M10 - 9.1 - Substitution Notes

$a = b$ $\quad$ $b = c$

$a = c$

Solve by Substitution

① $y = (x + 1)$ $\quad$ ② $y = (-2x + 4)$ $\quad$ Identify equation # 1 $\quad$ Identify equation # 2

Put Brackets around what $y =$

$$
\begin{array}{r}
y = y \\
x + 1 = -2x + 4 \\
-1 \qquad\quad -1 \\
x = -2x + 3 \\
+2x \quad +2x \\
\frac{3x}{3} = \frac{3}{3} \\
x = 1
\end{array}
$$

Substitution

Make them equal to each other. Do it!

Solve

① $y = x + 1$
$y = (1) + 1$
$y = 2$

Substitute

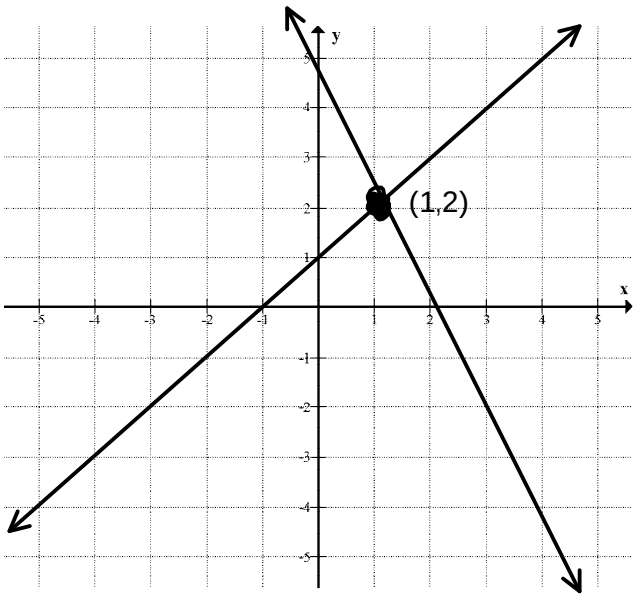
Solve

(1,2)

Intersection point

Solve by Graphing

$y = -2x + 4$ $\quad$ $y = x + 1$



M10 - 9.2 - Don't/Need to Isolate Substitution Notes

Substitution - Don't Need to Isolate

① $x = (3 - y)$ ② $2y - 2x = 10$ Identify equation # 1 Identify equation # 2

Put Brackets around what x =
Put Brackets around x *in eq.* #2

② $2y - 2(x) = 10$ Substitute
$2y - 2(3 - y) = 10$
$2y - 6 + 2y = 10$ *Combine Like Terms*
$4y - 6 = 10$
$+6 \quad +6$
$4y = 16$ Solve
$y = 4$

① $x = 3 - y$ *Substitute*
$x = 3 - (4)$
$x = -1$ Solve

$(-1,4)$ Intersection point

If a variable is already isolated go ahead and substitute what that variable equals into the other equation.

Substitution - Need to Isolate

① $x + y = 11$ ② $2y - 2x = 6$ Identify equation # 1 Identify equation # 2

① $x + y = 11$ Isolate
$-y \quad -y$
$x = (11 - y)$

② $2y - 2(x) = 6$ Substitute
$2y - 2(11 - y) = 6$
$2y - 22 + 2y = 6$
$4y - 22 = 6$
$+22 \quad +22$
$4y = 28$
$\frac{4y}{4} = \frac{28}{4}$
$y = 7$ Solve

① $x + y = 11$ Substitute
$x + 7 = 11$
$-7 \quad -7$
$x = 4$ Solve

$(4,7)$ Intersection point:

M10 - 9.3 - Elimination Notes

Solving a system of equations using elimination

① $2y = x - 2$ ② $y = x - 3$ Identify equation # 1 Identify equation # 2

$$\begin{array}{r} 2y = x - 2 \\ -(y = x - 3) \\ \hline y = 0 + 1 \end{array}$$

$-2 - (-3) = 5$

Subtract equations to eliminate x

$y = 1$

Solve

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

Substitute

Solve

Put brackets around what you're subtracting

(4,1)

Intersection point:

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① $y + x = 6$ ② $y - x = 4$ Identify equation # 1 Identify equation # 2

$$\begin{array}{r} y + x = 6 \\ +(y - x = 4) \\ \hline 2y + 0x = 10 \end{array}$$

