Week 1&2
Term 1
2021

HAWKER COLLEGE
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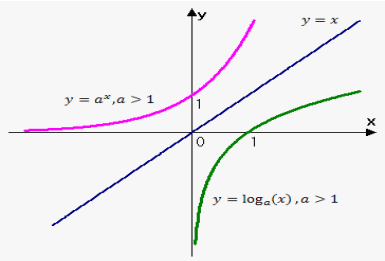
SMM3
Logarithmic Functions and Further differentiation and applications

Goals



This week:

- Reviewing rate of change, gradient and key features of graphs
- Reviewing differentiation using power rule
- Review index laws and exponential functions
- Define logarithms definition and learn their algebraic properties
- Sketch logarithmic functions

Theoretical Components

STEP 1

Resources:

- Maths Quest B Year 12 for Qld Chapter 3 (pdf on google classroom)

Index laws

- $a^x \times a^y = a^{x+y}$
- $a^x \div a^y = a^{x-y}$
- $(a^x)^y = a^{xy}$
- $a^0 = 1$
- $a^{-x} = \frac{1}{a^x}$ and $\frac{1}{a^{-x}} = a^x$
- $a^{\frac{1}{y}} = \sqrt[y]{a}$ and $a^{\frac{x}{y}} = \sqrt[y]{a^x}$
- $a^x = y \Leftrightarrow \log_a y = x$

Logarithm laws

- $\log_a 1 = 0$
- $\log_a a = 1$
- $\log_a 0$ is undefined
- $\log_a mn = \log_a m + \log_a n$
- $\log_a \frac{m}{n} = \log_a m - \log_a n$
- $\log_a m^p = p \log_a m$
- $\log_b N = \frac{\log_a N}{\log_a b}$ (change-of-base rule)

Lesson on Applications of Logarithmic Functions

https://mathspace.co/teach2/chapter/39045/1082/

Practical Components

STEP 2

For

Exercise 3A
Exercise 3B
Exercise 3C
Exercise 3D

Do as many as you need to become proficient at these skills and concepts.

On www.mathspace.co there are two custom tasks for you to complete.

- Change of Base

Investigation

STEP 3

See next page

QFO

Quiz/Forum/Other

Quiz on mathspace
https://mathspace.co/student/tasks/SubtopicCustomTask-895356/

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Week 1&2 Investigation

Question 1.

(a) Use the change of base rule to show that $\log_{a^x} b^x = \log_a b$

(b) Use your knowledge from part (a) to simplify:

i. $\log_{16} 81$

ii. $\log_{\sqrt{27}} \sqrt{125}$

Question 2.

(a) Show that $\log_{ab} x = \frac{\log_a x}{1+\log_a b}$

(b) show that $\log_2 5 = \frac{1-\log_{10} 2}{\log_{10} 2}$