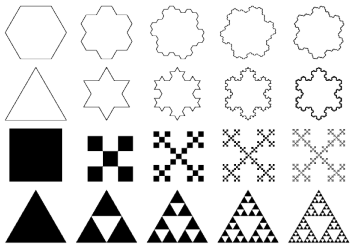
Week 11_12
Term 4
2023

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:

Roots of equations:

- use the general solution of real quadratic/cubic equations
- determine complex conjugate solutions of real quadratic/cubic equations
- determine linear factors of real quadratic/cubic polynomials.

Theoretical Components

Read through examples and make notes.

Mathspace - Zeroes and Factorisation:
https://bit.ly/33Xgtft

Solutions to Polynomials:
https://bit.ly/2RU72Ys

Videos:

Conjugate Pairs: https://goo.gl/BUAt8F

Zeores of Polynomials: https://goo.gl/oVQs0Z

Square Roots: https://goo.gl/ETPqmf

Additional Info:

Conjugate Root Theorem Proof:
https://goo.gl/kaC3ek

Practical Components

Check Google Drive WK11 folder:

(Answer all questions)

Investigation

A:
Given that $(x + yi)^{14} = a + bi, where\ x, y, a, b \in \mathbb{R}$, show that $(y - xi)^{14}, \forall(x, y)$ is equal to $-a - bi$.

B:
One zero of $ax^3 + (a + 1)x^2 + 10x + 15,\ a \in \mathbb{R}$, is purely imaginary. Find a and the zeroes of the polynomial.

(20 marks)

QFO

Quiz/Forum/Other

Historical Note:18th century mathematicians enjoyed playing with these new 'imaginary' numbers, but they were regarded as little more than interesting curiosities until the work of Gauss (1777 - 1855), the German mathematician, astronomer, and physicist. For centuries mathematicians had attempted to find a method of trisecting an angle using a compass and straight edge. Gauss put an end to this when he used complex numbers to prove the impossibility of such a construction. By his systematic use of complex numbers, he was able to convince mathematicians of their usefulness. Early last century, the American engineer Steinmetz used complex numbers to solve electrical problems, illustrating that complex numbers did have a practical application. Complex numbers are now used extensively in electronics, engineering, and physics.

Source: Haese Mathematics