

Chapter 1

Linear Functions

Section 1-3

Modeling with Linear Function

Writing Linear Equations

Core Concept

Writing an Equation of a Line

Given slope m and y -intercept b

Use slope-intercept form:

$$y = mx + b$$

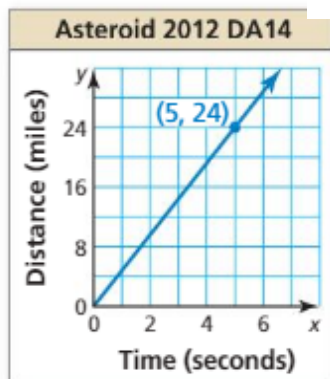
Given slope m and a point (x_1, y_1)

Use point-slope form:

$$y - y_1 = m(x - x_1)$$

Given points (x_1, y_1) and (x_2, y_2)

First use the slope formula to find m .
Then use point-slope form with either given point.



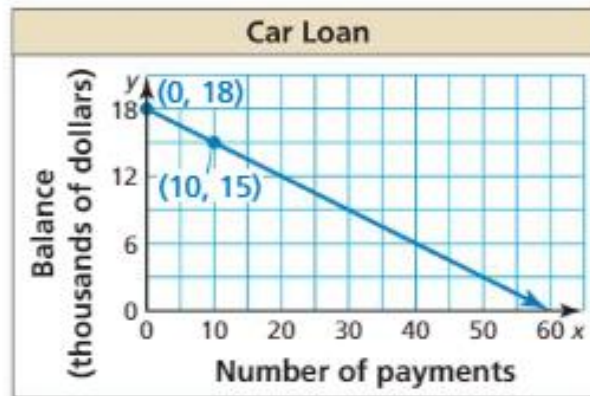
EXAMPLE 1

Writing a Linear Equation from a Graph

The graph shows the distance Asteroid 2012 DA14 travels in x seconds. Write an equation of the line and interpret the slope. The asteroid came within 17,200 miles of Earth in February, 2013. About how long does it take the asteroid to travel that distance?

Monitoring Progress

1. The graph shows the remaining balance y on a car loan after making x monthly payments. Write an equation of the line and interpret the slope and y -intercept. What is the remaining balance after 36 payments?



EXAMPLE 2

Modeling with Mathematics

Lakeside Inn	
Number of students, x	Total cost, y
100	\$1500
125	\$1800
150	\$2100
175	\$2400
200	\$2700

Two prom venues charge a rental fee plus a fee per student. The table shows the total costs for different numbers of students at Lakeside Inn. The total cost y (in dollars) for x students at Sunview Resort is represented by the equation

$$y = 10x + 600.$$

Which venue charges less per student? How many students must attend for the total costs to be the same?

Finding Lines of Fit and Lines of Best Fit

Data do not always show an *exact* linear relationship. When the data in a scatter plot show an approximately linear relationship, you can model the data with a **line of fit**.

Core Concept

Finding a Line of Fit

- Step 1** Create a scatter plot of the data.
- Step 2** Sketch the line that most closely appears to follow the trend given by the data points. There should be about as many points above the line as below it.
- Step 3** Choose two points on the line and estimate the coordinates of each point. These points do not have to be original data points.
- Step 4** Write an equation of the line that passes through the two points from Step 3. This equation is a model for the data.



EXAMPLE 3

Finding a Line of Fit

The table shows the femur lengths (in centimeters) and heights (in centimeters) of several people. Do the data show a linear relationship? If so, write an equation of a line of fit and use it to estimate the height of a person whose femur is 35 centimeters long.

Femur length, x	Height, y
40	170
45	183
32	151
50	195
37	162
41	174
30	141
34	151
47	185
45	182

