Note Title 1/30/2017

Review: Solve.

$$\frac{1}{5}y + 3 = \frac{7}{10}$$

$$\frac{1}{5}y = \frac{7}{10} - \frac{3}{1}\left(\frac{10}{10}\right)$$

$$\frac{1}{5}y = \frac{7}{10} - \frac{30}{10}$$

$$\frac{1}{5}y = -\frac{23}{10}$$

$$\left(\frac{\cancel{5}^{1}}{1}\right)\left(\frac{1}{\cancel{5}_{1}}y\right) = -\frac{23}{\cancel{10}_{2}}\left(\frac{\cancel{5}^{1}}{1}\right)$$

$$y = -\frac{23}{2}$$

$$\boxed{\left\{-\frac{23}{2}\right\}}$$

Reflect:
3 things I've learned/remembered about math
2 questions/concerns I still have
1 positive thought

2.2: Solving Linear Equations (cont'd)

<u>Example:</u> Solve.

$$2(h+6) - 7 = 4h - 2(h+7)$$

$$2h + 12 - 7 = 4h - 2h - 14$$

$$\underset{-2h}{2h} + 5 = \underset{-2h}{2h} - 14 \leftarrow \text{False for every } h$$

$$\underset{-5}{5} = \underset{-5}{-14} \leftarrow \text{False for every value of } h$$

$$0 = -19 \quad \text{False for every } h$$

Sol'n Set: $\boxed{\text{No Solution}}$

The solution set can also be written as $\emptyset$ (the <u>empty</u> set)

<u>Empty set:</u> set with no values in it. Also called the null set.

(So don't use $\emptyset$ for zero in algebra)

<u>Example:</u> Solve. $2x - (5x+6) = 3(x-5) + 9$

$$2x - 1(5x+6) = 3(x-5) + 9$$

$$2x - 5x - 6 = 3x - 15 + 9$$

$$-3x - \underset{+6}{6} = 3x - \underset{+6}{6}$$

$$\underset{-3x}{-3x} = \underset{-3x}{3x}$$

$$-6x = 0$$

$$\frac{-6x}{-6} = \frac{0}{-6}$$

$$1x = 0$$

$$x = 0$$

Sol'n Set: $\boxed{\{0\}}$

Example: Solve. $4(2z+3) = 8(z-3)+36$

$$8z+12 = 8z-24+36$$

$$8z+12 = 8z+12 \leftarrow \text{True for every } z$$

$$\underline{-8z} \qquad \underline{-8z}$$

$$0+12 = 12$$

$$12 = 12 \leftarrow \text{true for every } z$$

$$\underline{-12} \qquad \underline{-12}$$

$$0 = 0 \leftarrow \text{true for every } z$$

Therefore the original equation is true for every z

Solution Set: $\boxed{\text{All real numbers}}$

Summary

* If the variable disappears and leaves you with a false statement, the solution set is No solution.
  (ex: $6=0$ or $5=7$)
  A contradiction is an equation that is never true.

* If the variable disappears and leaves you with a true statement, then the solution set is all real numbers
  (e.g., $12=12$ or $0=0$)

  An identity is an equation that is always true.

* If the variable doesn't disappear, a linear equation will give you one numerical solution
  (ex: $h=0$ or $x=5$ ... sol'n set $\{0\}$ or $\{5\}$)

  A conditional equation is an equation that is true for certain value(s) of the variable but false for other values.

2.3: Clearing Fractions and Decimals

(An alternative approach to handling fractions)

To clear fractions, multiply both sides by the least common denominator (LCD) of all fractions:

Example: $\frac{1}{5}y + 3 = \frac{7}{10}$ (same as an earlier example)

LCD: 10

$$\frac{10}{1}\left(\frac{1}{5}y + 3\right) = \frac{7}{10}\left(\frac{10}{1}\right)$$

$$\left(\frac{\cancel{10}^{\,2}}{1}\right)\frac{1}{\cancel{5}_{1}}y + 3(10) = \frac{7}{\cancel{10}_{1}}\left(\frac{\cancel{10}^{\,1}}{1}\right)$$

$$\frac{10}{5}y + 30 = \frac{70}{10}$$

$$2y + 30 = 7$$

$$\quad -30 \quad -30$$

$$2y = -23$$

$$\frac{2y}{2} = \frac{-23}{2}$$

$$y = -\frac{23}{2}$$

$$\boxed{\left\{-\frac{23}{2}\right\}}$$

Ex: Solve. $\frac{1}{4}x - \frac{2}{5}x + 4 - \frac{5}{2} = 6x - \frac{2}{3}$

LCD: 60

$$\left(\frac{\cancel{60}^{\,15}}{1}\right)\frac{1}{\cancel{4}_{1}}x - \frac{2}{\cancel{5}_{1}}x\left(\frac{\cancel{60}^{\,12}}{1}\right) + 4(60) - \frac{5}{\cancel{2}_{1}}\left(\frac{\cancel{60}^{\,30}}{1}\right) = 6x(60) - \frac{2}{\cancel{3}_{1}}\left(\frac{\cancel{60}^{\,20}}{1}\right)$$

$$15x - 24x + 240 - 150 = 360x - 40$$

$$-9x + 90 = 360x - 40$$

$$-9x - 360x = -40 - 90$$

$$-369x = -130$$

see next page

Previous example cont'd:

$$-369x = -130$$

$$\frac{-369x}{-369} = \frac{-130}{-369}$$

$$x = \frac{130}{369}$$

$\Rightarrow$ (doesn't reduce)

130 is divisible by 2, 5, 10, 13

$(130 = 10 \cdot 13)$

2, 5, 10 don't go into 369

Only option for reducing is 13

$$\begin{array}{r} 28 \\ 13\overline{)369} \\ \underline{26} \\ 109 \\ \underline{104} \\ 5 \end{array}$$

doesn't work

$$\begin{array}{r} \overset{2}{1}3 \\ \times 7 \\ \hline 91 \end{array} \qquad \begin{array}{r} \overset{2}{1}3 \\ \times 8 \\ \hline 104 \end{array}$$

$$\boxed{\left\{ \frac{130}{369} \right\}}$$