# Linear Automobile Depreciation

5-5 NOTES

# What is the value of your car?

▶ Most cars will not be worth their purchase prices as they get older. Most cars *depreciate*, or, lose value over time.

▶ The simplest form of depreciation is straight line depreciation.

▶ In straight line depreciation, the car loses the same amount of value each year.

# Straight-Line Depreciation

**Straight-Line Depreciation**

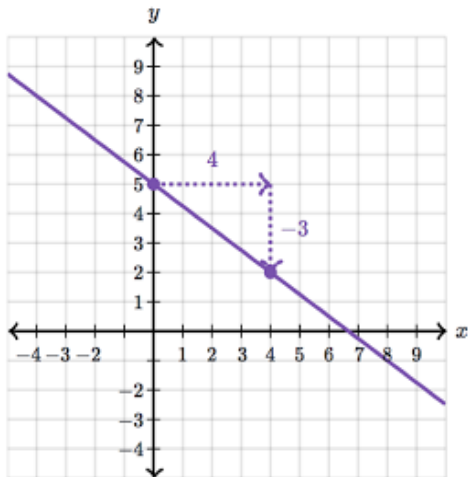(graph: Value vs Year, line decreasing from $300,000 at year 0 to $50,000 at year 10)
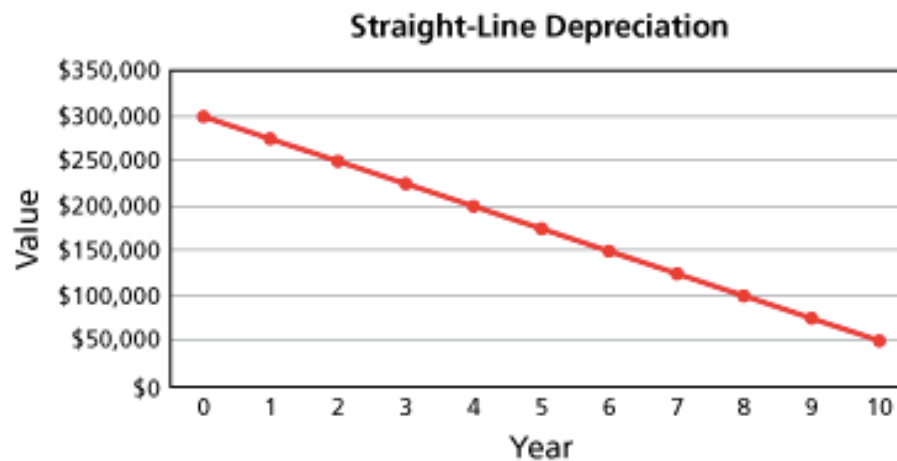
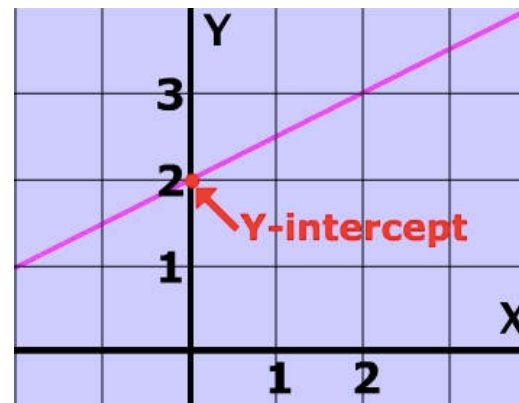- By determining the equation of this linear model, you can find the value of the car at any time in its lifespan.

# Linear Equations

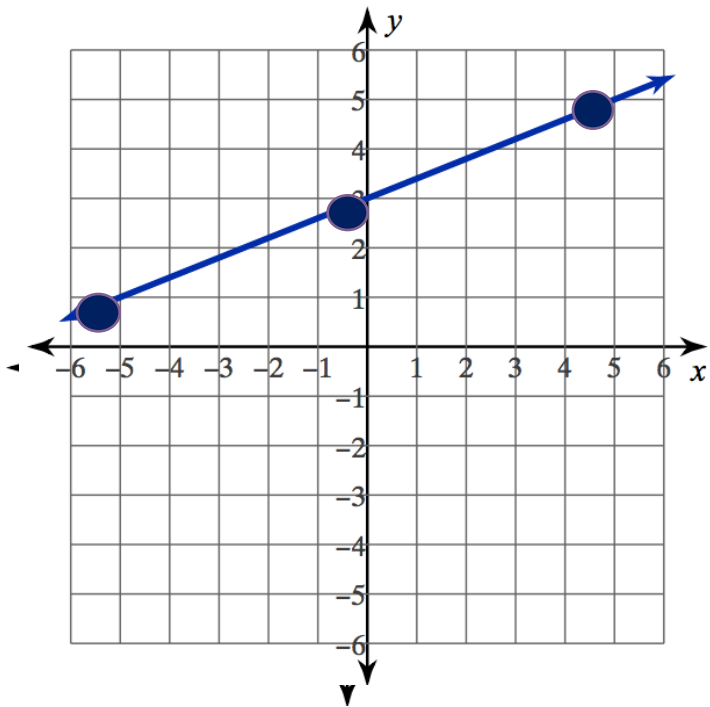▶ The slope-intercept form of a linear equation is: $y = mx + b$

