IM2 Problem Set 4.1 - Linear Relations & Functions

BIG PICTURE of this UNIT:	• What is meant by the term FUNCTIONS and how do we work with them? • mastery with working with basics & applications of linear functions • mastery with working with basics & applications of linear systems • understanding basics of function concepts and apply them to lines & linear systems

Part 1 - Skills/Concepts Review

1. Solve the following linear equations:

   a. $3x + 6 = 12$ b. $5 - 2x = 11$ c. $4x - 8 = 12$ d. $-6x + 8 = -10$

2. Solve the following linear equations:

   a. $9x + 2 = 11x - 10$ b. $-3(x + 1) - 2 = 4x - 5(x - 3)$ c. $2(x + 5) = 4(x + 2) - 4$

3. Solve the following linear equations:

   a. $\frac{3}{4}x + \frac{2}{3} = 2$ b. $-\frac{4}{5}x + \frac{2}{3} = 1\frac{3}{4}x + 2$ c. $\frac{4+x}{3} + 4 = \frac{x-6}{2} - 6$

4. Solve each of the following equations for the variable indicated:

   a. $P = 2L + 2W$; solve for L
   b. $A = P + Prt$; solve for t
   c. $A = P + Prt$; solve for P
   d. $V = \pi r^2 h$; solve for h
   e. $8x - 4y = 12$, solve for x
   f. $C = \frac{5}{9}(F - 32)$; solve for F

5. Evaluate each of the following when $x = -2$ and $y = 6$.

   a. $y - 2x$ b. $3xy$ c. $2x^2y + xy^2$ d. $\frac{x^2}{y+6}$ e. $(2x - y)(2x + y)$

6. Simplify the following expressions and then evaluate when $x = -2$ and $y = 3$.

   a. $(x + 3y) - (2x - 5y + 1)$ b. $3(x - xy + 3) - 4(x + xy + 7)$

Part 2 - Skills/Concepts Application Problems

7. Is $x = 3$ a solution to the equation $5(3x - 2) = 4 - (10 - 15x)$? If so, how do you know? If not, was is the solution to this equation?

8. A cell phone company offers a plan of \$25/month and \$0.10/min of talk. Let C represent the monthly costs for this phone plan and let n represent the number of minutes of talk used per month.

    a. Explain why this problem can be modeled with the linear relation $C = 25 + 0.10n$.
    b. Which variable is the independent variable? Which variable is the dependent variable?
    c. Evaluate for C when $n = 2$ hours.
    d. Solve the equation $C = 25 + 0.10n$ for n.
    e. Which variable is now the independent variable? Which variable is now the dependent variable?
    f. Use your new equation for evaluate for n when $C = 35$.

9. Ben has \$42.50 in quarters (worth \$0.25) and dimes (worth \$0.10).

    a. Write a linear relation expressing the total amount of money in terms of the number of quarters and the number of dimes.
    b. Write an equation to express the number of quarters in terms of the number of dimes.
    c. Write an equation to express the number of dimes in terms of the number of quarters.
    d. Use one of your equations to determine 4 possible combinations of quarters and dimes that Ben could have.

Part 3 - Extension Problems

10. Solve for x in the following equations:

    a. $\frac{5}{x} + 2y = 9$
    b. $3x^2 + 50 = 197$
    c. $(x - 4)^2 - 12 = 24$
    d. $\frac{3+y}{x} = -4$
    e. $\sqrt{x + 1} = 9$
    f. $2 - 8x^3 = 3$

11. The formula for finding the surface area of a cylinder is $S = 2\pi r^2 + 2\pi rh$.

    a. Solve for h in terms of S and r.
    b. Determine the height of a cylinder with a radius of 5 cm and a surface area of 300 cm^2.
    c. Solve for r in terms of the other variables.

HOMEWORK PROBLEMS:

1. Nelson 9, Chap 4.3, p221, Q7, 12
2. Nelson 9, chap 4.4, p237, Q7