

Substitution Method

Steps:

- get x or y by itself*
- i) Choose one equation and isolate one variable;
this equation will be considered the first equation.
(easiest one to get $x=$ or $y=$ from either eqn 1 or eqn 2)
 - ii) Substitute the solution from step 1 into the second equation and solve for the variable in the equation.
 - iii) Using the value found in step 2, substitute it into the first equation and solve for the second variable.
 - iv) Substitute the values for both variables into both equations to show they are correct.

Solve this system of equation by substitution.

$$y = 15 + 6x$$

$$-3x - 2y = 0$$

$$-3x - 2y = 0$$

$$-3x - 2(15 + 6x) = 0$$

$$-3x - 30 - 12x = 0$$

$$-3x - 12x = 0 + 30$$

$$\underline{-15x} = \underline{30}$$

$$\underline{-15} \quad \underline{-15}$$

$$x = \underline{\underline{-2}}$$

$$y = 15 + 6x$$

$$y = 15 + 6(\underline{\underline{-2}})$$

$$y = 15 - 12$$

$$y = 3$$

$$\boxed{(-2, 3)}$$

Solve the system by Substitution Method

$$x + 2y = 3$$

$$3x + 5y = 8$$

.....solve for x → $x = 3 - 2y$

$$\underline{3x} + 5y = 8$$

$$3(\underline{3-2y}) + 5y = 8$$

$$9 - 6y + 5y = 8$$

$$-6y + 5y = 8 - 9$$

$$-y = -1$$

$$\underline{y = 1}$$

$$x + \underline{2y} = 3$$

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

$$x + 2 = 3$$

$$x = 3 - 2$$

$$x = 1$$

$$(1, 1)$$



Use Substitution to Find the Point of Intersection

$$1) \quad x - 4y = 6 \rightarrow x = \underline{6 + 4y}$$

$$7x + 6y = 8$$

$$\underline{7x} + 6y = 8$$

$$7(6 + 4y) + 6y = 8$$

$$42 + 28y + 6y = 8$$

$$26y + 6y = 8 - 42$$

$$\frac{34y}{34} = \frac{-34}{34}$$

$$y = -1$$

$$x = 6 + 4y$$

$$x = 6 + 4(-1)$$

$$x = 6 - 4$$

$$x = 2$$

$$(2, -1)$$

Use Substitution to Find the Point of Intersection

$$\begin{aligned} 2) \quad 2x + y &= 9 \longrightarrow y = \underline{9 - 2x} \\ 3x - 5y &= -19 \\ 3x - 5(9 - 2x) &= -19 \\ 3x - 45 + 10x &= -19 \\ 3x + 10x &= -19 + 45 \\ \frac{13x}{13} &= \frac{26}{13} \\ x &= 2 \end{aligned}$$
$$\begin{aligned} y &= 9 - 2x \\ y &= 9 - 2(2) \\ y &= 9 - 4 \\ y &= 5 \\ (2, 5) \end{aligned}$$

Answers to worksheet:

① $(1, -1)$

② $(3, 2)$

③ $(0, -1)$

④ $(6, 6)$

⑤ $(3, -7)$

⑥ $(-6, 1)$

⑦ $(6, -4)$

⑧ $(-6, 2)$

⑨ $(-2, 6)$

⑩ $(3, 1)$

Questions from homework

$$\begin{aligned}
 \textcircled{5} \quad y &= -4x + 5 & \rightarrow & \quad y = \underline{-4x + 5} \\
 y &= 5x - 22 & & \quad y = \underline{5x - 22} \\
 & & & \quad -4x + 5 = 5x - 22 \\
 & & & \quad -4x - 5x = -22 - 5 \\
 & & & \quad \underline{-9x} = \underline{-27} \\
 & & & \quad \underline{-9} \quad \underline{-9} \\
 & & & \quad \boxed{x = 3}
 \end{aligned}$$

$$\begin{aligned}
 y &= -4x + 5 \\
 y &= -4(3) + 5 \\
 y &= -12 + 5 \\
 \boxed{y} &= \boxed{-7} \\
 & \quad (3, -7)
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{7} \quad \boxed{y = -4} & \quad (6, -4) \\
 -2x + 2y &= -20 \\
 -2x + 2(-4) &= -20 \\
 -2x - 8 &= -20 \\
 -2x &= -20 + 8 \\
 \underline{-2x} &= \underline{-12} \\
 \underline{-2} & \quad \underline{-2} \\
 \boxed{x = 6} &
 \end{aligned}$$

$$y = \underline{m}x + \underline{b}$$

- Joe charges a sitting fee of \$15.00 plus an additional \$10.00 an hour to tutor. $m=10$ $b=15$

