



3055 BA SANGAM COLLEGE

PH: 6674003/9264117 E-mail: basangam@connect.com.fj



WORKSHEET 13

School: Ba Sangam College

Year / Level: 12

Subject: Mathematics

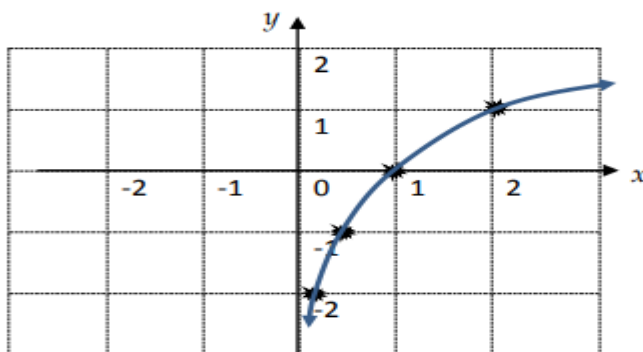
Name of Student: _____

Strand	3 – Graphs
Sub strand	3.1 – Graphs and Intersections
Content Learning Outcome	➤ Studying and interpreting graphs

Logarithmic and Exponential Functions (Ref: Year 12 Mathematics Pg 112 – 114)

EXAMPLE 1: Sketch graph of $y = \log_2 x$

x	0.125	0.25	0.5	1	2
$y = \log_2 x$ $= \frac{\log x}{\log 2}$	-3	-2	-1	0	1



- The y-axis is an asymptote because $\log 0$ is undefined

EXAMPLE 2: A function is given as $f(x) = 3^x$

- Find the coordinates of the y – intercept
- Sketch the graph of $f(x)$ and label it clearly

Another function is defined as $g(x) = \log_3 x$

- On the pair of axes, Sketch the graph of $g(x)$, showing the x – intercept clearly
- Describe fully the transformation that maps the graph of $f(x)$ onto the graph of $g(x)$.

Answers:

i. y – int, let $x = 0$ and solve

$$f(x) = 3^x$$

$$\therefore y = 3^x$$

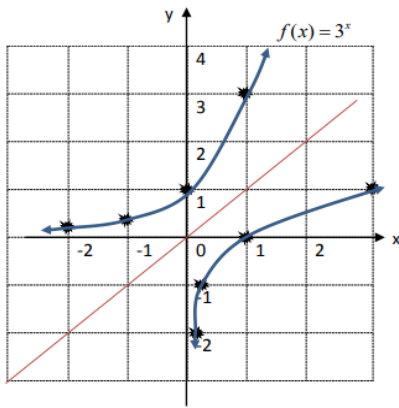
$$= 3^0 = 1$$

$$(0,1)$$

ii. Sketch: using tables

x	-2	-1	0	1	2
$y = 3^x$	$y = 3^{-2} = \frac{1}{9}$	$y = 3^{-1} = \frac{1}{3}$	$y = 3^0 = 1$	$y = 3^1 = 3$	$y = 3^2 = 9$

ii / iii Sketch



Prove that $f(x) = 3^x$ and $y = \log_3 x$ are inverses of each other.
 To find the inverse:
 $y = 3^x$
 Interchange **x** and **y**
 $3^y = x$
 $\log 3^y = \log x$
 $y = \frac{\log x}{\log 3}$
 $y = \log_3 x$

iv. Reflection in the line $y = x$.

Transformation Rules		
Function Notation	Type of Transformation	Change to Coordinate Point
$f(x) + d$	Vertical translation up d units	$(x, y) \rightarrow (x, y + d)$
$f(x) - d$	Vertical translation down d units	$(x, y) \rightarrow (x, y - d)$
$f(x + c)$	Horizontal translation left c units	$(x, y) \rightarrow (x - c, y)$
$f(x - c)$	Horizontal translation right c units	$(x, y) \rightarrow (x + c, y)$
$-f(x)$	Reflection over x -axis	$(x, y) \rightarrow (x, -y)$
$f(-x)$	Reflection over y -axis	$(x, y) \rightarrow (-x, y)$
$af(x)$	Vertical stretch for $ a > 0$	$(x, y) \rightarrow (x, ay)$
$af(x)$	Vertical compression for $0 < a < 1$	$(x, y) \rightarrow (x, ay)$
$f(bx)$	Horizontal compression for $ b > 0$	$(x, y) \rightarrow \left(\frac{x}{b}, y\right)$
$f(bx)$	Horizontal stretch for $0 < b < 1$	$(x, y) \rightarrow \left(\frac{x}{b}, y\right)$

ACTIVITY

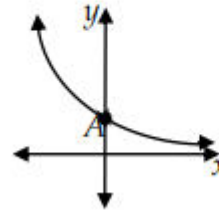
1. (10 marks)

A function is given as $f(x) = 2^x$.

- Sketch the graph of $f(x)$ and label it clearly
- Find the expression for $g(x) = -f(x)$
- Sketch the graph of $g(x)$ and label it clearly
- Describe fully the transformation that maps the graph of $f(x)$ onto the graph of $g(x)$.

2. (2 marks)

The diagram below shows the graph of $y = \frac{1}{2^x}$.



- Give the coordinates of point A.
- On the pair of axes, draw the graph of its inverse.

THE END