4 Which of the expressions below is equivalent to $3(4x - 5) - 7(9x - 2)$?

a $-51x - 1$

b $-51x - 3$

c $-51x - 7$

d $-51x - 29$

$12x - 15 - 63x + 14$

$-51x - 1$

12 Abigail buys a prepaid card for her cellphone. When she talks on her phone, a fee per minute is deducted from the value of the prepaid card.

The table below shows information about the remaining value of the card.

Total number of minutes used, t	Remaining value, V ($)
10	22.00
20	19.00

Which equation represents the relationship between the remaining value and total number of minutes used?

a $V = 22 - 3t$

b $V = 22 - 0.30t$

c $V = 25 - 3t$

d $V = 25 - 0.30t$
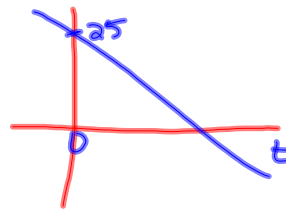
Learning Goals

1. To understand that you must use SAMDEB to isolate for a variable.

2. To understand that when there are 2 or more variables in an equation, one variable will be set equal to another. For example, y = -3x + 17 versus y = 17

4.4 - Solving Linear Relations with Multiple Variables

To solve a relation for any variable:

1. Imagine that all other variables are numbers except for the one you are isolating.

2. Use SAMDEB to isolate for required variable.

Note: Your equation will end up as one isolated variable set equal to numbers +/- other variables.
For example, y = 7 - 3x or m = $\dfrac{4k+1}{9}$

Example One
Solve (isolate) for n in terms of m for: 0.35m + 2.4n = 9

$$\boxed{0.35m} + 2.4n = 9$$
$$-0.35m$$
$$\frac{2.4n}{2.4} = \frac{9 - 0.35m}{2.4}$$
$$n = \frac{9 - 0.35m}{2.4}$$

Example Two
Solve (isolate) for y in terms of x for: $\dfrac{2}{3}x + \dfrac{1}{5}y = 2$

$$\left(\dfrac{2}{3}x\right) + \dfrac{1}{5}y = 2$$

$$-\dfrac{2}{3}x$$

$$\dfrac{1}{5}y = \left(2 - \dfrac{2}{3}x\right)^{\times \frac{5}{1}}$$

$$y = \dfrac{5}{1}\left(\dfrac{2}{1} - \dfrac{2}{3}x\right)$$

$$y = \dfrac{10}{1} - \dfrac{10x}{3}$$

Example Three
A cell phone company offers a monthly plan of $25 plus
$0.10/minute to talk.
a) Write the equation in terms of cost using n and C as
variables.

$$C = 0.10n + 25$$

b) Solve the relation for n in terms of C.

$$C = 0.10n + 25$$

$$-25$$

$$\dfrac{C - 25}{0.10} = \dfrac{0.10n}{0.10}$$

$$\dfrac{C - 25}{0.10} = n$$

$$\dfrac{C}{0.10} - \dfrac{25}{0.10} = n$$

Complete: p. 236 - 238 #2, 4ace, 6, 7ace, 9.

#2 a) $3f + 2.5h = 240$

$\qquad -3f$

b)

$$\frac{2.5h}{2.5} = \frac{240 - 3f}{2.5}$$

$$h = \frac{240 - 3f}{2.5}$$

$$h = \frac{240}{2.5} - \frac{3f}{2.5}$$

$$h = 96 - \frac{3f}{2.5}$$

4c) $2.8x + 1.1y - 5.3 = 0$

$\qquad\qquad -2.8x$

$1.1y - 5.3 = -2.8x$

$\qquad\qquad +5.3$

$$\frac{1.1y}{1.1} = \frac{-2.8x + 5.3}{1.1}$$

$$y = -\frac{2.8x}{1.1} + \frac{5.3}{1.1}$$

6a) $2x - 5y = 20$

$-2x$

$$\frac{-5y}{-5} = \frac{20}{-5} - \frac{2x}{-5}$$

$$y = -4 + \frac{2}{5}x \qquad m = \frac{2}{5}$$

7c) $\frac{1}{2}P \left(-\frac{2}{3}q \right) = \frac{1}{4}$

$+\frac{2}{3}q$

$$\frac{1}{2}P = \left(\frac{1}{4} + \frac{2}{3}q \right) \times \frac{2}{1}$$

$$P = \frac{2}{1}\left(\frac{1}{4} + \frac{2}{3}q \right)$$

$$P = \frac{2}{4} + \frac{4}{3}q$$

7e) $P = 2L \boxed{+ 2W}$

$-2W$

$\dfrac{P - 2W}{2} = \dfrac{2L}{2}$

$\dfrac{P}{2} - \dfrac{2W}{2} = L$

$\dfrac{P}{2} - 1W = L$