$$y = 10x + 15$$

- Bob charges a sitting fee of \$30.00 plus an additional \$5.00 an hour to tutor. $m=5$ $b=30$

$$y = 5x + 30$$

Where do these lines intersect:

$$y = 10x + 15$$

$$y = 5x + 30$$

$$y = \underline{10x + 15}$$

$$y = 5x + 30$$

$$10x + 15 = 5x + 30$$

$$10x - 5x = 30 - 15$$

$$\frac{5x}{5} = \frac{15}{5}$$

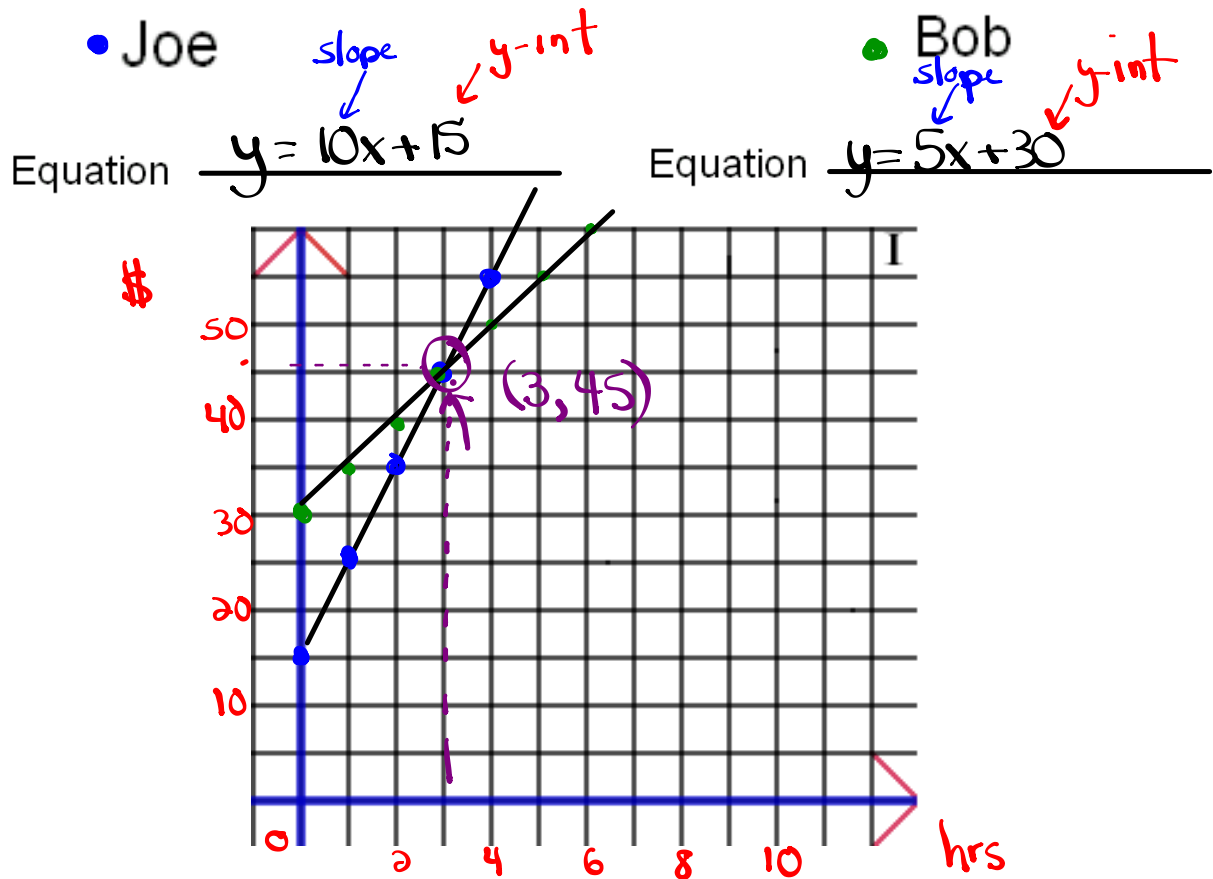
$$x = 3$$

$$y = 10x + 15$$

$$y = 10(3) + 15$$

$$y = 30 + 15$$

$$y = 45$$



If you were planning to get tutored for 5 hours, who would you ask?

Bob is cheaper

Answers to Homework

① C

② D

③ C

④ A

⑤ (3,5)

⑥ (-5,0)

⑦ (1,-2)

⑧ No Solution (Parallel lines)

⑨ (2,-5)

⑩ (3,4)