Add equations to eliminate x

You could have subtracted equations to eliminate y

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

Solve

① $y + x = 6$
$(5) + x = 6$
$-5 \quad -5$
$x = 1$

Substitute

Solve

(1,5)

Intersection point:

M10 - 9.4 - Line Up Elimination Notes

Solving a system of equations using elimination

① $y = -6x + 2$ ② $y + 4x = 0$ Identify equation # 1 Identify equation # 2

$$y = -6x + 2$$
$$+6x \quad +6x$$
$$y + 6x = 2$$

① $y + 6x = 2$
② $y + 4x = 0$ Line up equations

$y + x = \#$
$y + x = \#$

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

Subtract equations to eliminate y

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

Solve

① $y = -6x + 2$
$y = -6(1) + 2$
$y = -4$

Substitute

Solve

$(1, -4)$

Intersection point:

M10 - 9.5 - Multiply Elimination Notes

Solving a system of equations using elimination

(1) $2x - 3y = 2$ (2) $x + 2y = 8$ Identify equation # 1 Identify equation # 2

(2) $2(x + 2y = 8)$ Multiply equation #2 by 2
$2x + 4y = 16$

$2x - 3y = 2$
$-(2x + 4y = 16)$
$0x - 7y = -14$ Line up equations / Subtract equations to eliminate x

$-\frac{7y}{-7} = -\frac{14}{-7}$ Solve
$y = 2$

(2) $x + 2y = 8$ Substitute
$x + 2(2) = 8$
$x + 4 = 8$
$x = 4$ Solve

(4,2) Intersection point:

M10 - 9.5 - Fraction Elimination Notes

Solving a system of equations using elimination

(1) $2y + x = 4$ (2) $\frac{y}{2} + \frac{x}{2} = 3$ Identify equation # 1 Identify equation # 2

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

Multiply equation #2 by 2 to get rid of denominator

$2y + x = 4$
$-(y + x = 6)$
$y = -2$

Subtract equations to eliminate x

Solve

(2) $y + x = 6$
$(-2) + x = 6$
$+2 \quad +2$
$x = 8$

Substitute

Solve

$(8, -2)$

Intersection point:

M10 - 9.6 - Variables Systems of Equations Notes

Define The following Variables

Nick's Age

$let\ n = Nick's\ age$

Number of Dolphins

$let\ d = \#\ of\ Dolphins$

Meters

$let\ m = Number\ of\ Meters$

Revenue Dollars

$let\ d = \#\ of\ Revenue\ Dollars$

$r\ is\ a\ bad\ choice\ because\ it\ looks\ like\ a\ 1$

A person has the following number of Dimes, How much money do they have in Dimes?

$let\ d = \#\ of\ Dimes$

d	*Value $*	*Calculation*
0	*0*	$0 \times 0.1 = 0$
1	*0.1*	$1 \times 0.1 = 0.1$
2	*0.2*	$2 \times 0.1 = 0.2$
d	*0.1d*	$d \times 0.1 = 0.1d$

$0.1d$

A person has the $2.30 in Dimes, How many Dimes do they have?

$$0.1d = 2.30$$

$$\frac{0.1d}{0.1} = \frac{2.30}{0.1}$$

$$d = 23$$

M10 - 9.6 - 2 Var Word Problems Notes

Create Let Statements, an equation, and solve the equation.

Bob is 6 years older than Mark. Mark is 30. How old is Bob?

$Let\ m\ = Mark's\ age.$
$Let\ b\ =\ Bob's\ age$

$m + 6 = b$
$(30) + 6 = b$
$36 = b$
$b = 36$

Substitute $Mark's\ age$ $m = 30$

$Bob's\ age\ b = 36$

$Arbitrary$

$Mark = 10$

$Bob = m + 6$
$Bob = 10 + 6$
$Bob = 16$

$Bob\ is\ 6\ years\ older\ than\ Mark$

Nick is two years younger than twice Damon's age. Nick is 28. How old is Damon?

$Let\ d\ = Damon's\ Age$

$Let\ n\ = Nick's\ age$

$2d - 2 = n$
$2d - 2 = 28$
$+2 \quad +2$
$\frac{2d}{2} = \frac{30}{2}$
$d = 15$

Substitute $Nick's\ age$ $n = 28$

$Damon's\ age\ d = 15$

A cell phone Costs $40 per month plus $0.1 per Megabyte of Data. Define Variables and Create an Equation.

