Week 2/3
Term 3
2024

HAWKER COLLEGE
Engage | Inspire | Achieve

Learning Brief
MM2

Goals

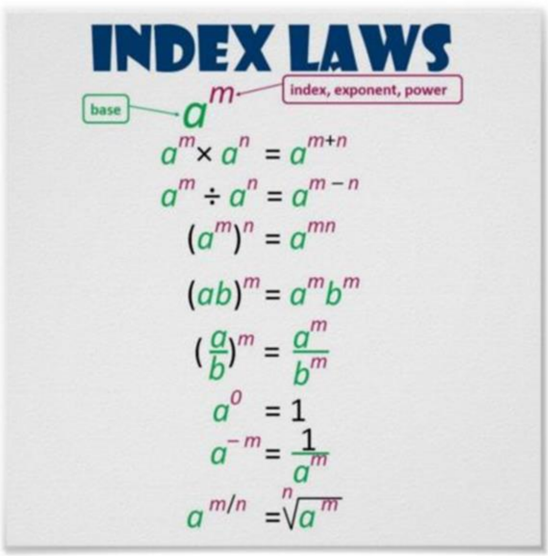
By the end of this fortnight, you will:

- Establish and use the algebraic properties of exponential functions
- Recognise the qualitative features of the graph of $y = a^x$ $(a > 0)$ including asymptotes, and of its translations ($y = a^x + b$ and $y = a^{x+c}$)
- Identify contexts suitable for modelling by exponential functions and use them to solve practical problems
- Solve equations involving exponential functions using technology, and algebraically in simple cases

Theoretical Components

Knowledge Checklist:

- Index Laws
- Exponential Equations



Make sure you check in with your teacher EVERY lesson.

Practical Components

Resources:
Make notes on the following chapters and websites:
Chapter 5 of Maths Quest 11 Mathematical Methods (pdf – Google Classroom)

- 5C Indicial equations
- 5D Graphs of exponential equations
- 5H Applications of exponential functions

Do the following questions:
Organise your solutions neatly in your exercise book.
Chapter 5 of Maths Quest 11 Mathematical Methods (pdf – Google Classroom)

- 5C: 1-4 (two from each), 5a, 9b, 10
- 5D: 1a, 1b, 2c, 2d, 3a, 3h, 4, 5 (any 2)
- 5H: 1, 2, 4-8, 12

Use DESMOS to check your graphs

Investigation

See next page

Work on your assignment

Other

Fun Fact: The markings on slide rulers are arranged in a log scale for multiplying or dividing numbers by adding or subtracting lengths on the scales. Scientific notation is nothing more than the use of logarithms and exponentials to efficiently handle very large or very small numbers. Of course, base-10 scientific notation is most commonly used, but other bases can be used as well. For example, base-2 is commonly used in computing, and engineers often use a base-1000 version.

Week 2 and 3 Investigation

Some equations involving powers or indices can be solved using logarithms… but not all.
The example below illustrates how to solve an indicial equation using logarithms.

WORKED EXAMPLE 22

Solve for x correct to 3 decimal places, if $2^x = 7$.

THINK	WRITE
1 Write the equation.	$2^x = 7$
2 Take $\log_{10}$ of both sides.	$\log_{10}(2^x) = \log_{10}(7)$
3 Use the 'logarithm of a power' law to bring the power, x, to the front of the logarithmic equation.	$x \log_{10}(2) = \log_{10}(7)$
4 Divide both sides by $\log_{10}(2)$ to get x by itself.	Therefore $x = \frac{\log_{10}(7)}{\log_{10}(2)}$
5 Evaluate the logarithms correct to 4 decimal places, at least one more than the answer requires.	$x = \frac{0.8451}{0.3010}$
6 Solve for x.	$x = 2.808$

Summary: If $b^x = N$, then $x = \frac{\log_a(N)}{\log_a(b)}$

Note: The log button 

on your scientific calculator is log_{10} ("log base 10").

The following equations can be solved using indices or logarithms. For each:

- state whether it can be solved using indices, or must be solved using logarithms, then proceed to solve.

$3^x = 81$	$x^5 = 50$
$3^x = 43$	$6^{2x-1} = 2$
$3^{2x} - 3 = 24$	$16^{\frac{3}{x}} = 10$