Solving Geometric Problems

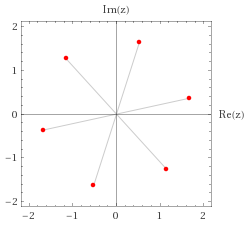
We have already seen in the previous exercise that the roots of an equation such as that below give evenly spaced points in the Argand diagram, because the modulus remained the same but we kept adding to the argument.

These points formed a regular hexagon, and in general for , form a regular -agon.

Recall that is the first root of unity of :

.

This has modulus 1 and argument .



Suppose was the first root of . Then consider the product . What happens? Why does this work?

If is one root of the equation ,

and are the th roots of unity,

then the roots of are given by

.

Example

The point lies at one vertex of an equilateral triangle. The centre of the triangle is at the origin.

1. Find the coordinates of the other vertices of the triangle.
2. Find the area of the triangle.

Test your understanding

An equilateral triangle has its centroid located at the origin and a vertex at (1,0). What are the coordinates of the other two vertices?

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