

Name: _____

Read pp. 585-592 to assist you in completing this worksheet.

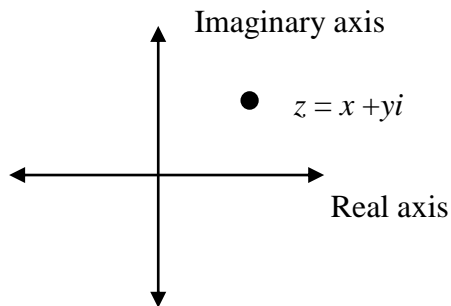
Chapter 9.3

The Complex Plane

Directions: Use your text to assist you in filling in the following blanks.

Introduction

A complex number $z = x + yi$ can be interpreted geometrically as the point (x, y) in the xy -plane as shown.



We shall refer to the collection of such points as the _____. The x-axis will be referred to as the _____, because any point that lies on the real axis is of the form _____, a real number. The y-axis is called the _____, because any point that lies on it is of the form _____, a pure imaginary number.

Magnitude

The magnitude of a complex number, z , is also called the _____ of z and is denoted by _____.

Find the magnitude of $z = 2 - 3i$.

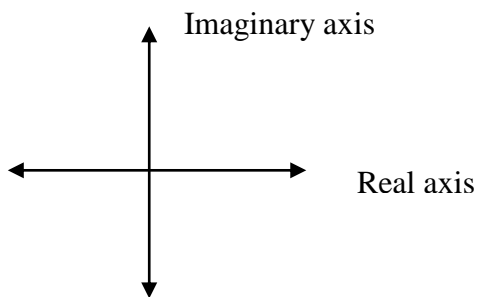
If $z = x + yi$, then its conjugate is _____. Show that $|z| = \sqrt{z\bar{z}}$.

Polar Form

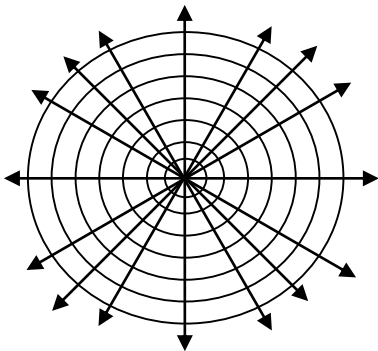
When a complex number is written in the form $z = x + yi$, it is said to be in _____ or _____ form. If $r \geq 0$ and $0 \leq \theta < 2\pi$, then it can be written in polar form as _____, where the angle θ is called the _____ of z and the magnitude of z is equal to _____.

Examples

1. Plot the point $z = \sqrt{3} - i$ in the complex plane and write an expression for z in polar form.



2. Plot the point $z = 2(\cos 30^\circ + i \sin 30^\circ)$ in the complex plane and write an expression for z in rectangular form.



Chapter 9.3

DeMoivre's Theorem

Directions: Evaluate the expressions below to find a pattern.

$$[2(\cos(20^\circ) + i\sin(20^\circ))]^2 =$$

$$[2(\cos(20^\circ) + i\sin(20^\circ))]^3 = [2(\cos(20^\circ) + i\sin(20^\circ))]^2 \times [2(\cos(20^\circ) + i\sin(20^\circ))]^1 =$$

$$[2(\cos(20^\circ) + i\sin(20^\circ))]^4 =$$

$$[2(\cos(20^\circ) + i\sin(20^\circ))]^n =$$

DeMoivre's Theorem: If $z = r(\cos(\theta) + i\sin(\theta))$ is a complex number, then

where $n \geq 1$ is a positive integer.