

Unit 2

Exponents and Logarithms


Exponential

$y=2^x$

$y=3^x$

$y=4^x$

Asymptote

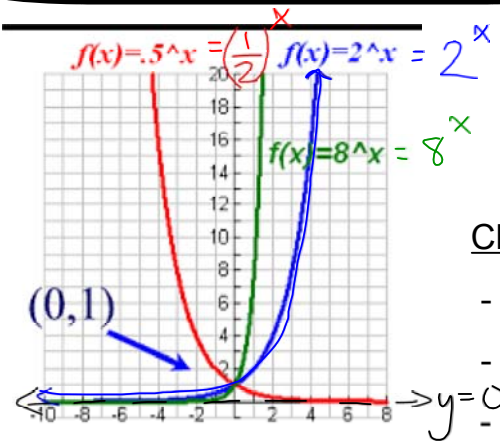


4.1 Introduction to Exponential Functions

Formula Sheet:

Exponential functions

$$y = a \cdot b^x$$



Characteristics of Exponential Mother Functions:

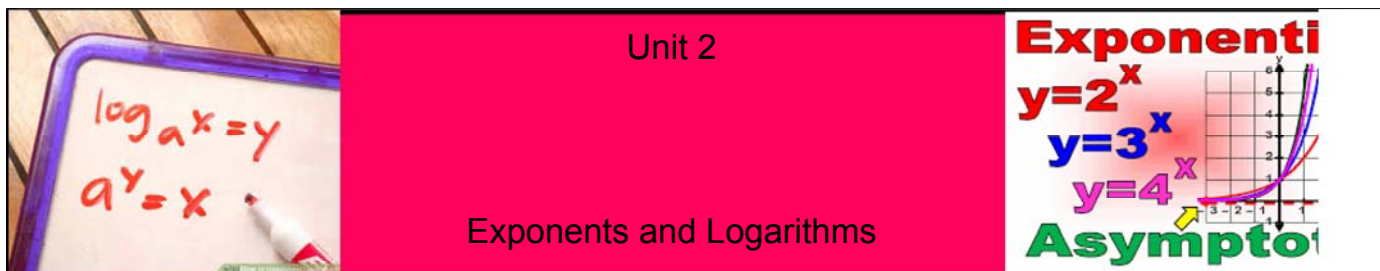
- horizontal asymptote $y = 0$ *x-axis*
- no x-intercept
- y-intercept: $(0, 1)$ $a = 1$
- Domain: $x \in \mathbb{R}$
- Range: $y > 0$
- End Behaviour: QII to QI

Increasing: $b > 1$

Decreasing: $0 < b < 1$

fraction





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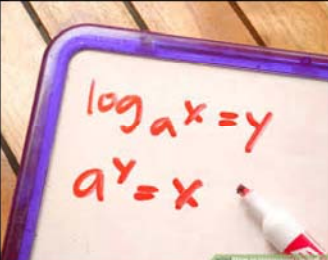
What happens if you change a ?

Ex.) On your calculator, enter the following functions:

$y = 2^x$	$y = 2(2^x)$	$y = 5(2^x)$	$y = 0.5(2^x)$
$(0, 1)$	$(0, 2)$	$(0, 5)$	$(0, \frac{1}{2})$

How does the a value change your graph?

'a' is the y-int of the graph



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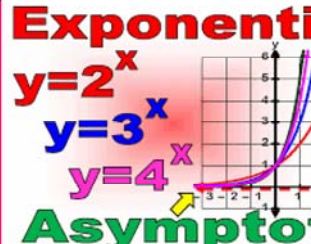
Exponential

$y=2^x$

$y=3^x$

$y=4^x$

Asymptote



Ex.) Determine the exponential function that goes through the points (0, 1) and (2, 25) in the form $y = b^x$.

$$y = 5^x$$

$$y = a \cdot b^x \quad (x, y)$$

$$y = b^x$$

$$\sqrt{25} = \sqrt{b^2}$$

$$b = 5$$

Ex.) Determine the exponential function that goes through the points (0, 1) and (-2, 16) in the form $y = b^x$.

