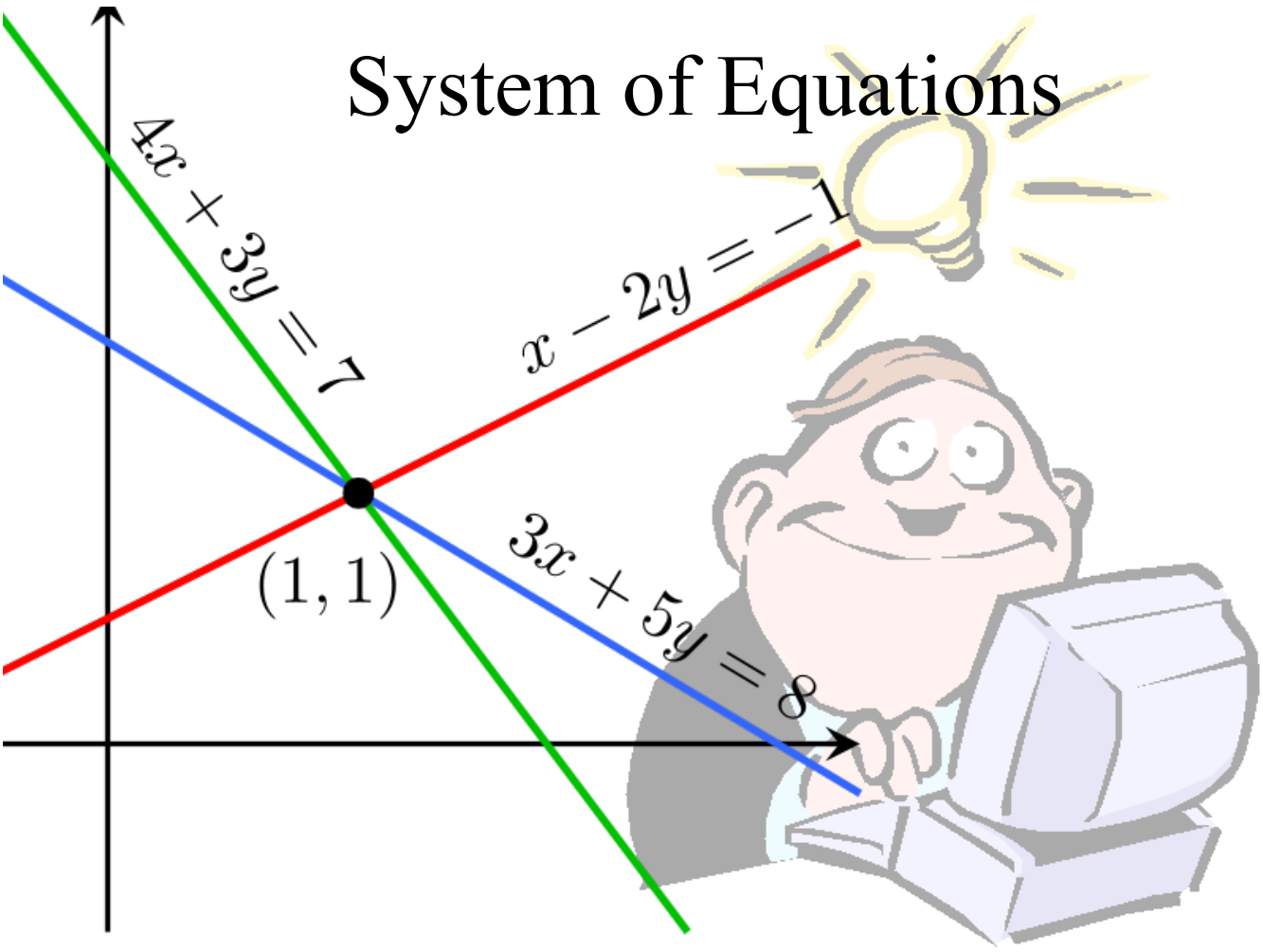
System of Equations



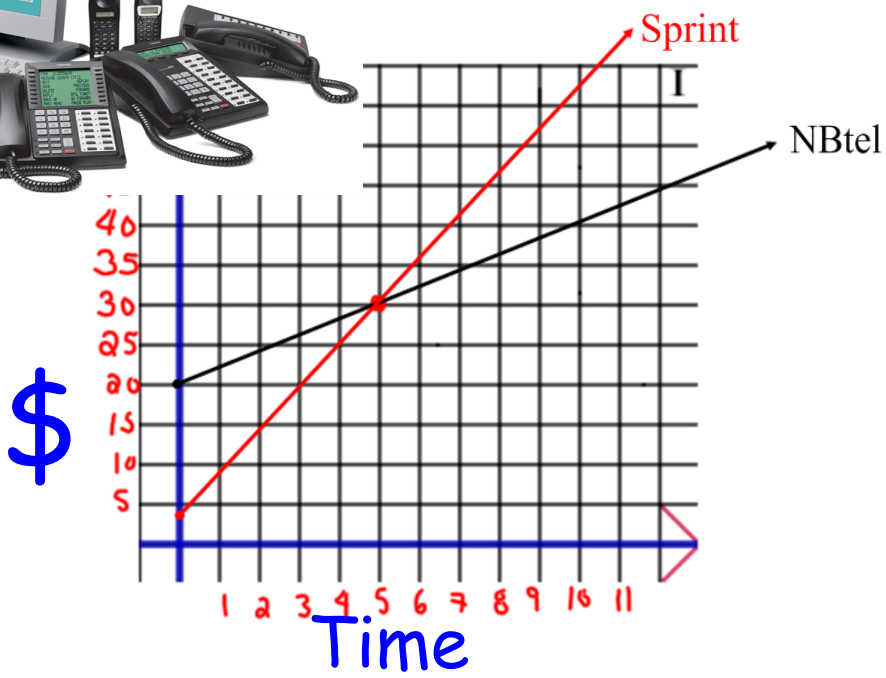
Internet Service

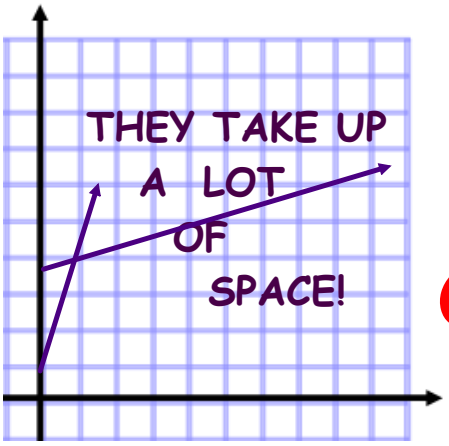
NBtel charges a monthly fee of $20.00, and an additional $2.00 per hour.
