

Date \_\_\_\_\_

Dear Family,

In chapter 5, your child will learn to identify and graph **linear functions**.

A function is linear if its graph forms a non-vertical straight line. You can also determine if a function is linear by looking at the differences in the  $x$ - and  $y$ - values of a list of ordered pairs.

$\{(0, 3), (2, 6), (4, 9), (6, 12)\}$

This function is linear because the  $x$ -values increase by a constant amount (2) while the  $y$ -values also increase by a constant amount (3).

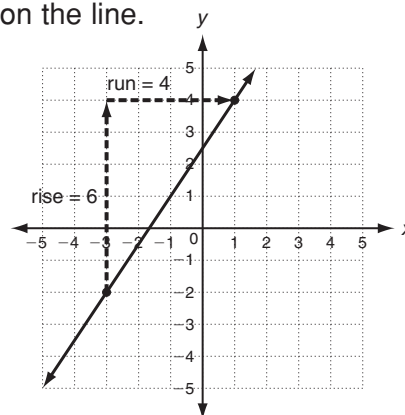
Another way to determine if a function is linear is by studying its equation.

If the equation can be written in the form  $Ax + By = C$  where  $A$ ,  $B$ , and  $C$  are real numbers and  $A$  and  $B$  are both not 0, then the function is linear.

Students will also find the **slope** of a line, which tells how steep the line is. The slope of a line is the ratio of *rise* to *run* for any two points on the line.

If you pick any two points on a line, the slope can be found by first counting up or down, then left or right, and then dividing.

The slope of the line at right is  $\frac{6}{4}$ , which reduces to  $\frac{3}{2}$ . From any point on the line, if you count up 3 and right 2, you will land on another point on the line.



Students will learn to graph linear functions other than by generating ordered pairs. One way to graph a linear function is by using **intercepts**. An intercept is where a line crosses an axis.

### Graph $2x - 4y = 8$ .

**Step 1:** Find the value of  $x$  when  $y = 0$ .

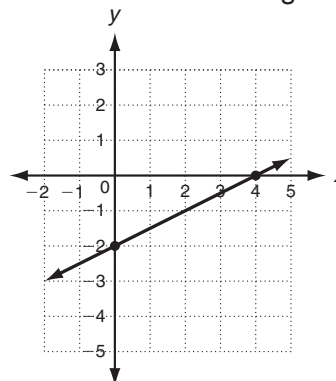
$$\begin{aligned} 2x - 4y &= 8 \\ 2x - 4(0) &= 8 \\ 2x &= 8 \\ x &= 4 \longrightarrow (4, 0) \end{aligned}$$

**Step 2:** Find the value of  $y$  when  $x = 0$ .

$$\begin{aligned} 2x - 4y &= 8 \\ 2(0) - 4y &= 8 \\ -4y &= 8 \\ y &= -2 \longrightarrow (0, -2) \end{aligned}$$

**Step 3:** Plot  $(4, 0)$  and  $(0, -2)$ .

Connect with a straight line.

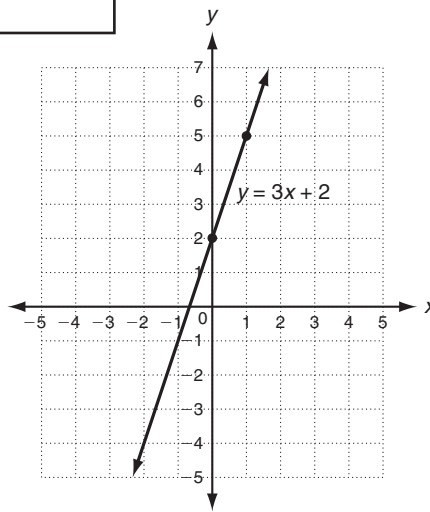


$Ax + By = C$  is called the **standard form of a line**, but a line can also be written in **slope-intercept form** or **point-slope form**.

Slope-intercept form of a linear equation is  $y = mx + b$ , where  $m$  is the slope and  $b$  is the  $y$ -intercept.

$y = 3x + 2$       The  $y$ -intercept is 2.

The slope is 3, or  $\frac{3}{1}$ .



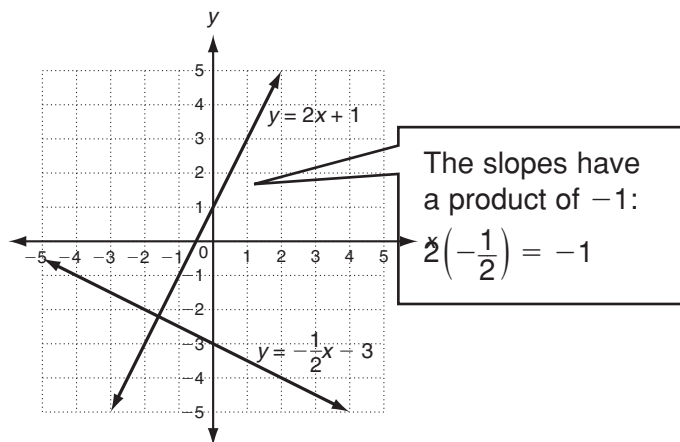
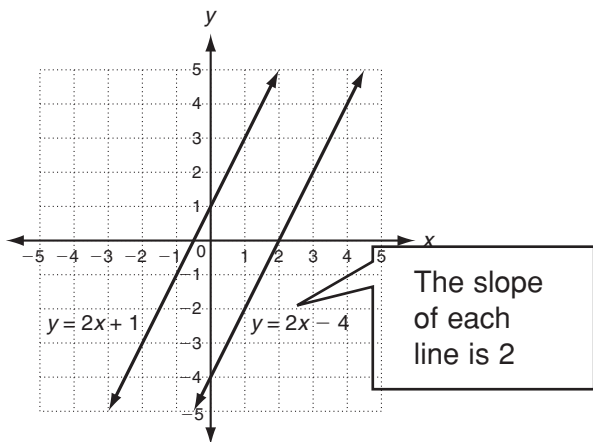
To graph a line written in slope-intercept form, first plot the  $y$ -intercept, and then find another point on the line by using the slope.

If given the slope of a line and one point on the line, the equation of the line can be written in point-slope form.

Point-slope form of a linear equation is  $y - y_1 = m(x - x_1)$ , where  $m$  is the slope and  $(x_1, y_1)$  is a point on the line.

An equation in point-slope form can be written in slope-intercept form by solving for  $y$ .

Students will learn that the slopes of **parallel lines** are equal, while the slopes of **perpendicular lines** have a product of  $-1$ .



Students will learn how changing the slope and  $y$ -intercept of a linear function change the position of the graph. These changes are called **transformations**, and include **translations** (slides), **rotations** (turns), and **reflections** (flips).

For additional resources, visit [go.hrw.com](http://go.hrw.com) and enter the keyword MA7 Parent.