

Name:

IN THIS LESSON, YOU WILL:

- Write percent change exponential functions given the necessary values
- Model a real world situation using exponential functions
- Find the rate of growth and decay given the equation
- Analyze return on an investment given starting investment, rate of return and time periods
- Explain what inflation is and how it affects purchasing power and investments
- Explain how depreciation affects the value of a car



INTRO

REVIEW: Calculating Percent Change

Let's review percent increase and decrease. Try to perform each of the following calculations in one step.

1. **Sierra walks into a store and spends \$12. If there is a 7% sales tax, how can Sierra calculate her total bill in one step?**
2. **Ang finds a great sale on a new pair of headphones. The original cost was \$89 but the item is 25% off. How can Ang calculate his total bill in one step?**



LEARN IT

Exponential Growth and Decay using Percents

Remember that the **b** value in the general form $y = ab^x$ represents the growth or decay of the initial value. If the **b** value is 1, then no growth or decay happens.

If you are told that the initial value changes by a **percent**, then we can represent the **b** value as growth or decay where:

- Growth is $1 + r$
- Decay is $1 - r$
- r is the decimal form of the percent

1. **Write an equation that represents the following situation**
 - **Starting value = 125**
 - **Rate = 6% growth per year**

- **Years = 10 years**

2. Write an equation that represents the following situation

- **Starting value = 200**
- **Rate = 2.5% decay per year**
- **Years = 5 years**



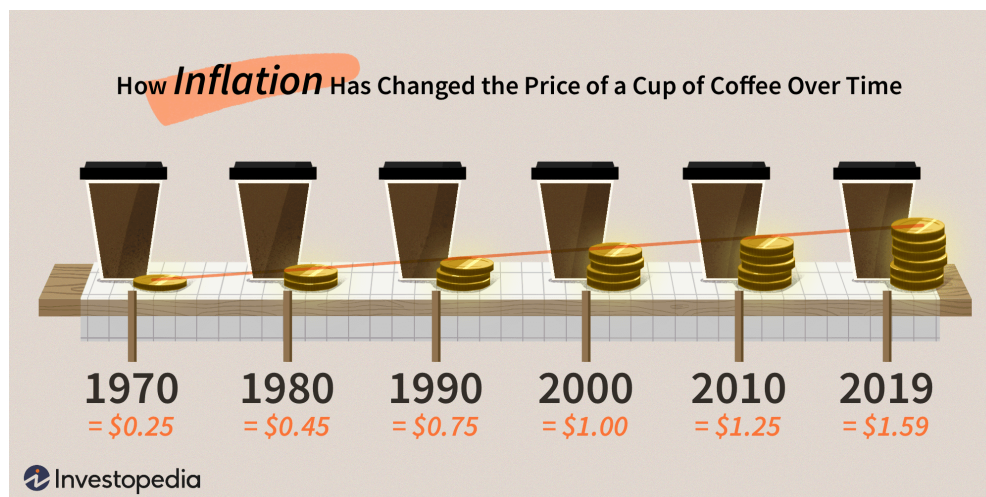
PRACTICE IT

Use what you know about writing exponential functions with percent growth or decay to complete the following problems.

- 1. Farid makes a \$12,000 investment that yields an average yearly return of 4%. If he makes no additional investments, how much will his investment be worth in 15 years?**
- 2. You purchase a car for \$36,000. You did some research and found that this particular model of car depreciates in value by around 15% per year. What is the value of your car after 6 years?**

ACTIVITY: Exponential Decay in Purchasing Power

Recall that inflation affects the purchasing power of your money over time. Review the graphic to see how a cup of coffee's price has changed over time then complete the activity to explore how to calculate your purchasing power due to inflation.



LEARN IT

Now that we know how to use $1 + r$ and $1 - r$ to write percent growth and decay equations, we can use this to determine the rate of change of a given equation.

- You make an investment where the balance over time can be modeled by the equation $y = 32000(1.035)^x$, where x represents the number of years since the investment started and y represents your total balance after x years.**
 - What is the starting balance of your investment?
 - What is the rate of growth of your investment?
- $y = 100(0.96)^x$ is an equation that can be used to represent the purchasing power of \$100 after x years of inflation. What is the rate of inflation used to make this calculation?**



APPLY IT

Follow your teacher's directions to complete the Application Problems.

Teachers, you can find the Application problems linked in the Lesson Guide.