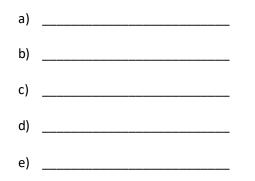


## Investigation on families of exponential functions

**Objective:** In this investigation we will examine the graphs of various families of exponential functions Use of Graphing calculator is required for this activity (Casio cg20 or Casio cg50 is recommended)

- 1. Sketch the following curves using your GDC and answer the questions that follow.
  - a.  $y_1 = 2^x$
  - b.  $y_2 = 3^x$
  - c.  $y_3 = 4^x$
  - d.  $y_4 = (0.5)^x$
  - e.  $y_5 = (0.25)^x$

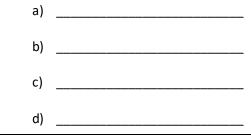
Write down the y intercept and equation of horizontal asymptote of each function



What do you observe by changing the value of b in  $y = b^{x}$  where b > 0 in each equation?

- 2. Sketch the following curves using your GDC and answer the questions that follow.
  - a.  $y_1 = 2^x$
  - b.  $y_2 = 2^x + 3$
  - c.  $y_3 = 2^x + 5$
  - d.  $y_4 = 2^x 3$

Write down the y intercept and equation of horizontal asymptote of each function



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What do you observe in the **position** and **shape** by changing the value of k in  $y = 2^{x} + k$  where

k is a constant in each equation?

What is the horizontal asymptote of  $y = 2^x + k$ ?

- 3. Sketch the following curves using your GDC and answer the questions that follow.
  - a.  $y_1 = 2^x + 3$ b.  $y_2 = 2^{x-2} + 3$ c.  $y_3 = 2^{x-4} + 3$ d.  $y_4 = 2^{x+4} + 3$ e.  $y_5 = 2^{x+2} + 3$

Write down the y intercept and equation of horizontal asymptote of each function

a)	
b)	
c)	
d)	
e)	

What do you observe in the **position** and **shape** by changing the value of h in  $y = 2^{x-h} + k$ 

where h is a constant in each equation?

What is the horizontal asymptote of  $y = 2^{x-h} + k$ ?

4. Sketch the following curves using your GDC and answer the questions that follow.





a. 
$$y_1 = 2^{-x} + 3$$
  
b.  $y_2 = 2^x + 3$ 

What do you observe in the **position** and **shape** by changing the sign of x in  $y = 2^{x} + k$  in each

equation?

- 5. Sketch the following curves using your GDC and answer the questions that follow.
  - a.  $y_1 = 2^x$ b.  $y_2 = 2 \times 2^x$
  - c.  $y_3 = 4 \times 2^x$
  - d.  $y_4 = 6 \times 2^x$

What do you observe in the **steepness of graph** by changing the value of a in  $y = a \cdot 2^x$  where a is a

constant in each equation?

Summarize the effect of each change in *a*, *b*, *c* and *d* in  $y = a \times b^{x-c} + d$ 



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