

Algebra 2H
Sections 8.1 and 8.2 Homework Day 1

Name: _____

Marge accepted a job where she will make \$35,000. Each year, she will get a 4% pay increase. Complete the chart below to determine how much she will earn after t years.

# years, t	4% increase	New Salary
0	-	30,000
1		
2		
3		
4		
5		

Exponential Growth and Exponential Decay Models

When a quantity increases by a fixed percent each time period, it can be modeled by an exponential growth function:

$$y = a(1+r)^t$$

When a quantity decreases by a fixed percent each time period, it can be modeled by an exponential decay function:

$$y = a(1-r)^t$$

y is the amount after t time periods, a is the initial amount and r is the percent growth/decay expressed as a decimal.

$(1+r)$ is the growth factor

$(1 - r)$ is the decay factor

Problems:

1. For the problem above (Marge), determine whether the situation represents exponential growth or exponential decay. _____

a) Write an equation to model the situation: _____

b) How much will she earn after 10 years? _____

c) How many years would it take until she earns more than \$80,000 years annually? _____

2. A car depreciates at a rate of 21% a year. The car originally costs \$26,000. Does this represent exponential growth or decay? _____

a) Write an equation to model the situation: _____

b) How much will the car be worth after 8 years? _____

- c) When will the car be worth less than half of its original value? _____
3. The amount (in milligrams) of a drug in the body t hours after taking a pill is given by :
 $A(t) = 200(0.75)^t$
- a) What is the initial dosage given? _____
- b) What percent of the drug leaves the body each hour? _____
- c) How many milligrams of the drug will be left in the body after 8 hours? _____
- d) How many hours will it take until there are less than 5mg of the drug in the body? _____
4. A rapidly decaying radioactive material's half-life is every 9 hours. The material originally has 500mg of radioactive material.
- a) Write a model to represent this situation (what time period does t represent?) _____
- b) How much radioactive material will be left after 45 hours? _____
- c) How much radioactive material will be left after 8 days? _____

Compound Interest – is interest paid on an initial investment, called the *principal*, and on previously earned interest.

If an initial investment, P , is in an account that pays an annual rate, r (as a decimal), compounded n times per year, then the amount, A , in the account after t years is:

$$A = P \left(1 + \frac{r}{n} \right)^{nt}$$

Examples:

1. You deposit \$100,000 in an account that earns 2.5% annual interest. Find the balance after three years if the interest is compounded:

- a) annually
- b) quarterly
- c) monthly
- d) daily

2. You want to have \$10,000 in your account after 5 years. Find the amount your initial deposit should be for each situation:

- a) The account pays 3.5% annual interest compounded monthly.
- b) The account pays 4.25% annual interest compounded yearly.