$Let\ c\ = cost$

$Let\ d\ = \#\ megabytes\ of\ data$

$c = 40 + 0.1d$

If a person uses 480 megabytes of Data what will month bill cost?

$d = 480$

$c = 40 + 0.1d$

$c = 40 + 0.1(480)$
$c = 40 + 4.8$

$c = \$\ 44.80$

If a person's bill is $52.60, How many Megabytes did the use?

$c = 52.60$

$c = 40 + 0.1d$

$52.60 = 40 + 0.1d$
$-40 \quad -40$
$\frac{12.60}{0.1} = \frac{0.1d}{0.1}$
$126 = d$

$d = 126$

M10 - 9.6 - Coins Notes

Quarters and Dimes worth $2.40. 12 Total Coins. How many of each.

let d = # dimes

let q = # quarters

$d + q = 12$ $\quad .1d + .25q = 2.40$

$q = 12 - d$ $\quad .1d + .25(12 - d) = 2.40$

$.1d + 3 - .25d = 2.40$

$\frac{-.15d}{-.15} = \frac{-.60}{-.15}$

$d = 4$

$q = 12 - 4$

$q = 8$

$.25 \times 8 + .1 \times 4 = 2.40$ ✓

M10 - 9.6 - Plane w/ Wind

A plane travels 780 km in 4 hours with a headwind. It takes 3 hours to return with a tailwind. What is the wind speed?

w = wind speed
p = plane "

$S = \frac{d}{t}$

$p - w = \frac{780}{4}$

$p - w = 195$

$p = 195 + w$

$S = \frac{d}{t}$

$(p) + w = \frac{780}{3}$

$(195 + w) + w = 260$

$2w = 65$

$w = 32.5$

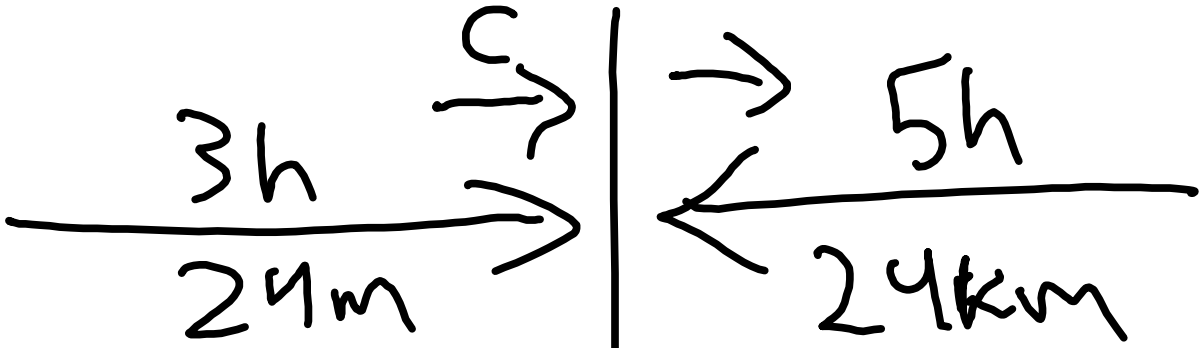
WIND SPEED = 32.5 $\frac{km}{h}$

M10 - 9.6 - Boat w/ Current

A boat took 3 hrs to travel 24 km with a current and 5 hrs to return. What is the speed of the boat in still water?

b = boat speed

C = current



$s = \frac{d}{t}$

$S = \frac{d}{E}$

$b + c = \frac{24}{3}$

$b + c = 8$

$b = 8 - c$

$b = 8 - 1.6$

$b = 6.4$

$b - c = \frac{24}{5}$

$b - c = 4.8$

$8 - c - c = 4.8$

$3.2 = 2c$

$c = 1.6$

IN BANK	%	DEC	INTEREST	CALCULATION
$100	10%	0.1	$10	100x.1
$50	20%	0.2	$10	50x.2
x	6%	0.06	___	.06x

COST	#	SPENT
5	x	5x

RATE	#	SPENT
2	y	6y

AMOUNT = RATE x DENOMINATOR