

## CHAPTER 3

### Linear Equations

#### 3.1 Simplifying Expressions

1)  $245 = 60t + 95$   
 $245 - 95 = 60t + 95 - 95$  Subtract 95 from both sides of equation  
 $150 = 60t$  Combine like terms  
 $\frac{150}{60} = \frac{60t}{60}$  Divide both sides of equation by 60  
 $\frac{150}{60} = t$   
 $t = \frac{150}{60} = \frac{5}{2} = 2.5$

The variable is usually written on the left side of the equation and the solution is simplified.

3)  $8 = 2x - 6$   
 $8 + 6 = 2x - 6 + 6$  Add 6 to both sides of equation  
 $14 = 2x$  Combine like terms  
 $\frac{14}{2} = \frac{2x}{2}$  Divide both sides of equation by 2  
 $x = 7$

5)  $1.8b - 3.4 = -10.2$   
 $1.8b - 3.4 + 3.4 = -10.2 + 3.4$  Add 3.4 to both sides of equation  
 $1.8b = -6.8$  Combine like terms  
 $\frac{1.8b}{1.8} = \frac{-6.8}{1.8}$  Divide both sides of equation by 1.8  
 $b = \frac{-6.8}{1.8} = -\frac{34}{9}$

Enter  $-6.8/1.8$  on the TI calculator. Hit **ENTER**. Then hit **MATH** **1** **ENTER**

7)  $11x = 20x - 18$   
 $11x - 20x = 20x - 18 - 20x$  Subtract  $20x$  from both sides of equation  
 $-9x = -18$  Combine like terms  
 $\frac{-9x}{-9} = \frac{-18}{-9}$  Divide both sides of equation by  $-9$   
 $x = 2$

9)  $3x + 20 = 6x + 2$  Original Equation  
 $3x + 20 - 20 = 6x + 2 - 20$  Subtract 20 (or add  $-20$ ) to both sides of equation  
 $3x = 6x - 18$  Combine like terms

$$\begin{aligned}
3x - 6x &= 6x - 18 - 6x \\
-3x &= -18 \\
\frac{-3x}{-3} &= \frac{-18}{-3} \\
x &= 6
\end{aligned}$$

Subtract  $6x$  (or add  $-6x$ ) to both sides of equation  
Combine like terms

Divide both sides of equation by  $-3$

- a) Membership to both clubs costs the same when exactly 6 visits per month are made.

$$\begin{aligned}
11) \quad \frac{x}{3} - 7 &= 9 + x \\
\frac{x}{3} - 7 - x &= 9 + x - x \\
-\frac{2}{3}x - 7 &= 9 \\
-\frac{2}{3}x - 7 + 7 &= 9 + 7 \\
-\frac{2}{3}x &= 16 \\
\left(-\frac{3}{2}\right) -\frac{2}{3}x &= \left(-\frac{3}{2}\right) 16 \\
x &= -24
\end{aligned}$$

Subtract  $x$  from both sides of equation

Combine like terms

Add 7 to both sides of equation

Combine like terms

Multiply both sides of equation by  $-\frac{3}{2}$

Simplify to obtain solution

$$\begin{aligned}
13) \quad \frac{1}{3}x - \frac{2}{3} &= x - \frac{1}{2} \\
\frac{1}{3}x - \frac{2}{3} - 1x &= 1x - \frac{1}{2} - 1x \\
\frac{1}{3}x - \frac{2}{3} - \frac{3}{3}x &= 1x - \frac{1}{2} - 1x \\
-\frac{2}{3}x - \frac{2}{3} &= -\frac{1}{2} \\
-\frac{2}{3}x - \frac{2}{3} + \frac{2}{3} &= -\frac{1}{2} + \frac{2}{3} \\
-\frac{2}{3}x - \frac{2}{3} + \frac{2}{3} &= -\frac{1}{2} + \frac{4}{6} \\
-\frac{2}{3}x &= \frac{1}{6} \\
\frac{-3}{2} \frac{-2}{3}x &= \frac{-3}{2} \frac{1}{6} \\
x &= -\frac{3}{12} = -\frac{1}{4} = -0.25
\end{aligned}$$

Subtract  $1x$  from both sides of equation

Write like terms with a common denominator

Combine like terms

Add  $\frac{2}{3}$  to both sides of equation

Write like terms with a common denominator

Combine like terms

Multiply both sides of equation by  $-\frac{3}{2}$

- 15) a) Let  $h$  be the hours of Internet use.

Charges:

Provider 1:  $12 + 2h$

Provider 2:  $15 + 1.5h$

b)  $12 + 2h = 15 + 1.5h$

- c)  $12 + 2h = 15 + 1.5h$   
 $12 + 2h - 1.5h = 15 + 1.5h - 1.5h$  Subtract  $1.5h$  from both sides  
 $12 + 0.5h = 15$  Combine like terms  
 $12 + 0.5h - 12 = 15 - 12$  Subtract 12 from both sides  
 $0.5h = 3$  Combine like terms  
 $\frac{0.5h}{0.5} = \frac{3}{0.5}$  Divide both sides by 0.5  
 $h = 6$
- d) Both Internet providers will charge the same amount for 6 hours of Internet use.

### Skill and Review

Order of Operations—(from Section 2.1)—Steps 1-4: PEMDAS:

1. (P) Do operations inside grouping symbols first
2. (E) Evaluate exponents and roots from left to right
3. (MD) Perform multiplication & division from left to right
4. (AS) Perform addition & subtraction from left to right

17)  $\frac{12 + 4}{7 - (-5)} = \frac{16}{7 + 5} = \frac{16}{12} = \frac{4}{3}$

- 19) 98 is slightly less than  $100 = 10^2$ , so a good estimate for  $\sqrt{98}$  is about 9.9 or 9.8.