Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_\_\_\_\_

Using Exponential Growth and Decay Models

Use an [exponential growth](https://www.ck12.org/algebra/Exponential-Growth) or [exponential decay](https://www.ck12.org/algebra/Exponential-Decay) function to model the following scenarios and answer the questions.

1. Sonya’s salary increases at a rate of 4% per year. Her starting salary is $45,000. What is her annual salary, to the nearest $100, after 8 years of service?
2. The value of Sam’s car depreciates at a rate of 8% per year. The initial value was $22,000. What will his car be worth after 12 years to the nearest dollar?
3. Rebecca is training for a marathon. Her weekly long run is currently 5 miles. If she increase her mileage each week by 10%, will she complete a 20 mile training run within 15 weeks?
4. An investment grows at a rate of 6% per year. How much, to the nearest $100, should Noel invest if he wants to have $100,000 at the end of 20 years?
5. Charlie purchases a 7 year old used RV for $54,000. If the rate of depreciation was 13% per year during those 7 years, how much was the RV worth when it was new? Give your answer to the nearest one thousand dollars.
6. The value of homes in a neighborhood increase in value an average of 3% per year. What will a home purchased for $180,000 be worth in 25 years to the nearest one thousand dollars?
7. The population of a community is decreasing at a rate of 2% per year. The current population is 152,000. How many people lived in the town 5 years ago?
8. The value of a particular piece of land worth $40,000 is increasing at a rate of 1.5% per year. Assuming the rate of appreciation continues, how long will the owner need to wait to sell the land if he hopes to get $50,000 for it? Give your answer to the nearest year.

For problems 9-15, use the formula for [compound interest](https://www.ck12.org/calculus/Compound-Interest): $A=\left(1+\frac{r}{n}\right)^{nt}$

1. If $12,000 is invested at 4% annual interest compounded monthly, how much will the investment be worth in 10 years? Give your answer to the nearest dollar.
2. If $8,000 is invested at 5% annual interest compounded semiannually, how much will the investment be worth in 6 years? Give your answer to the nearest dollar.
3. If $20,000 is invested at 6% annual interested compounded quarterly, how much will the investment be worth in 12 years. Give your answer to the nearest dollar.
4. If $5,000 is invested at 8% annual interest compounded quarterly, how much will the investment be worth in 15 years? Give your answer to the nearest dollar.
5. How much of an initial investment is required to insure an accumulated amount of at least $25,000 at the end of 8 years at an annual interest rate of 3.75% compounded monthly? Give your answer to the nearest one hundred dollars.
6. How much of an initial investment is required to insure an accumulated amount of at least $10,000 at the end of 5 years at an annual interest rate of 5% compounded quarterly? Give your answer to the nearest one hundred dollars.
7. Your initial investment of $20,000 doubles after 10 years. If the bank compounds interest quarterly, what is your interest rate?