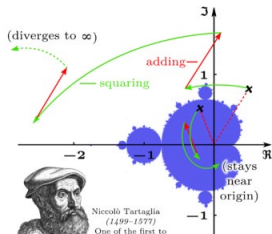


Goals



By the end of this unit, students will:

- understand the concepts and techniques in vectors, complex numbers, functions and graph sketching
- apply reasoning skills and solve problems in vectors, complex numbers, functions and graph sketching
- 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:

The complex plane (the Argand plane):

- examine and use addition of complex numbers as vector addition in the complex plane (SPMT08)
- examine and use multiplication as a linear transformation in the complex plane (SPMT09)
- identify subsets of the complex plane determined by relations such as $|z - 3i| \leq 4$, $\frac{\pi}{4} \leq \text{Arg}(z) \leq \frac{3\pi}{4}$, $\text{Re}(z) > \text{Im}(z)$, and $|z - 1| = 2|z - i|$

Theoretical Components

Rays and lines:

<http://www.youtube.com/watch?v=e2hw450iajA>

Have a look at the link for Graphing regions below:

<http://www.youtube.com/watch?v=8gtnZ5xSLuE>

Mathspace Lesson on Rays and Lines:

- <https://goo.gl/XjUOx>
- <https://goo.gl/CgPGe8>

Mathspace Lesson on Circles and Eclipses:

- <https://goo.gl/r6EXMv>
- <https://goo.gl/UVgDX9>

Mathspace Lesson on Regions and Areas:

<https://goo.gl/Zilwgz>

Practical Components

Check Google Classroom WK03 folder:

Ex 4A – Graphing Rays and lines on the Argand diagram

Ex 4B – Circles and Ellipses

Ex 4C – Combination Regions

Attempt at least 8 questions from each of the listed exercises.

Investigation

A: If $z = \cos \theta + i \sin \theta$, show that $1 + z = 2 \cos \frac{\theta}{2} \left(\cos \frac{\theta}{2} + i \sin \frac{\theta}{2} \right)$.

B: Sketch the region where $|z - 3 + i| \leq 5$ and $|z + 1| \leq |z - 1|$.

C: Use De Moivre's theorem to express $\cos 4\theta$ and $\sin 4\theta$ in terms of $\cos \theta$ and $\sin \theta$.
Hence show that $\tan 4\theta = \frac{4\tan\theta - 4\tan^3\theta}{1 - 6\tan^2\theta + \tan^4\theta}$

(20 marks)

Q/F/O
Quiz/Forum/Other

Mathspace Quiz: to be completed by the end of this week.