Sprint charges a monthly fee of $10.00, and an additional $4.00 per hour.

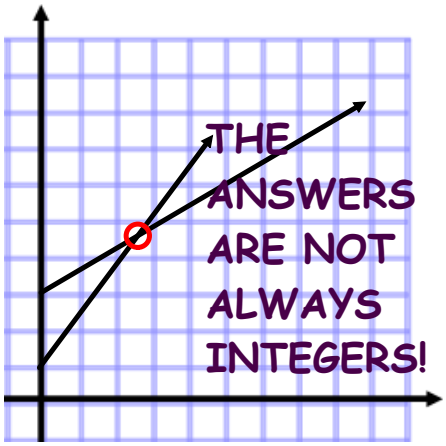
Equation??

NBtel _____

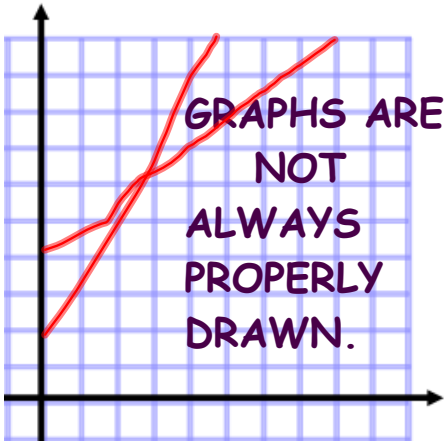
Sprint _____

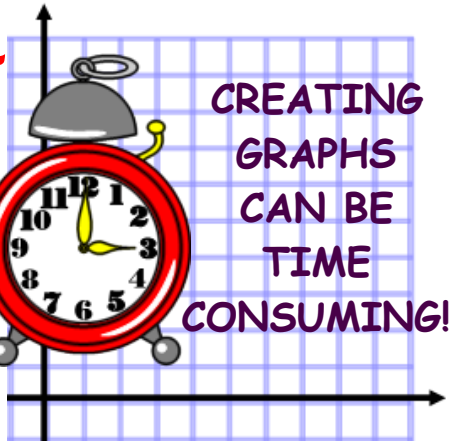






Graphing is not always practical.





