 Subsets of the complex plane

Modelled solutions

Determine the Cartesian equation, describe and sketch the graph defined by:

* Finding the Cartesian equation:
	+ Geometric interpretation:

 is the set of points 3 units from the origin. A circle with centre and radius of .

* + Algebraic interpretation:

Let

 (definition of the modulus)

The equation represents a circle with centre and radius or the set of all points which are units from the origin.

* Sketch the graph:



* Finding the Cartesian equation:
	+ Geometric interpretation:

This is of the formwhere

This is the set of points less than or equal to 4 units from the point or the set of all points on or inside the circle with centre and radius of .

* + Algebraic interpretation:

Let

 (definition of the modulus)

This is the set of points on or inside the circle with centre and radius of or the set of all points less than or equal to 4 units from the point

* Sketch the graph:



* Finding the Cartesian equation:
	+ Geometric interpretation:

This is of the formwhere

This is the set of points 5 units from the point or a circle with centre and radius of 5.

* + Algebraic interpretation:

Let

 (definition of the modulus)

This is the set of points on the circle with centre and radius of 5 or the set of all points 5 units from the point

* Sketch the graph:



* Geometric interpretation:

 is the set of all points which have an argument between and inclusive

* Algebraic interpretation:

Let

, where

(Change the sign as is negative as is in the 2nd quadrant)

This will represent the region which satisfies two conditions or the overlap in two regions. Region 1: Area above and including the line .

Region 2: Area above and including the line .

* Sketch the graph



* Algebraic interpretation:

Let

 and

This is the region where , or the area below the line

* Sketch the graph



* Finding the Cartesian equation:
	+ Geometric interpretation:

Set of points which are twice as far from as they are from

* + Algebraic interpretation:

Let

 (definition of the modulus)

 (squaring both sides)

The equation represents a circle with centre and radius or the set of points which are units from the origin.

* Sketch the graph



[Geogerba applet](https://ggbm.at/hbpzag93) demonstrating the solution where C is a moveable point and represents the solution.

* Finding the Cartesian equation:
	+ Algebraic interpretation:

Let

 and

Or

This is a linear relationship with

* + -intercept of and -intercept of .
	+ Gradient and -intercept of .
* Sketch the graph



1. Arg
* Geometric interpretation:

Arg

This is of the formwhere

Argis the set of all points which lie of the vector from (3, -2) at an angle of from the horizontal.

* Sketch the graph



1. |
* Finding the Cartesian equation:
* Geometric interpretation:

Set of points whose distance from and distance from sums to 3.

* Algebraic interpretation:

Let

 (definition of the modulus)

(squaring both sides)

 (squaring both sides)

(divide both sides by

Ellipse with centre with minor axis of and major axis of

* Sketch the graph



[Geogerba applet](https://ggbm.at/rrgct9u3) demonstrating the solution where C is a moveable point and represents the solution.