

Name: Ray Date: _____**Exponential Growth and Decay – Applications****Exponential Models**

$$A = P(1+r)^t$$

A = Amount you end withP = Principle (starting amount)t = time (assume in years)r = rate of growth (as a decimal)1+r = growth factor

$$A = P(1-r)^t$$

A = Amount you end withP = Principle (starting amount)t = time (assume in years)r = rate of decay (as a decimal)1-r = decay factor

1. In 1990, the cost of tuition at a state university was \$4300. During the next 8 years, the tuition rose 4% each year.

a. Growth or decay? What is the growth factor? $1.04 = 1.04$

b. Write a model the gives the tuition y (in dollars) t years after 1990.

$$A = 4300(1.04)^t$$

c. How much would it cost to attend college in 2000? In 2007?

$$A = 4300(1.04)^{10} = \$6365.05$$

$$A = 4300(1.04)^{17} = \$8375.97$$

d. How long it will take for tuition to reach \$6000?

(Use Table) 8-9 years

2. A 2011 Kia Sorrento depreciates at a rate of 33.6% per year. The car was bought for \$32,000.

a. Growth of decay? What is the decay factor? $1 - .336 = .664$

b. Write a model the gives the value of the car y (in dollars) t years after 2011.

$$A = 32,000(1 - .336)^t$$

c. How much is the car worth now? In 2012?

(in 2012) $A = 32,000(1 - .336)^{10} = \533.13

$$A = 32,000(1 - .336)^{10} = \$21,248$$

d. How long will it take for the car to be worth half?

(Use Table) 1-2 years

$A = P \left(1 + \frac{r}{n} \right)^{nt}$ <p> $A =$ <u>Amount you end with</u> $P =$ <u>Principle (starting amount)</u> $t =$ <u>time (assume in years)</u> $r =$ <u>Rate (as a decimal)</u> $n =$ <u>Number of times compounded</u> </p>	<p>COMPOUND INTEREST:</p> <table border="1"> <thead> <tr> <th>Compounded:</th> <th>n</th> </tr> </thead> <tbody> <tr> <td>Annually</td> <td>1</td> </tr> <tr> <td>Semi-Annually</td> <td>2</td> </tr> <tr> <td>Quarterly</td> <td>4</td> </tr> <tr> <td>Monthly</td> <td>12</td> </tr> <tr> <td>Weekly</td> <td>52</td> </tr> <tr> <td>Daily</td> <td>365</td> </tr> </tbody> </table>	Compounded:	n	Annually	1	Semi-Annually	2	Quarterly	4	Monthly	12	Weekly	52	Daily	365
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3. You invest your \$1000 graduation money. A bank is offering a 4% interest rate. Calculate how much money you have after 10 years if the bank compounds:

a. Annually $A = 1000 \left(1 + \frac{.04}{1} \right)^{1(10)} = \1480.24

b. Semi-Annually $A = 1000 \left(1 + \frac{.04}{2} \right)^{2(10)} = \1485.95

c. Quarterly $A = 1000 \left(1 + \frac{.04}{4} \right)^{4(10)} = \1488.86

d. Monthly $A = 1000 \left(1 + \frac{.04}{12} \right)^{12(10)} = \1490.83

e. Weekly $A = 1000 \left(1 + \frac{.04}{52} \right)^{52(10)} = \1491.60