▶ $m$ = slope
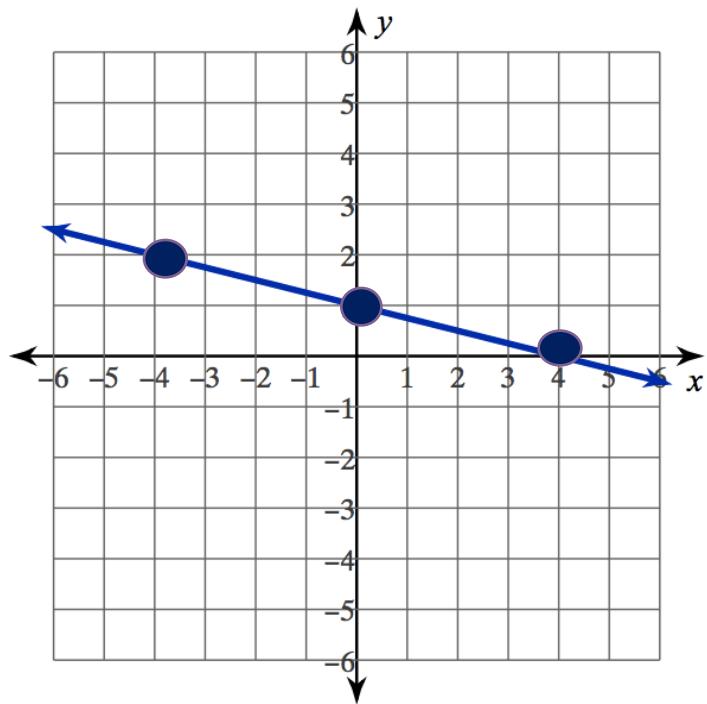
▶ $b$ = y-intercept

# Example 1



$y$-intercept = 3

slope = up 2, right 5 = $\frac{2}{5}$

# Example 2



y-intercept = 1

slope = down 1, right 4 = $\dfrac{-1}{4} = -\dfrac{1}{4}$

# Using the equations to predict

▶ If a certain car has a depreciation equation of $v = -2{,}055y + 18{,}495$, we can use this equation to predict its value after a period of time.

To know the value after 3 years, we substitute 3 in for $y$.

$$v = -2{,}055y + 18{,}495$$

$$v = -2{,}055(3) + 18{,}495$$

$$v = -6{,}165 + 18{,}495$$

$$v = \$12{,}330$$

# Using the equations to predict

- If a certain car has a depreciation equation of $v = -2{,}055y + 18{,}495$, we can use this equation to predict its value after a period of time.

To know the value after 7 years, we substitute 7 in for $y$.

$$v = -2{,}055y + 18{,}495$$

$$v = -2{,}055(7) + 18{,}495$$

$$v = -14{,}385 + 18{,}495$$

$$v = \$4{,}110$$

# Missing pieces...

► What if you know the starting value of the car (the *y*-intercept) but not the exact slope? How could you find the slope?

If there are 2 different years when you know the value of the car, you can calculate the slope.

1st known year & value: $(x_1, y_1)$        2nd known year & value: $(x_2, y_2)$

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta y}{\Delta x}$$

# Finding Slope: Example

When you first bought your car, it was worth $27,000. 12 years later, it depreciated to a value of zero dollars. What is the rate of depreciation of your car (aka, the slope)?

Point 1: (time, value) = (0, 27,000)          Point 2: (time, value) = (12, 0)

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 27,000}{12 - 0} = \frac{-27,000}{12} = -2,250$$

Each year, the car's value goes down by $2,250.

# Finding Slope: Example

Now, what is the depreciation equation of your car?

Starting value (*y*-intercept) = $27,000          Depreciation rate (slope) = $-2,250

$$y = mx + b$$

$$y = -2250x + 27{,}000$$