Date ______________

Dear Family,

In Chapter 2, your child will study linear and absolute-value equations, inequalities, and functions.

An **equation** is a statement that two expressions are equal. The equation $5(1 - 2x) = -4x + 15$ is a **linear equation in one variable** because the variable $x$ is not in a radical, not in a denominator, not used as an exponent, and not raised to an exponent other than 1.

A **solution** to an equation is a value of the variable that makes the equation true. To solve a linear equation, isolate the variable on one side of the equation.

Many equations have only one solution. For example, the only solution to $x + 2 = 7$ is $x = 5$. An equation that is always true is called an **identity**. An equation that is never true is called a **contradiction.**

| | | |
|---|---|---|
| **Identity:** | $x + 2 = x + 2$ | Any value of $x$ is a solution. |
| **Contradiction:** | $x + 2 = x + 3$ | No value of $x$ is a solution. |

An **inequality** compares two expressions with $<$, $\leq$, $>$, $\geq$, or $\neq$. An inequality can be solved in the same way as an equation, except for one difference:

**Solving Linear Inequalities**

When you multiply or divide both sides of an inequality by a negative number, the inequality sign reverses direction.

**original inequality:** $10 > 3$ **multiplied by $-5$:** $-50 < -15$

the inequality sign reverses direction

A **ratio** relates two quantities, such as 2 to 5, or $\frac{2}{5}$. A **proportion** states that two ratios are equal, such as $\frac{2}{5} = \frac{12}{30}$. When a proportion contains a variable, you can solve it by using **cross products**: if $\frac{a}{b} = \frac{c}{d}$, then $a \cdot d = b \cdot c$. Ratios and proportions have many useful applications, including percents.

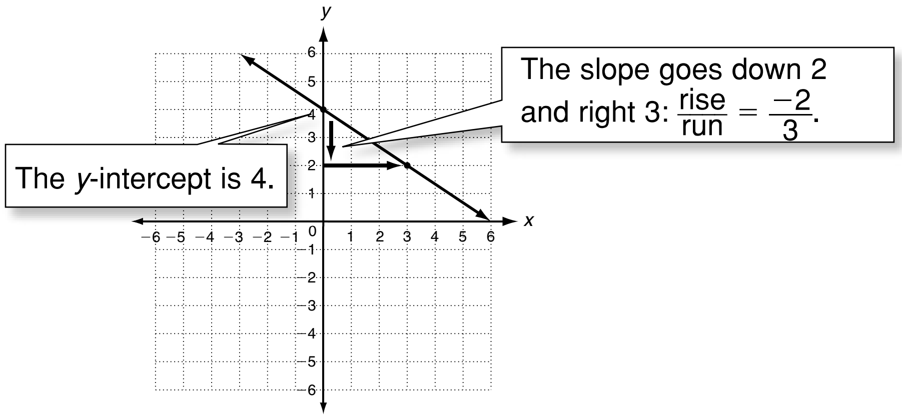
Chapter 1 introduced **linear functions**. Chapter 2 shows how linear functions can be written in two useful forms:

**Slope-intercept form:** $y = mx + b$
**Point-slope form:** $y - y_1 = m(x - x_1)$

Slope-intercept form highlights the slope $(m)$ and the $y$-intercept $(b)$, so it is helpful when graphing a linear function or writing the equation of a line.

$y = \underset{\text{slope}}{mx} + \underset{y\text{-int}}{b}$

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




**Linear inequalities in two variables,** such as $y > 2x - 4$, are graphed by first drawing either a dashed line (for $<$ or $>$) or a solid line (for $\leq$ or $\geq$). Then the region above or below that line is shaded to show which points satisfy the inequality.

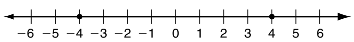
Chapter 1 also introduced transformations. In Chapter 2, your child will further investigate transformations of linear functions and summarize the transformations algebraically.

Real-world data sometimes show a linear relationship. If you calculate a **line of best fit**, then you can use it to make predictions about the data. In general, the study of relationships between variables is called **regression**.

The **absolute value** of a number $x$, written $|x|$, represents its distance from zero on a number line. The value of $x$ could be positive, negative, or zero, but its absolute value is always nonnegative. To solve an absolute value equation or inequality, you must consider each possibility.

$|x| = 4$

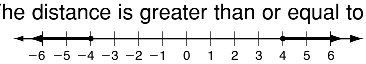
The distance from zero is 4.



$x = -4$ OR $x = 4$

$|x| \geq 4$

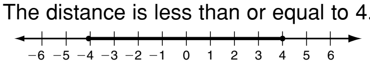
The distance is greater than or equal to 4.



$x \leq -4$ OR $x \geq 4$

$|x| \leq 4$

The distance is less than or equal to 4.



$x \geq -4$ AND $x \leq 4$

Because an absolute value is never negative, the graph of the **absolute-value function** $f(x) = |x|$ has two linear pieces that form a V shape with a vertex at (0, 0). As shown at right, a variety of absolute-value functions can be created by transforming $f(x) = |x|$.

For additional resources, visit go.hrw.com and enter the keyword MB7 Parent.