

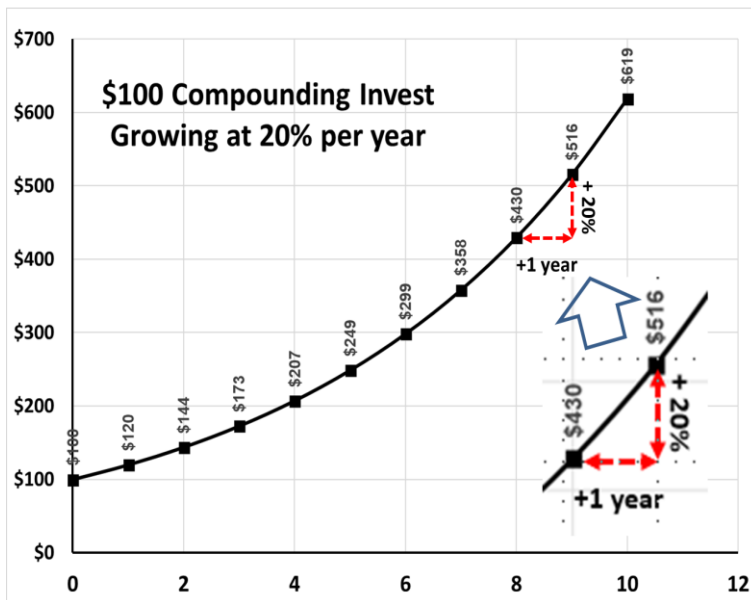
GRADE 12 APPLIED UNIT C – FUNCTIONS EXPONENTIAL FUNCTIONS

Name: _____

Date: _____

Exponential functions change by a certain percentage every step to the right. Example: Something that doubles itself every step [of some size] to the right, or something that halves itself every step to the right.

Exponential functions are of the general form: $y = ab^x$; where **a** is an 'initial value', '**b**' is the base, and **x** is the exponent.



Recall that Compound Interest is an exponential relationship, the value of your investment growing by a percentage of itself every year. Any living population (including germs, people) grows exponentially (until acted on by other causes).

$$y = 100 \cdot (1 + 0.20)^x$$

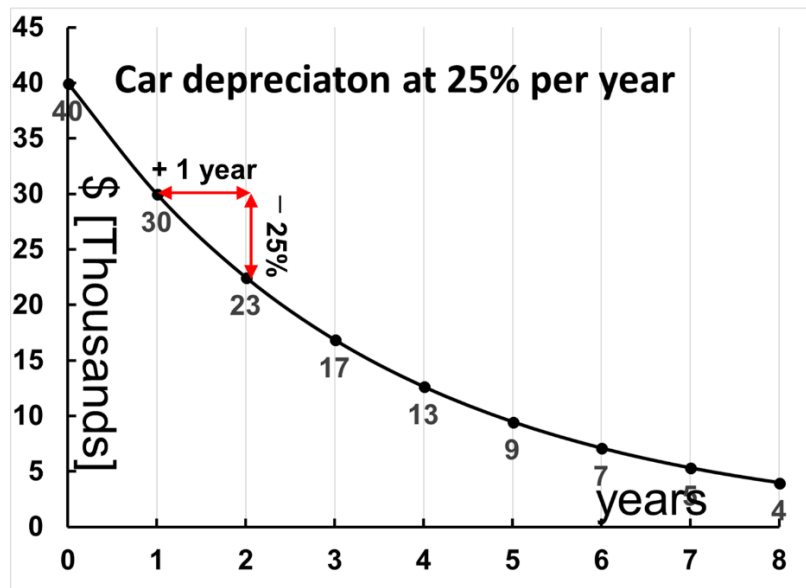
In this graph every change in x of +1 year causes a change in \$ value by +20%.

Recall that the depreciation of a car or the cooling of your coffee is exponential. Every change in the time gives a percentage change to the value of the car value or the temperature of the coffee.

