GUIDED NOTES – 2.2 LINEAR EQUATIONS IN ONE VARIABLE

LEARNING OBJECTIVES

In this section, you will:

- Solve equations in one variable algebraically.
- Solve a rational equation.
- Find a linear equation.
- Given the equations of two lines, determine whether their graphs are parallel or perpendicular.
- Write the equation of a line parallel or perpendicular to a given line.

SOLVING LINEAR EQUATIONS IN ONE VARIABLE

- A linear equation in one variable is one that can be written in the form _____. The defining features of such an equation is that they only involve a variable of power _____, and when graphed they yield a straight _____.
- Briefly define the following types of equations, specifically in terms of how many solutions each has.
  - Identity Equation:
  - Conditional Equation:
  - Inconsistent Equation:
- Write out the 4 step procedure for using algebra to solve a linear equation in one variable, as described in this textbook section.

  1.

  2.

  3.

  4.

Try It: Read Example 1 in the text, then answer the following.

Solve the linear equation in one variable.

$$2x + 1 = -9$$

Try It: Read Example 2 in the text, then answer the following.

Solve the linear equation in one variable.

$$-2(3x - 1) + x = 14 - x$$

SOLVING A RATIONAL EQUATION

- A rational equation is an equation that involves at least one rational expression. What is a rational expression? Also, give at least one example of a rational expression.

- The key to solving a rational equation is to "clear" the fractions by multiplying both sides of the equation by the _____.

- Write out the 6 step procedure for solving a rational equation, as described in this textbook section.

  1.

  2.

3.

4.

5.

6.

Try It: Read Example 4 in the text, then answer the following.

Solve the rational equation.

$$\frac{2}{3x} = \frac{1}{4} - \frac{1}{6x}$$

Try It: Read Example 5 in the text, then answer the following.

Solve the rational equation. State the excluded values.

$$-\frac{5}{2x} + \frac{3}{4x} = -\frac{7}{4}$$

Try It: Read Example 6 in the text, then answer the following.

Solve the rational equation. State the excluded values.

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

Try It: Read Example 7 in the text, then answer the following.

Solve the rational equation. State the excluded values.

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

FINDING A LINEAR EQUATION

- Briefly describe what is meant by the *slope* of a line.

- What can we tell about a line that has:
  - positive slope?
  - negative slope?
- Give the formula for the slope of a line through two points, (x_1, y_1) and (x_2, y_2).

Try It: Read Example 8 in the text, then answer the following.

Find the slope of the line that passes through the points $(-2, 6)$ and $(1, 4)$.

- Give formulas for the following three forms of a linear equation in two variables.
  - Slope-Intercept Form:
  - Point-Slope Form:
  - Standard Form:

Try It: Read Example 10 in the text, then answer the following.

Given $m = 4$, find the equation of the line in slope-intercept form passing through the point $(2, 5)$.

Try It: Read Example 12 in the text, then answer the following.

Find the equation of the line in standard form with slope $m = -\frac{1}{3}$ and passing through the point $\left(1, \frac{1}{3}\right)$.

- Give the slope and formula for both horizontal and vertical lines.
  - Horizontal Line:
    - Slope:
    - Formula:
  - Vertical Line:
    - Slope:
    - Formula:

Try It: Read Example 13 in the text, then answer the following.

Find the equation of the line passing through $(-5, 2)$ and $(2, 2)$.

DETERMINING WHETHER GRAPHS OF LINES ARE PARALLEL OR PERPENDICULAR

- Given two lines, $y = m_1 x + b_1$ and $y = m_2 x + b_2$, describe how to determine whether the lines are parallel or perpendicular.
  - Parallel:
  - Perpendicular:

Try It: Read Example 14 in the text, then answer the following.

Determine whether the following two lines are parallel, perpendicular, or neither.

$$2y - x = 10 \quad \text{and} \quad 2y = x + 4$$

WRITING THE EQUATIONS OF LINES PARALLEL OR PERPENDICULAR TO A GIVEN LINE

- Write out the 3 step procedure for writing the equation of a line parallel or perpendicular to a given line, as described in this textbook section.

1.

2.

3.

Try It: Read Example 15 in the text, then answer the following.

Find the equation of the line parallel to $5x = 7 + y$ and passing through the point $(-1, -2)$.