MBF 3C1 Name: _____

Solving Problems with Exponential Relations

% Rate, r, not same as factor, b

Example 1

To determine the equation of an exponential relationship given a rate of growth or decay as a percentage:

	a. A principal of $500 is invested at 8% per year, compounded annually. Write an exponential equation to represent the relationship.	b. A new car costs $20 000. It's value decreases 16% per year after it is purchased. Write an exponential equation to represent the relationship.
1. Start with the generalization for an exponential relation.	$y = ab^x$	$y = ab^x$
2. Sub in the initial amount, a.	$y = 500\,b^x$	$y = 20\,000\,b^x$
3. Sub in the common ratio, b. ★ for special words: • double use b=2, • for half-life use b=0.5 • for triple use b=3, etc ★ for Percent: • convert the percent to a decimal (divide by 100) • for growth, b=1+r • for decay, b=1−r	r = 0.08 increase b = 1 + r b = 1 + 0.08 b = 1.08 $\therefore y = 500(1.08)^x$ x: year, y: value	r = 0.16 decrease b = 1 − r b = 1 − 0.16 b = 0.84 $\therefore y = 20000(0.84)^x$ x: year, y: value

Example 2

The population of Alberta between 1987 and 2005 can be modelled by an exponential equation. The population in 1987 was 2.4 million and the growth rate was 1.7%.

a. Write an equation to model the situation.

a = 2400 000

r = 0.017

b = 1 + r

b = 1 + 0.017

b = 1.017

$\therefore y = ab^x$

$y = 2400000(1.017)^x$

x: year, y: population

b. Use your model to calculate the population in 1985.

x = −2 (2 yrs. back from 1987)

$y = 2400000(1.017)^{-2}$

$y \doteq 2320435$ people

c. Use your model to calculate the population in 2012.

2012 − 1987 = 25 years

$y = 2400000(1.017)^{25}$

$y \doteq 3\,657\,927$ people