

Name: \_\_\_\_\_

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

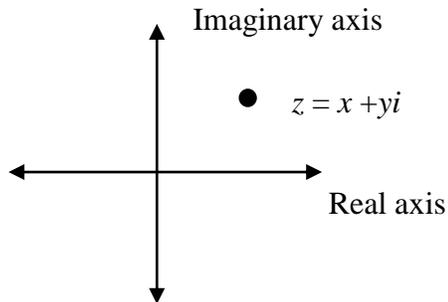
## Chapter 9.3

### 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  $|z| = \sqrt{z\bar{z}}$ .

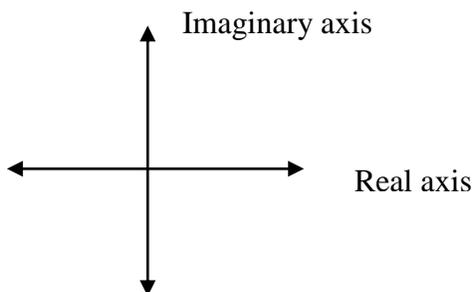
## Polar Form

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  $\theta$  is called the \_\_\_\_\_ of  $z$  and the magnitude of  $z$  is equal to \_\_\_\_\_.

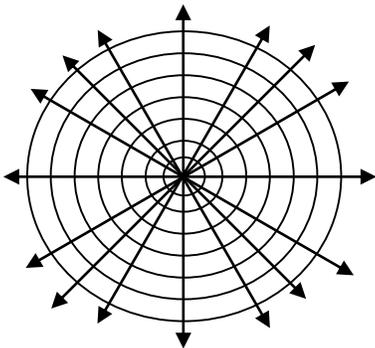
---

## 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.