1.08 Equation Solving

Basic Algebra: One Step at a Time. **Page 45-55: #32, 33, 34, 35, 48, 49, 50, 51, 57.**

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Strategy Summary: Equation Solving

Step 1: If there are parentheses in the problem, eliminate them by use of the distributive property.

Step 2: Combine like terms (if possible) on each side of the equal sign.

Step 3: Using the "principle of opposites," get all variable terms to one side of the equation.

Step 4: Using the "principle of opposites," get all number terms to the <u>other</u> side of the equation.

Step 5: Divide both sides of the equation by the coefficient of the variable--that is, the number times the variable. (Or multiply both sides times the reciprocal of the coefficient.) If the coefficient is positive, divide by a positive number. If the coefficient is negative, divide by a negative number. The coefficient of the variable MUST be a positive one (+1) when you are finished.

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p. 45-55: Solve for *x*:

32. $-3(2-x)+2(3x+5)=31$

 Step 1: Remove parentheses by distributive property.

$$-6+3x+6x+10=31$$

 Step 2: Combine like terms on the left side.

$$9x+4=31$$

Step 4: Get all number terms on the right side by subtracting 4.

$$9x+4=31$$
$$\underline{-4\ -4}$$
$$9x\ =27$$

Step 5: Divide both sides by 9.

$$\frac{9x}{9}=\frac{27}{9}$$

$$x=3$$

33. $4(2-3x)+4(2x-3)=4(x+1)$

 Step 1: Remove parentheses by distributive property.

$$8-12x+8x-12=4x+4$$

 Step 2: Combine like terms on the left side.

$$-4x-4=4x+4$$

Step 3: Get all variable terms on the left side by adding $-4x$.

$$-4x-4=4x+4$$
$$\underline{-4x-4x}$$
$$-8x-4=4$$

Step 4: Get all number terms on the right side by adding 4.

$$-8x-4=4$$
$$\underline{+4\ +4}$$
$$-8x\ =8$$

Step 5: Divide both sides by -8.

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

$$x=-1$$

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34. $3(x - 6) - 5(x - 10) = 24$

Step 1: Remove parentheses by distributive property.

$3x - 18 - 5x + 50 = 24$

Step 2: Combine like terms on the left side.

$-2x + 32 = 24$

Step 3: All the variable terms are already on the left side .

Step 4: Get all number terms on the right side by subtracting 32 from each side.

$$-2x + 32 = 24$$
$$\underline{\quad - 32 \quad - 32}$$
$$- 2x \ = \ -8$$

Step 5: Divide both sides by -2.

$$\frac{-2x}{-2} = \frac{-8}{-2}$$

$$x = 4$$

35. $3x - 5(2x - 6) = 9(2 - x)$

Step 1: Remove parentheses by distributive property.

$3x - 10x + 30 = 18 - 9x$

Step 2: Combine like terms on the left side.

$-7x + 30 = 18 - 9x$

Step 3: Get all the variable terms on the left side by adding +9x to each side.

$-7x + 30 = 18 - 9x$
$\underline{+9x \qquad\quad +9x}$
$2x + 30 = 18$

Step 4: Get all number terms on the right side by subtracting 30 from each side.

$2x + 30 = 18$
$\underline{-30 \quad -30}$
$2x = -12$

Step 5: Divide both sides by 2.

$$\frac{2x}{2} = \frac{-12}{2}$$

$x = -6$

48. $8d + 4 = 2d$

Get all variable terms on the right side by adding $-8d$ to each side.

$$8d + 4 = 2d$$
$$\underline{-8d \qquad -8d}$$
$$4 = -6d$$

$$-6d = 4$$

Divide both sides by -6.

$$\frac{-6d}{-6} = \frac{4}{-6}$$

$$x = \frac{-2}{3} \quad or \quad -\frac{2}{3}$$

49. $3c - 5c = 9 + 4c$

Combine like terms on the left side.

$$-2c = 9 + 4c$$

Get all variable terms on the left side by adding $-4c$ .to each side.

$$-2c = 9 + 4c$$
$$\underline{-4c \qquad -4c}$$
$$-6x = 9$$

Divide both sides by -6.

$$\frac{-6c}{-6} = \frac{9}{-6}$$

$$c = -\frac{3}{2}$$

50. $4z - (z - 8) = 0$

Remove parentheses by distributive property.

$$4z - z + 8 = 0$$

Combine like terms on the left side.

$$3x + 8 = 0$$

Get all number terms on the right side by subtracting 8 from each side.

$$
\begin{array}{rcl}
3x + 8 & = & 0 \\
\underline{-8} & & \underline{-8} \\
3x & = & -8
\end{array}
$$

Divide both sides by 3.

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

$$x = \frac{-8}{3} \quad \text{or} \quad -\frac{8}{3}$$

51. $5 - 3(f - 4) = 13$

Remove parentheses by distributive property.

$$5 - 3f + 12 = 13$$

Combine like terms on the left side.

$$-3f + 17 = 13$$

Get all number terms on the right side by subtracting 17 from each side.

$$
\begin{array}{rcl}
-3f + 17 & = & 13 \\
\underline{-17} & & \underline{-17} \\
-3f & = & -4
\end{array}
$$

Divide both sides by -3.

$$\frac{-3f}{-3} = \frac{-4}{-3}$$

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

57. $j(j+3) = 4 - j(2-j)$

Remove parentheses by distributive property.

$$j^2 + 3j = 4 - 2j + j^2$$

There are NO like terms to combine on either side, and you have a j^2 term on each side. Fortunately, if you add $-j^2$ to each side, these will all subtract out!

$$j^2 + 3j = 4 - 2j + j^2$$
$$\underline{-j^2 \qquad\qquad\quad - j^2}$$
$$3j = 4 - 2j$$

Get all variable terms on the right side by adding 2j to each side.

$$3j = 4 - 2j$$
$$\underline{+2j \qquad + 2j}$$
$$5j = 4$$

Divide both sides by 5.

$$\frac{5j}{5} = \frac{4}{5}$$

$$j = \frac{4}{5}$$