Exponential Growth and Decay Models Notes

**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Exponential **DECAY** can be modeled by the formula

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

Exponential **GROWTH** can be modeled by the formula

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

y = the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_amount (also called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

a = the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_amount (also called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

r = the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ rate (must be written as a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

t = the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (typically in years, but depends on the problem)

**Write a model and solve for the starting/ending value. Round answers appropriately**.

**EX 1:** You deposit $1500 into an account that pays 6.2% interest. What will the balance be after 5 years?

**EX 2:** Eight students returned to school today with the flu virus. If the virus is expect to spread at a rate of 11% each day, how many students will be affected after one week?

**EX 3:** You purchased a car in 2010 for $22, 000 which is given to have an annual depreciation rate of 9.4%. Approximate the resale value of the car today.

**EX 4:** Your grandparents purchased an acre of land in 1960 which has appreciated at a rate of 4.5% each year. The land is worth $2,458.43 today, how much did they originally purchase the land for?

**Sometimes it will be necessary to use a rational exponent to solve for the interest rate.**

**EX 5:** A car purchased for $31,000 in the year 2010 is worth an estimated $24,000 today. To the nearest tenth, what is the depreciation rate of the car?

**EX 6:** In 1998, Rob’s parents invested $5000 into a savings account for his college expenses. Today, the account has a balance of $12,500. To the nearest tenth, what is the interest rate they were given on the account?

**Sometimes we need to recognize and use ratios in order to solve applications problems.**

**EX 7:** If it takes 25 years to triple an investment of $1000 invested in a savings account, what is the interest rate being paid on the account?

**EX 8:** What is the depreciation rate on a piece of machinery that loses 50% its values in 10 years?

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| **You try:** The Jones’ bought their home for $176,000 in 1994. Last week, the home was appraised for $410,000. Estimate the appreciation rate of the home. | **You try:**  |

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| **You try:** What interest rate will you need on your investment if you need to double your money in one year? | **You try:** What is the depreciation rate on a car that is worth 75% of its original value after 5 years? |