There are other ways to solve Systems of Equations!

Elimination

Elimination is when you "eliminate" one of the variables.

Elimination by Addition

$y - 2x = 5$ ①

$-y - 1x = 4$ ②

① + ②

$\frac{-3x}{-3} = \frac{9}{-3}$

$x = -3$

Sub in ①: $y - 2x = 5$

$y - 2(-3) = 5$

$y + 6 = 5 - 6$

$y = -1$

Make sure the corresponding variables, constants and equal signs are lined up.

You must explain what you are doing.

$(-3, -1)$

Elimination by Addition

Consider the system

$x - 2y = 5$ ←

$2x + 2y = 7$ ←

Elimination by Addition

Consider the system

$1x - 2y = 5$ ①

$+ 2x + 2y = 7$ ②

Lets add both equations to each other

① + ② $\frac{3x}{3} = \frac{12}{3}$

$x = 4$

Sub in ① $x - 2y = 5$

$4 - 2y = 5 - 4$

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

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

Elimination by Addition

$x + 3y = 14$ ①

$-x + 4y = 7$ ②

Who would you eliminate??

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① + ② $7y = 21$

$\frac{7y}{7} = \frac{21}{7}$

$y = 3$

Sub in ①

$x + 3y = 14$

$x + 3(3) = 14$

$x + 9 = 14$

$-9 \quad -9$

$x = 5$

$(5, 3)$

Elimination by Addition

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

Elimination By Subtraction

$6x + 11y = -5$ ①

$-6x - 9y = +3$ ② Add the Opposite

①+② $2y = -2$

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

$y = -1$

$(1, -1)$

Sub in ① $6x + 11y = -5$

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

$6x - 11 = -5 + 11$

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

$x = 1$

$$x - 2y = -12$$
$$-2y - 6x = 16$$

$-3x - 5y = 10$ ①

$+3x + 7y = -14$ ② Add the Opp.

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

$y = -2$

$(0, -2)$

Sub in ①

$-3x - 5y = 10$

$-3x - 5(-2) = 10$

$-3x + 10 = 10 - 10$

$\frac{-3x}{-3} = \frac{0}{-3}$

$x = 0$

Solve the following System of Equations

$x + 2y = 7$ ①

$-2x + 8y = 10$ ②

① × 2 $2x + 4y = 14$ ③

$-2x + 8y = 10$ ②

③ + ② $12y = 24$

$\frac{12y}{12} = \frac{24}{12}$

$y = 2$

Sub in ① $x + 2y = 7$

$x + 2(2) = 7$

$x + 4 = 7 - 4$

$x = 3$

Make sure the corresponding variables, constants and equal signs are lined up.

You must explain what you are doing.

(3, 2)

Solve the following System of Equations

$-5x - 9y = 27$ ①

$4x + 3y = -9$ ②

Make sure the corresponding variables, constants and equal signs are lined up.

You must explain what you are doing.

② x 3 $\quad 12x + 9y = -27$ ③

$-5x - 9y = 27$ ①

③ + ① $\quad \frac{7x}{7} = \frac{0}{7}$

$x = 0$

Sub in ② $\quad 4x + 3y = -9$

$4(0) + 3y = -9$

$\frac{3y}{3} = \frac{-9}{3}$

$y = -3$

$(0, -3)$

Solve the following System of Equations

$3x + 2y = 12$ ①

$2x + 3y = 13$ ②

① × 2 $6x + 4y = 24$ ③

② × -3 $-6x - 9y = -39$ ④

③ + ④ $\frac{-5y}{-5} = \frac{-15}{-5}$

$y = 3$

Sub in ② $2x + 3y = 13$

$2x + 3(3) = 13$

$2x + 9 = 13 - 9$

$\frac{2x}{2} = \frac{4}{2}$

$x = 2$

$(2, 3)$

Make sure the corresponding variables, constants and equal signs are lined up.

You must explain what you are doing.

Try these:

1.

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

2.

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

3.

$$x + 2y = 6$$
$$3x + 3y = -6$$

1.

$$\begin{array}{rl} x - 2y = 5 & \leftarrow \\ + \; 2x + 2y = 7 & \leftarrow \\ \hline 3x \qquad = 12 & \end{array}$$

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)

2.

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)

3.

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

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

$$(-10, 6)$$

STOP