

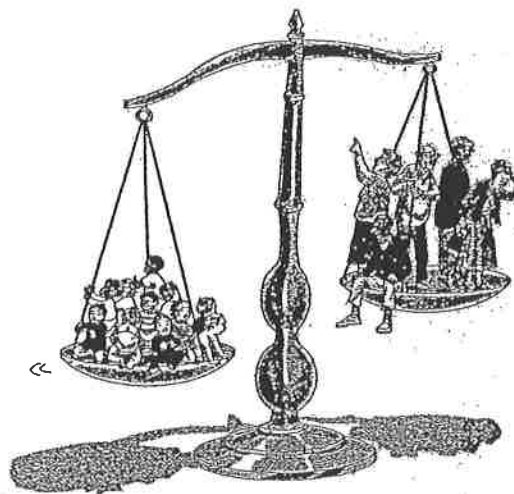
# Exponential Function Review!

- Please read the following paragraph written in the mid 1990's.

## The Exponential Function

"Obvious" is the most dangerous word in mathematics.  
—Eric Temple Bell

Every two seconds, nine babies are born and three people die. The net increase of three people each second results in a growth in world population of 10,600 per hour, 254,000 per day, 1.8 million per week, 7.7 million per month, and 93 million per year. It is estimated that by the year 2000, annual population growth will increase to 94 million; by 2020, it will be 98 million. Social scientists who study long-range population trends often use exponential functions to model the growth.



Exponential functions are functions that have a variable as an exponent.  
Therefore,  $f(x) = 2x^3$  is not exponential but  $f(x) = 3(0.6)^x$  is!

Exponential functions model situations that have a constant percentage change..... as in biology, physics, sociology, economics, and the list goes on.

Since you have studied exponential functions in ALGEBRA 2, we will not spend a lot of class time on them.

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Problem #1 : In 1989, the population of India was 835 million people. The annual growth rate was 1.9%. Use this information to predict the population in 1990, 1991, and 1992.

#2 : Write an exponential function to model India's growth. Use it to estimate India's population in 2001

CONTINUE  
ON BACK

Problem #3 : A typical car depreciates about 20% a year once purchased. Hopefully my Subaru's is only 10% !

Suppose a \$19,000 car loses  $\frac{1}{5}$  of its value every year. What is its value after 5 years ?

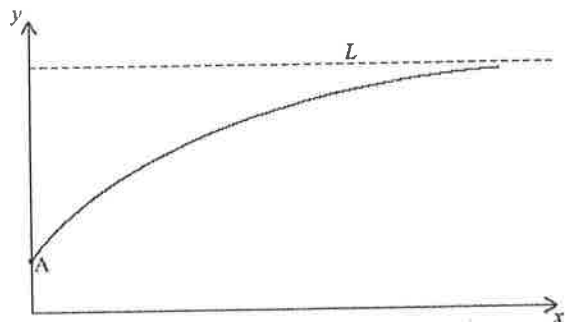
Try to write an exponential function to help you answer this question.

$$f(x) = \underline{\hspace{10em}} =$$

$$f(x) = -a^{-x} + 1.25$$



4 Consider the function  $f(x) = \underline{\hspace{10em}}$ , where  $a$  is a positive constant and  $x \geq 0$ . The diagram shows a sketch of the graph of  $f$ . The graph intersects the  $y$ -axis at point  $A$  and line  $L$  is its horizontal asymptote.



