

Homework Q5

Note Title

1/31/2018

$$\underline{1.5 \# 115} \quad \frac{1}{2}(10q-2) + \frac{1}{3}(2-3q)$$

$$= \frac{1}{2}(\frac{10q}{1}) + \frac{1}{2}(\frac{-2}{1}) + \frac{1}{3}(\frac{2}{1}) + \frac{1}{3}(\frac{-3q}{1})$$

$$= \frac{10q}{2} - \frac{2}{2} + \frac{2}{3} - \frac{3q}{3}$$

$$= 5q - 1 + \frac{2}{3} - q$$

$$= 4q - \frac{1}{1}(\frac{3}{3}) + \frac{2}{3}$$

$$= 4q - \frac{3}{3} + \frac{2}{3} = \boxed{4q - \frac{1}{3}}$$

$$\begin{array}{r} 15 \\ \times 11 \\ \hline 15 \\ 15 \\ \hline 165 \end{array}$$

$$\underline{1.5 \# 95} \quad \frac{2}{5} \cdot \frac{1}{3} \cdot \left(-\frac{10}{11}\right) = \frac{2}{15} \cdot \left(-\frac{10}{11}\right)$$

$$= -\frac{20}{165} \div 5$$

$$= \boxed{-\frac{4}{33}}$$

2.1: Additive and Multiplicative Properties of Equality

2.1.1

An equation is a statement that two values are equal. It has an equals sign.

A solution for the equation is a value of the variable that makes the equation true.

To solve an equation means to find the solution(s).

Example: Is 3 a solution to $2y - 5 = 11$?

Substitute $y=3$: $2(3) - 5 = 11$

$$6 - 5 = 11$$

$$1 = 11 \text{ False!}$$

No, 3 is not a solution.

Ex: Is 8 a solution to $2y - 5 = 11$?

$$y = 8 \Rightarrow$$

"implies,
leads to"

$$2(8) - 5 = 11$$

$$16 - 5 = 11$$

$$11 = 11 \text{ True!}$$

Yes, this is a solution

Additive property of Equality

2.1.2

If $a=b$, then $a+c=b+c$

This means we can add (or subtract) the same quantity on both sides.

Example: Solve.

$$x - 7 = 15$$

$$x - 7 + 7 = 15 + 7$$

$$x + 0 = 22$$

$$x = 22$$

We want to isolate the variable.

Solution Set:

$$\boxed{\{22\}}$$

Solution set: the set of solutions to an equation.
It is written with curly brackets $\{ \}$.

Two equations are equivalent if they have the same solution set. When solving an equation, you should have a sequence of equivalent equations.

Note: Expressions get simplified.
Equations get solved.

Ex: Solve.

$$3x + 8 = 2x - 9$$

$$1x + 8 = -9$$

$$-8 \quad -8$$

$$x = -17$$

Sol'n Set:

$$\boxed{\{-17\}}$$

Multiplicative Property of Equality

2.1.3

If $a = b$, then $ac = bc$ for $c \neq 0$.

This means we can multiply (or divide) both sides by the same nonzero number.

So, we also have: if $a = b$, then $\frac{a}{c} = \frac{b}{c}$ for $c \neq 0$.

Ex: Solve.

$$9x = 45$$

$$\frac{9x}{9} = \frac{45}{9}$$

$$x = 5$$

Sol'n set:

$\{5\}$

Ex: Solve.

$$-8x + 1 = 25$$

$$-8x = 24$$

$$\frac{-8x}{-8} = \frac{24}{-8}$$

$$x = -3$$

Sol'n set:

$\{-3\}$

Check: ^{Substitute}
 $x = -3$ into $-8x + 1 = 25$
 $-8(-3) + 1 = 25$
 $24 + 1 = 25$
 $25 = 25$ ✓

Ex: Solve.

$$-\frac{2}{3}y = 7$$

$$\frac{-\frac{2}{3}y}{-\frac{2}{3}} = \frac{7}{-\frac{2}{3}}$$

$$\left(-\frac{2}{3}y\right)\left(-\frac{3}{2}\right) = \frac{7}{1}\left(-\frac{3}{2}\right)$$

$$y = -\frac{21}{2}$$

$$y = -\frac{21}{2}$$

$$y = -\frac{21}{2} = -10\frac{1}{2}$$

Recall:

Dividing by a number is equivalent to multiplying by its reciprocal.

Sol'n set: $\{-\frac{21}{2}\}$

or $\{-10\frac{1}{2}\}$

Ex: Solve.

$$-\frac{4}{3}x = -\frac{5}{7}$$

$$\frac{-\frac{4}{3}x}{-\frac{4}{3}} = \frac{-\frac{5}{7}}{-\frac{4}{3}}$$

$$-\frac{3}{4} \left(-\frac{4}{3}x \right) = \left(-\frac{5}{7} \right) \left(-\frac{3}{4} \right)$$

$$x = +\frac{15}{28}$$

Sol'n Set:
 $\left\{ \frac{15}{28} \right\}$

Ex: Solve.

$$3x + \frac{1}{8} = \frac{5}{8}$$

$$-\frac{1}{8} \quad -\frac{1}{8}$$

$$3x = \frac{5}{8} - \frac{1}{8}$$

$$3x = \frac{4}{8}$$

$$3x = \frac{1}{2}$$

$$\frac{3x}{3} = \frac{\frac{1}{2}}{3}$$

$$x = \frac{1}{2} \left(\frac{1}{3} \right)$$

$$x = \frac{1}{6}$$

Sol'n Set:

$\left\{ \frac{1}{6} \right\}$

Ex: Solve.

$$3x + 1 = 5$$

$$3x = 5 - 1$$

$$3x = 4$$

$$\frac{3x}{3} = \frac{4}{3}$$

$$x = \frac{4}{3}$$

Sol'n Set: $\left\{ \frac{4}{3} \right\}$

2.2: Solving Linear Equations

2.2.1

A linear equation has the variable to the 1st power only. (can be rearranged to get $ax+b=c$ or similar)

Ex: $-5 - 2(y-5) = 4y - 2(y+4) - 3$ Solve.

$$-5 - 2y + 10 = 4y - 2y - 8 - 3$$

$$\begin{array}{c} -2y + 5 \\ +2y \end{array} = \begin{array}{c} 2y - 11 \\ +2y \end{array}$$

$$5 = 2y + 2y - 11$$

$$\begin{array}{c} 5 \\ +11 \end{array} = \begin{array}{c} 4y - 11 \\ +11 \end{array}$$

$$5 + 11 = 4y$$

$$16 = 4y$$

$$\frac{16}{4} = \frac{4y}{4}$$

$$4 = y$$

Sol'n Set:

$$\boxed{\{4\}}$$

Ex: Solve.

$$4(7x-2) = 2(14x-1)$$

$$\begin{array}{c} 28x - 8 \\ -28x \end{array} = \begin{array}{c} 28x - 2 \\ -28x \end{array}$$

$$\begin{array}{c} -8 \\ +2 \end{array} = \begin{array}{c} -2 \\ +2 \end{array}$$

$$-6 = 0$$

False!

False!

This is called a contradiction

No solution

Ex: Solve.

2.2.2

$$-2(3-x) + 5x = 7x - 6$$

$$-6 + 2x + 5x = 7x - 6$$

$$-6 + 7x = 7x - 6 \quad \text{True for every } x$$

$$-6 = -6$$

$$0 = 0 \quad \text{True for every } x$$

This is
called an
identity

Sol'n set:

all real numbers

If you get just one solution, it's a
conditional equation.