FEBRUARY 19, 2016

UNIT 5:   LINEAR EQUATIONS AND
**   INEQUALITIES**

SECTION 6.2:
SOLVING EQUATIONS BY
USING BALANCE
STRATEGIES

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MATH 9

WHAT'S THE POINT OF TODAY'S LESSON?

We will continue working on the Math 9 Specific Curriculum Outcome (SCO) "Patterns and Relations 3" OR "PR3" which states:

"Model and solve problems using linear equations in a variety of forms ($ax = b$; $ax + b = c$; $ax + b = cx + d$; $a(bx + c) = d (ex + f)$ etc.) concretely, pictorially and symbolically where a, b, c, d, e and f are rational numbers."

WARM UP - SOLVE AND VERIFY THE FOLLOWING EQUATION:

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

$$5x - 15 = 2x + 12$$

$$5x - 2x - 15 = 2x - 2x + 12$$

$$3x - 15 = 12$$

$$3x - 15 + 15 = 12 + 15 \quad *$$

$$\frac{3x}{3} = \frac{27}{3} \quad *$$

$$x = 9$$

Simplifying

Solving

LS	RS
$5(x-3)$	$2(x+6)$
$5(9-3)$	$2(9+6)$
$5(6)$	$2(15)$
30	30

$$LS = RS \therefore x = 9.$$

HOMEWORK QUESTIONS???
(page 281, #10, #11 and #13)

a e g
c
     f (both)

10. a) $-12a = 15 - 15a$

$-12a + 15a = 15 - \cancel{15a + 15a}$

$\dfrac{3a}{3} = \dfrac{15}{3}$

$a = 5$

HOMEWORK QUESTIONS???
(page 281, #10, #11 and #13)

10. c) $-10.8 + 7z = 5z$

$-10.8 + 7z - 5z = 5z - 5z$

$-10.8 + 2z = 0$

$2z = 10.8$

$z = 5.4$

11. a) $2 - 3n = 2n + 7$

$2 - 3n + 3n = 2n + 3n + 7$

$2 = 5n + 7$

$-5 = 5n$

$-1 = n$

HOMEWORK QUESTIONS???
(page 281, #10, #11 and #13)

11. d) $8.8v + 2.1 = 2.3v - 16.1$

$8.8v - 2.3v + 2.1 = 2.3v - 2.3v - 16.1$

$6.5v + 2.1 = -16.1$

$6.5v = -18.2$

$v = -2.8$

11. f) $6.4 - 9.3b = 25.3 - 3.9b$

$6.4 - 9.3b + 9.3b = 25.3 - 3.9b + 9.3b$

$6.4 = 25.3 + 5.4b$

$-18.9 = 5.4b$

$-3.5 = b$

LS	RS
$6.4 - 9.3b$	$25.3 - 3.9b$
$6.4 - 9.3(-3.5)$	$25.3 - 3.9(-3.5)$
$6.4 + 32.55$	$25.3 + 13.65$
38.95	38.95

$LS = RS \therefore b = -3.5.$

SIMPLIFYING PRIOR TO SOLVING EQUATIONS:

THERE ARE 3 SITUATIONS THAT MAY ARISE EITHER INDIVIDUALLY OR IN COMBINATION THAT YOU WILL HAVE TO DO PRIOR TO SOLVING SOME EQUATIONS (i.e. prior to working with SAMDEB):

1. **Grouping LIKE TERMS:**
   - **on one or both sides of an equation**
   - **like terms containing variables must end up on the same side of an equation**

Grouping LIKE TERMS - Examples:

i.

$$4x + 2x = 12$$

$$\frac{6x}{6} = \frac{12}{6}$$

$$x = 2$$

ii.

$$5y + 3 = 2y + 19 + y$$

$$5y + 3 = 3y + 19$$

$$5y - 3y + 3 = 3y - 3y + 19$$

$$2y + 3 = 19$$

$$2y + 3 - 3 = 19 - 3$$

$$\frac{2y}{2} = \frac{16}{2}$$

$$y = 8$$

2. Performing the DISTRIBUTIVE PROPERTY:

➝ this is generally done prior to solving an equation (ie: prior to working with "SAMDEB")

➝ Examples:

i.

$$4(m+5)=16$$
$$4m+20=16$$
$$4m+20-20=16-20$$
$$\frac{4m}{4}=\frac{-4}{4}$$
$$m=-1$$

ii.

$$3(p-1) = 5(p+7)$$
$$3p - 3 = 5p + 35$$
$$3p - 3p - 3 = 5p - 3p + 35$$
$$-3 = 2p + 35$$
$$-3 - 35 = 2p + 35 - 35$$
$$\frac{-38}{2} = \frac{2p}{2}$$
$$-19 = p$$

3. ELIMINATING FRACTIONS using the denominators' lowest common multiple (LCM); multiply **EACH** term in the equation by the LCM.

➤ again, this is generally done prior to solving an equation (ie: prior to working with "SAMDEB")

➤ Examples:

i.

$$\frac{1}{4} = \frac{1}{4}x - \frac{3}{4} \qquad \text{LCM} = 4$$

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

$$1 = x - 3$$

$$1 + 3 = x - 3 + 3 \quad \text{✳}$$

$$4 = x$$

ii.

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

LCM = 10

$$10\left(\frac{3}{2}\right) = 10\left(\frac{-1}{5}y\right) + 10\left(\frac{1}{2}\right)$$

$$15 = -2y + 5$$

$$15 - 5 = -2y + 5 - 5$$

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

$$-5 = y$$

iii.

$$\frac{24}{x} = 36 \,, x \neq 0$$

$$\frac{\overset{1}{\cancel{x}}}{1}\left(\frac{24}{\cancel{x}}\right) = x(36)$$

$$\frac{24}{36} = \frac{\cancel{36}x}{\cancel{36}}$$

$$\frac{24}{36} = x$$

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

$$\frac{5}{5} = 1 \Bigg\} \quad \frac{x}{x} = 1$$

$$GCF = 12$$

MY PERSONAL PREFERENCE WITH REGARDS TO THE ORDER IN WHICH I PERFORM THESE STEPS (DEGSAMDEB):

1. **DISTRIBUTIVE PROPERTY**

2. **ELIMINATE FRACTIONS**

3. **GROUP LIKE TERMS**

4. **SOLVE**

AN EXAMPLE COMBINING ALL 3 STEPS:

SOLVE AND CHECK:

$$\frac{4(r + 5)}{3} = 6 + 2r$$

$$\frac{4r + 20}{3} = 6 + 2r$$

$$\frac{3}{1}\left(\frac{4r + 20}{3}\right) = 3(6) + 3(2r)$$

$$4r + 20 = 18 + 6r$$

$$4r - 4r + 20 = 18 + 6r - 4r$$

$$20 = 18 + 2r$$

$$2 = 2r$$

$$1 = r$$

CONCEPT REINFORCEMENT:

MMS9:
Page 281:   #8
Page 282:   #20
Page 283:   #21

Remember to check your answers in the back of the book as part of your homework. The answers for this section begin on .