(a) Find the  $y$ -coordinate of  $A$ . (2)

The point  $(2, 1)$  lies on the graph of  $y = f(x)$

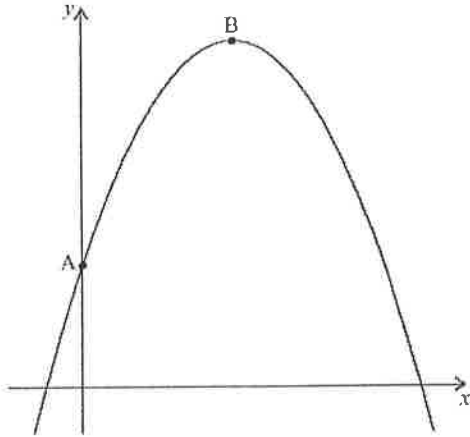
(b) Calculate the value of  $a$ . (2)

(c) Write down the equation of  $L$ . (2)

# Function Review Questions from Alg I - Alg II

5

The graph of the quadratic function  $f(x) = 3 + 4x - x^2$  intersects the  $y$ -axis at point A and has its vertex at point B.



(a) Find the coordinates of B.

(3)

Another point, C, which lies on the graph of  $y = f(x)$  has the same  $y$ -coordinate as A.

(b) (i) Plot and label C on the graph above.

(ii) Find the  $x$ -coordinate of C.

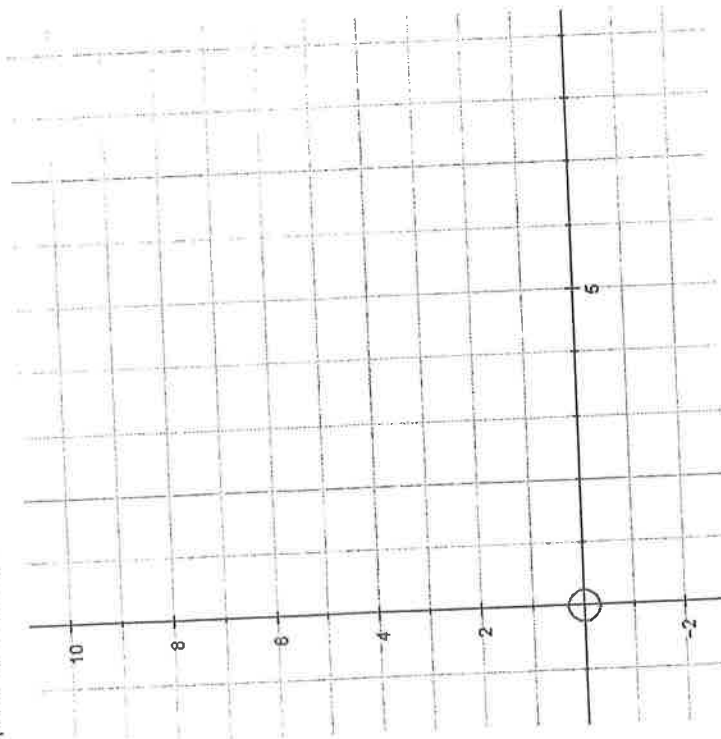
(3)

(Total 6 marks)

6

Factorise the following Quadratic,  $f(x) = x^2 - 6x + 8$

Plot it on the axes below for the domain  $0 \leq x \leq 6$  label with the coordinates, the zeros, the  $y$ -intercepts and the vertex. Mark on the axis of symmetry and label it with the equation of the line. State the corresponding range of the function.



Where is the vertex of the function  $f(x) = (x - 5)^2 + 6$ ?

7

- a. Given  $f(x) = k \times 2^x$  and  $f(2) = 24$ , what is the value of  $k$ ?
- b. Given  $g(x) = 2^{(x+1)} - 1$ , what is the equation of the asymptote and the coordinates of the  $y$  - intercept
- c. If the diameter of a tree is given by  $d = 3.5 \times 2.4^{0.1t}$ , where  $t$  is the number of years after planting, find
- The diameter of the tree when it was planted
  - The number of years it takes for the diameter to triple
  - The diameter of the tree after 20 years

8

$f(x)$  is a linear function with gradient 3 and  $y$  - intercept 2,  $g(x) = -0.5x - 1.5$   
Plot these two lines on the grid below for the domain  $-4 \leq x \leq 1$  and state the coordinates of the intersection of the two lines and the range of the functions.

