Homework Qs

Note Title 6/7/2017

1.5 # 103

$8 - 2^3 \cdot 5 + 3 - (-6)$

$= 8 - 8 \cdot 5 + 3 + 6$

$= 8 - 40 + 3 + 6$

$= -32 + 9$

$= \boxed{-23}$

Note:

$-3^2 = -(3)(3) = -9$

$(-3)^2 = (-3)(-3) = 9$

$-3^3 = -(3)(3)(3) = \boxed{-27}$

$(-3)^3 = (-3)(-3)(-3)$

$= 9(-3) = \boxed{-27}$

1.6: Simplifying Expressions

Variable: represents an unknown number

Expression: numbers and variables combined using arithmetic operations

Examples of expressions:

$x + 5$ (5 more than the unknown number)

$2x - 8$

$x^2 - 5y$

Ex: Evaluate the expression

$-5x + 8y + 2$ for the values

$x = -2$ and $y = 6$.

substitute $x = -2, y = 6$:

$-5(-2) + 8(6) + 2$

$= 10 + 48 + 2$

$= 58 + 2$

$= \boxed{60}$

When simplifying expressions, we can combine like terms by adding the coefficients.

Terms: expressions being added

Factors: expressions being multiplied

Like terms: have the same variable(s) with the same exponents.

Constant term: term with no variable

Coefficient: numerical factor in a term

Example: $x^2 + 5x + 2$

This expression has 3 terms.

The constant term (or constant, or constant coefficient) is 2.

The coefficient of x is 5.

The coefficient of x^2 is 1.

Ex.: $6 - 12x^2 + 8xy - y^2$

Constant: 6

4 terms

coefficient of x^2 is -12.

coefficient of xy is 8.

coefficient of y^2 is -1.

No like terms here. It is completely simplified.

Ex.: Simplify.

$$-2x - 5 + 17 - 3x^2 + 8x + 1 + x^2$$

$$= -3x^2 + 1x^2 - 2x + 8x - 5 + 17 + 1$$

$$= \boxed{-2x^2 + 6x + 13}$$

Note: $\left.\begin{array}{l} 13 - 2x^2 + 6x \\ 13 + 6x - 2x^2 \\ 6x - 2x^2 + 13 \end{array}\right\}$ also correct.

Ex: Simplify.

$$2(6-7x+5x^2)-4(12-2x)$$

$$= 12 - 14x + 10x^2 - 48 + 8x$$

$$= \boxed{10x^2 - 6x - 36}$$

Recall:

Distributive property of numbers:

$$a(b+c) = ab + ac$$

Also

$$(b+c)(a) = ba + ca$$
$$= ab + ac$$

Ex:

$$3(2+5) = 3(2) + 3(5)$$
$$= 6 + 15$$
$$= \boxed{21}$$

Same as

$$3(2+5) = 3(7) = 21$$

Ex: $\frac{3}{4}x^2 - \frac{2}{3}x + \frac{1}{5} - 1 - \frac{2}{3}x^2 + \frac{1}{4}$

$$\frac{3}{4}x^2 - \frac{2}{3}x^2 - \frac{2}{3}x + \frac{1}{5} - 1 + \frac{1}{4}$$

$$\left(\frac{3}{3}\right)\frac{3}{4}x^2 - \frac{2}{3}x^2\left(\frac{4}{4}\right) - \frac{2}{3}x + \frac{1}{5}\left(\frac{4}{4}\right) - \frac{1}{1}\left(\frac{20}{20}\right) + \frac{1}{4}\left(\frac{5}{5}\right)$$

$$\frac{9}{12}x^2 - \frac{8}{12}x^2 - \frac{2}{3}x + \frac{4}{20} - \frac{20}{20} + \frac{5}{20}$$

$$\boxed{\frac{1}{12}x^2 - \frac{2}{3}x - \frac{11}{20}}$$

Ex: Simplify.