$$y = b^x \quad (x, y)$$

$$16 = \frac{b^{-2}}{1}$$


$$16 = \frac{1}{b^2}$$

$$\sqrt{b^2} = \sqrt{\frac{1}{16}}$$

$$b = \frac{1}{4}$$

$$y = b^x$$

$$y = \left(\frac{1}{4}\right)^x$$




$\log_a x = y$
 $a^y = x$

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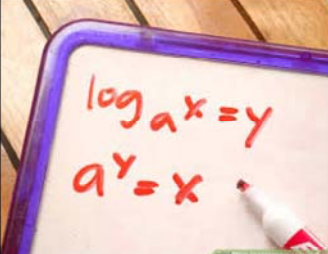
Asymptote

****BIG IDEA****

different y-int

Question: Are $y_1 = 2(5^x)$ and $y_2 = 10^x$ the same graph? Look at the graphs to explain.

** never multiply together!*



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$y=2^x$

$y=3^x$

$y=4^x$

Asymptote



Ex.) Determine the following characteristics for the graphs: x-int, y-int, domain, range, HA, end behaviour, increasing or decreasing function.

a) $y = 4^x$

HA: $y = 0$

X-int: none

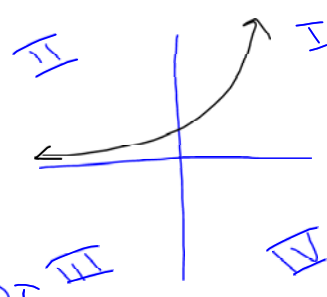
Y-int: $(0, 1)$

domain: $x \in \mathbb{R}$

range: $y > 0$

end behaviour: Q II to Q I

increasing



b) $y = (1/2)^x$

HA: $y = 0$

X-int: none

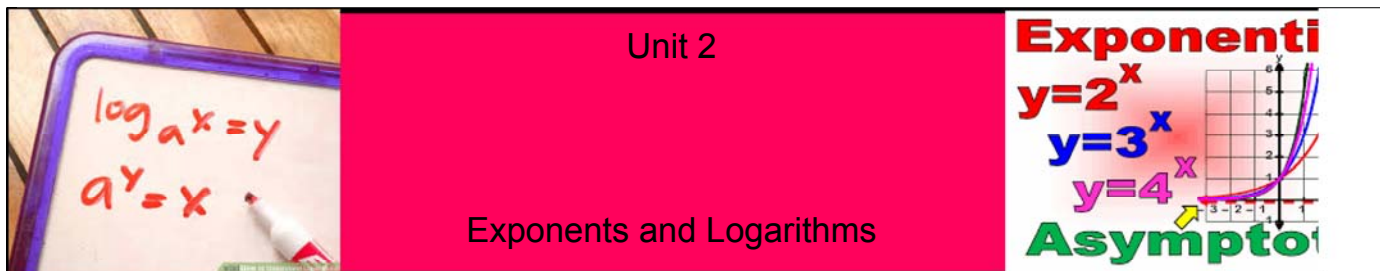
Y-int: $(0, 1)$

domain: $x \in \mathbb{R}$

range: $y > 0$

end behaviour: Q II to Q I

decreasing



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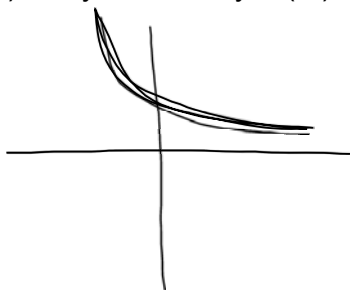
$y=3^x$

$y=4^x$

Asymptote

The graphic features a red background with the text 'Unit 2' and 'Exponents and Logarithms'. On the left, a whiteboard shows the equations $\log_a x = y$ and $a^y = x$. On the right, there is a graph showing three exponential curves: $y=2^x$ (red), $y=3^x$ (blue), and $y=4^x$ (purple). A horizontal dashed line represents the asymptote at $y=0$. The word 'Exponential' is written in red, and 'Asymptote' is written in green.

Ex.) Are $y = 2^{-x}$ and $y = (\frac{1}{2})^x$ the same graph? Explain.



Yes, they're the same graph
because of gr. 10 exponent
laws.

Pg. 337 # 1-3.

Pg. 347 #5-8, 12.

Exponent Law
Worksheet