HAWKER COLLEGE
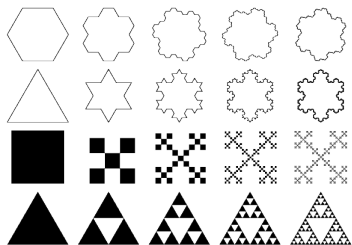Engage | Inspire | Achieve

**Learning Brief
SM2**

Goals

By the end of this unit, students:

- understand the concepts and techniques in trigonometry, real and complex numbers, and matrices
- apply reasoning skills and solve problems in trigonometry, real and complex numbers, and matrices
- communicate their arguments and strategies when solving problems
- construct proofs of results
- interpret mathematical information and ascertain the reasonableness of their solutions to problems

This week:
Complex Numbers:

- define the imaginary number i as a root of the equation $x^2 = -1$
- use complex numbers in the form a + bi where a and b are the real and imaginary parts
- determine and use complex conjugates
- perform complex-number arithmetic: addition, subtraction, multiplication and division.

Theoretical Components

Read through examples and make notes.

What are Complex Numbers:
https://bit.ly/3c4qCKM

Addition & Subtraction of Complex Numbers:
https://bit.ly/3iE8aeF

Multiplication of Complex Numbers:
https://bit.ly/33zS2EB

Powers of i:
https://bit.ly/3hzK7MF

Complex Conjugates:
https://bit.ly/32CiTkd

Complex Numbers & Four Operations:
https://bit.ly/3hDFXDx
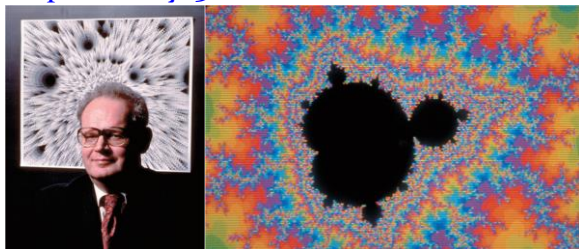
This Mandelbrot set shows how fractal geometry creates order out of what seem like irregular patterns. Points that are not in the Mandelbrot set are colour based on how quickly they diverge. Benoit Mandelbrot (b 1924), left, was the first person to study and name fractal geometry.

Practical Components

Check Google Drive 2023S2/WK10 folder:

(Answer all questions)

Investigation

A: The sum of two numbers, x and y, is 10, and their product is 40. Find the numbers x and y.

This investigation is based on a problem that was posed by Cardon in 1545 that saw the need to introduce complex numbers in the 16th century.

B. There is a complex number m with the imaginary part 164 and a positive integer n such that

$$\frac{m}{m+n} = 4i$$

Find n.

20 marks

QFO
Quiz/Forum/Other

This will help you visualise Mandlebrot Set Process:

https://www.desmos.com/calculator/uscgu3skam