$$-\frac{2}{3}\left(x-\frac{1}{2}\right)-\frac{3}{4}\left(2x^2-\frac{1}{2}x+4\right)$$

$$=-\frac{2}{3}x-\frac{2}{3}\left(-\frac{1}{2}\right)-\frac{3}{4}\left(\frac{2x^2}{1}\right)-\frac{3}{4}\left(-\frac{1}{2}x\right)-\frac{3}{4}\left(\frac{4}{1}\right)$$

$$=-\frac{2}{3}x+\frac{2}{6}-\frac{6x^2}{4}+\frac{3}{8}x-\frac{12}{4}$$

$$=-\frac{2}{3}x+\frac{1}{3}-\frac{3x^2}{2}+\frac{3}{8}x-3$$

$$=-\frac{3x^2}{2}-\frac{2}{3}x\left(\frac{8}{8}\right)+\frac{3}{8}x\left(\frac{3}{3}\right)+\frac{1}{3}-\frac{3}{1}\left(\frac{3}{3}\right)$$

$$=-\frac{3x^2}{2}-\frac{16}{24}x+\frac{9}{24}x+\frac{1}{3}-\frac{9}{3}$$

$$=\boxed{-\frac{3x^2}{2}-\frac{7}{24}x-\frac{8}{3}} \quad \text{OR} \quad \boxed{-\frac{3}{2}x^2-\frac{7}{24}x-\frac{8}{3}}$$

$$\text{OR} \quad \boxed{-\frac{3x^2}{2}-\frac{7x}{24}-\frac{8}{3}}$$

Note:

Why is $-\frac{7x}{24}$ equal to $-\frac{7}{24}x$?

$$-\frac{7}{24}x=-\frac{7}{24}\cdot\frac{x}{1}=\frac{-7x}{24}$$

<u>Never</u> write $-\frac{7}{24\ x}$ or $-7/24x$

2.1: Addition, ~~Subtraction~~, and Multiplication properties of equality.

Ex: Suppose $x+7=10$.
what value of x makes this equation true? 3

An equation is a statement composed of two expressions joined by an equals sign.

A value is a solution to an equation if it makes the equation true.

To solve an equation means to find all the solutions.

The group of all solutions is the solution set.

Additive Property of Equality

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

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

Ex: Solve.

$$5+y=18$$
$$-5 \qquad -5$$
$$0+y=13$$
$$y=13$$

Solution Set: $\boxed{\{13\}}$

Ex: Solve.

$$-8+x=-19$$
$$+8 \qquad +8$$
$$x=-11$$

Sol'n set: $\boxed{\{-11\}}$

Check: $-8+(-11)=-19$
$-8-11=-19$
$-19=-19$ ✓

Note: Expressions get simplified.
Equations get solved.

Ex: Solve.

$$2x - 7 = 6 + 3x$$
$-2x \qquad -2x$
$$-7 = 6 + 3x - 2x$$
$$-7 = 6 + x$$
$-6 \qquad -6$
$$-7 - 6 = x$$
$$-13 = x$$

OR

$$2x - 7 = 6 + 3x$$
$-3x \qquad -3x$
$$2x - 3x - 7 = 6$$
$$-x - 7 = 6$$
$+7 \qquad +7$
$$-x = 6 + 7$$
$$-x = 13$$
so $x = -13$

Solution set: $\boxed{\{-13\}}$

Multiplicative Property of Equality

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

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

Ex: Solve.

$$3x = 12$$
$$\frac{3x}{3} = \frac{12}{3}$$
$$x = 4$$

Sol'n Set: $\boxed{\{4\}}$

Ex: Solve.

$$5(x-3) = 25$$

$$5x - 15 = 25$$

$$\quad +15 \qquad +15$$

$$5x = 40$$

$$\frac{5x}{5} = \frac{40}{5}$$

$$x = 8$$

Sol'n set: $\boxed{\{8\}}$

Ex: Solve.

$$6 - 12x = 5x - 10$$

$$\quad -5x \qquad -5x$$

$$6 - 17x = -10$$

$$-6 \qquad\qquad -6$$

$$-17x = -16$$

$$\frac{-17x}{-17} = \frac{-16}{-17}$$

$$x = \frac{16}{17}$$

Sol'n set: $\boxed{\left\{\frac{16}{17}\right\}}$