

Name \_\_\_\_\_

Date \_\_\_\_\_

Advanced Algebra

Unit 4 quadratics

Assignment #17

Working with Imaginary Roots

We will start to do basic work with the complex number system. We will use this for parabolas that are above the x axis and open up or parabolas that are below and open down....so in either case they do not have roots.

A definition that you need to know is  $i^2 = -1$  so  $i = \sqrt{-1}$

So moving forward when we have  $\sqrt{-4}$  we can now write  $2i$

Example. The roots of a parabola are given as  $7+2i$  and  $7-2i$ . Write the equation of the parabola that produced these roots.

$-b =$  sum of the roots and  $c =$  the product of the roots So we will need to do the sum which is basically combining like terms. And then we will need to do the product. FOIL or use a box to help you with the multiplication.

Write the equation of the parabola from which the roots came.

1)  $5+3i$  and  $5-3i$

$-b = 10$   
 $b = -10$   
 $c = 25 + 9$   
 $34$

$$x^2 - 10x + 34$$

2)  $6+4i$  and  $6-4i$

$-b = 12$   
 $b = -12$   
 $c = 36 + 16$

$$x^2 - 12x + 52$$

3)  $9+2i$  and  $9-2i$

$-b = 18$   
 $b = -18$   
 $c = 81 + 4$

$$x^2 - 18x + 85$$

4)  $10+7i$  and  $10-7i$

$-b = 20$   
 $b = -20$   
 $c = 100 + 49$

$$x^2 - 20x + 149$$

5)  $12+9i$  and  $12-9i$

$-b = 24$   
 $b = -24$   
 $c = 144 + 81$

$$x^2 - 24x + 225$$

6)  $14+10i$  and  $14-10i$

$-b = 28$   
 $c = 196 + 100$   
 $296$

$$x^2 - 28x + 296$$

Complete the Square to solve the following. You will get all imaginary roots

1)  $y = x^2 - 12x + 40$

$$(x^2 - 12x + 36) - 36 + 40$$

$$(x-6)^2 + 4 = 0$$

$$x = 6 \pm \sqrt{-4}$$

$$\boxed{6 \pm 2i}$$

2)  $y = x^2 - 8x + 20$

$$(x^2 - 8x + 16) - 16 + 20 = 0$$

$$(x-4)^2 + 4 = 0$$

$$x = 4 \pm \sqrt{-4}$$

$$\boxed{4 \pm 2i}$$

3)  $y = x^2 - 6x + 13$

$$x^2 - 6x + 13 = 0$$

$$(x^2 - 6x + 9) - 9 + 13$$

$$(x-3)^2 + 4 = 0$$

$$\boxed{x = 3 \pm 2i}$$

4)  $y = x^2 - 6x + 18$

$$(x^2 - 6x + 9) - 9 + 18$$

$$(x-3)^2 + 9 = 0$$

$$\boxed{x = 3 \pm 3i}$$

5)  $y = x^2 - 10x + 34$

$$x^2 - 10x + 34 = 0$$

$$(x^2 - 10x + 25) - 25 + 34 = 0$$

$$(x-5)^2 + 9 = 0$$

$$\boxed{x = 5 \pm 3i}$$

6)  $y = x^2 - 18x + 90$

$$x^2 - 18x + 90 = 0$$

$$(x^2 - 18x + 81) - 81 + 90 = 0$$

$$(x-9)^2 + 9 = 0$$

$$\boxed{x = 9 \pm 3i}$$

7)  $y = x^2 - 10x + 29$

$$(x^2 - 10x + 25) - 25 + 29$$

$$(x-5)^2 + 4 = 0$$

$$\boxed{x = 5 \pm 2i}$$

8)  $y = x^2 - 20x + 104$

$$x^2 - 20x + 104$$

$$(x^2 - 20x + 100) - 100 + 104 = 0$$

$$(x-10)^2 + 4 = 0$$

$$\boxed{x = 10 \pm 2i}$$