$$y = 40,000(1 - 0.25)^x$$

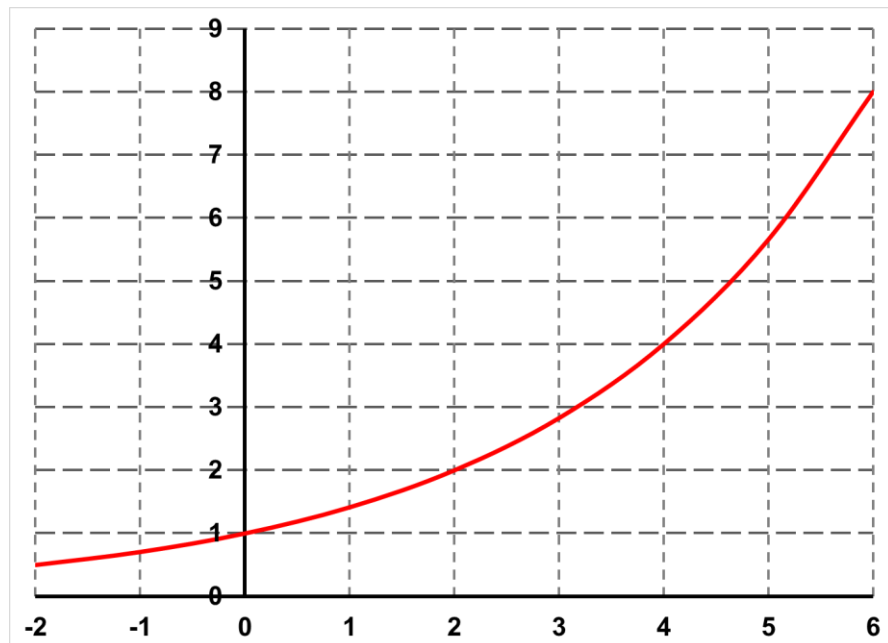
$$\text{ie: } y = 40,000(0.75)^x$$

(losing 25% is the same as keeping 75%)



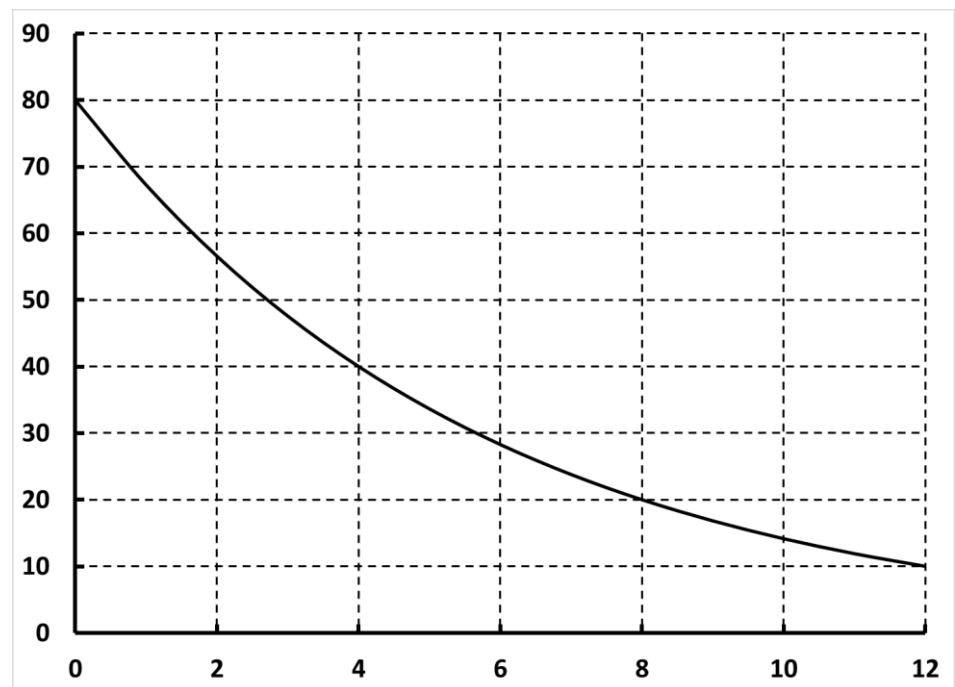
1. Consider the graph below:

- Is the graph increasing (growing) or decreasing (decaying) as a function of x ?
- State the y -intercept. Indicate it on the graph.
- State the x intercept (if any). Indicate it on the graph.
- State the domain and state the range.
- State the equation of the function [use 'ExpReg']
- By what percentage does the y value of the graph increase for every unit one increase in x ? Indicate it on the graph.



2. Consider the graph below.

- Determine the equation of the function.
- Calculate [evaluate] the value of y if the x is 2.5, indicate it on the graph.
- At what value(s) of x is y equal to 1.5? [ie: solve]. Indicate it on the graph.



3. Respond to the following:

- a) **Sketch** a decreasing exponential function that has an initial value of 100 and passes through the point (1, 50). Sketch it below.
- b) Determine the equation of the exponential function.

4. The number of daily customers at a new store is recorded in the table below:

Day	1	2	4	6	8
Customers	8	10	18	40	65

- a) Determine the exponential equation of best fit.
- b) Comment on how good the fit is.
- c) Use your equation to estimate ('extrapolate' forward) the number of customers that will come on the 10th day.
- d) Explain any limitations on the model for this situation.
- e) Sketch the situation (a sketch is always a good idea even if you are not asked for it!)

5. The average annual salary of a city employee in Exponentville is given in the table below:

Year	2000	2003	2006	2009	2012
Salary [\$]	41,000	46,000	52,000	58,500	69,000

- Determine the exponential function of best fit.
- Comment on how good the fit is.
- Assuming this function is valid into the future (extrapolating forward) use your equation to find how long it will take for the average salary to reach \$100 000. [ie: solve]
- Sketch the situation of course!