Answers to Rally Coach - Working with i (ID: 1)

1) $4i$
2) $5i$
3) $i\sqrt{30}$
4) $i\sqrt{3}$
5) $2i\sqrt{2}$
6) $2i\sqrt{3}$
7) $-i$
8) $-1 + 5i$
9) $7 + 2i$
10) $-14 - 9i$
11) -24
12) $-6 - 24i$
13) $-3 - 4i$
14) $-15 - 8i$
15) $-40 - 34i$
16) $20 - 20i$

$(-8+4i)(-3+i)$

	-8	$+4i$
-3	24	$-12i$
$+i$	$-8i$	$4i^2$

i^2

$24 - 20i + 4(-1)$

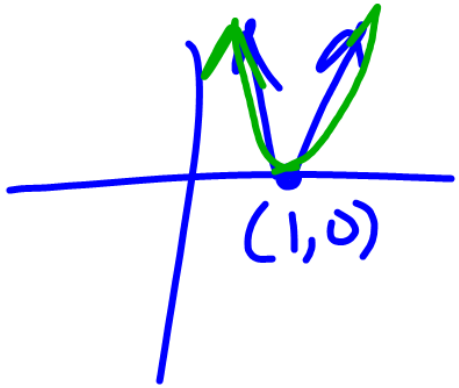
$24 - 20i - 4$

$20 - 20i$

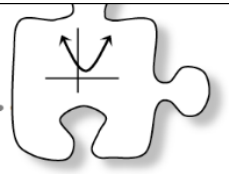
10

Select the correct domain and range for each function.

	Domain: All Real Numbers	Domain: $x \geq 3$	Range: All Real Numbers	Range: $y \geq 0$
$y = 3(x-1)$	☐	☐	☐	☐
$y = 3\|x-1\|$	☐	☐	☐	☐
$y = 3(x-1)^2$	☐	☐	☐	☐



8.2.1 What is the equation?



Writing Equations Using Complex Roots

So far in this chapter, you have studied the attributes of polynomial functions, including how to write the equation of a function given its graph. Now you will reverse your thinking to write the equation of a polynomial function given its roots, even when the roots are not visible on the graph!

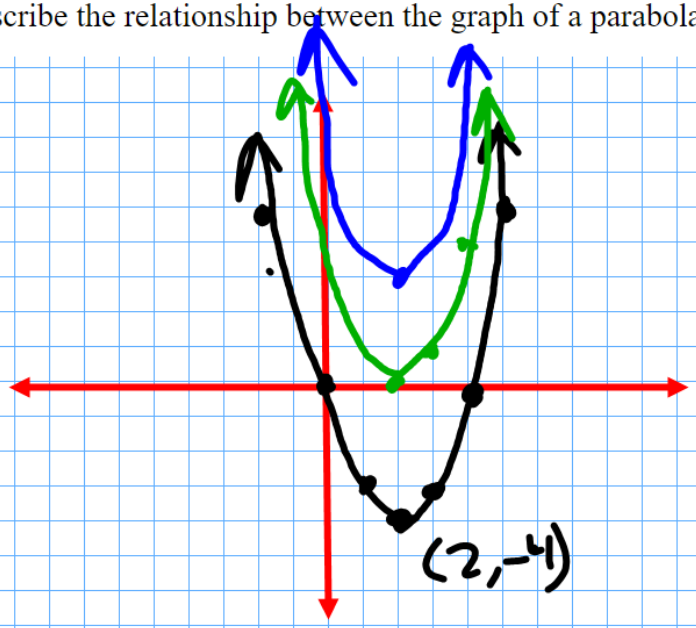
8-55. In previous lessons, you have focused on the real roots of polynomials, which are the x-intercepts of the graph. However, you have seen that the roots of quadratic functions can be real or complex. Compare and contrast what happens with the graphs and equations for the three cases in parts (a) through (c) below.

a. Sketch the graph of $y = (x - 2)^2 - 4$. What are the roots?

b. Sketch the graph of $y = (x - 2)^2$. What are the roots?

c. Sketch the graph of $y = (x - 2)^2 + 3$. What are the roots?

d. Describe the relationship between the graph of a parabola and the number and kind of roots its equation has.



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

$+4 \qquad +4$

$4 = (x-2)^2$

$\sqrt{4} = |x|$

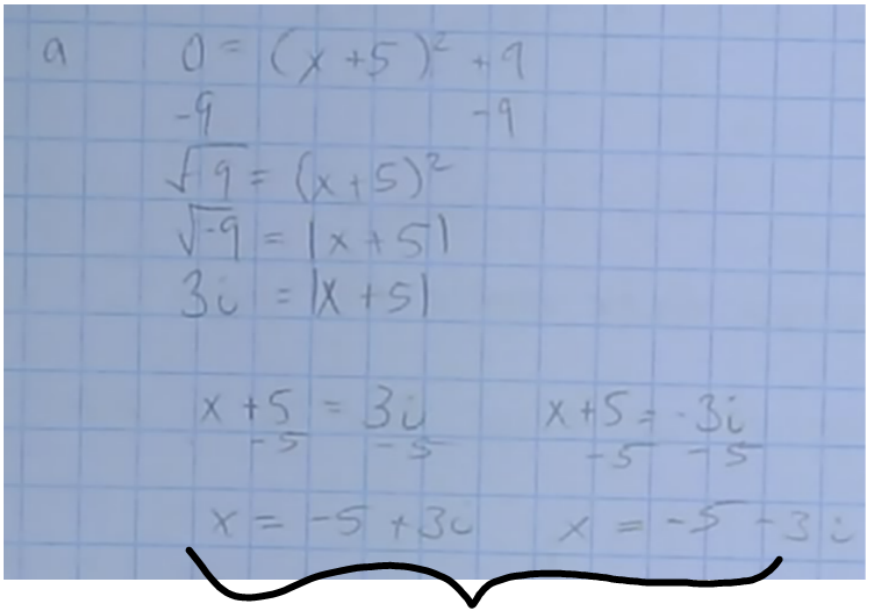
8-56. Determine the roots of each of the following quadratic functions by solving for x when $y = 0$. Does the graph of either of these functions intersect the x-axis?

$$X = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

a. $y = (x + 5)^2 + 9$

b. $y = x^2 - 4x + 9$

8-57. What do you notice about the complex roots in problem 8-56? Describe any patterns you see. Discuss these patterns with your team and write all of your observations.



$X = -5 \pm 3i$

b) $X = \frac{4 \pm \sqrt{-20}}{2}$

$X = \frac{4 \pm 2i\sqrt{5}}{2}$

$X = \frac{4}{2} \pm \frac{2i\sqrt{5}}{2}$

$X = 2 \pm i\sqrt{5}$

8-49. Consider the quadratic equation $x^2 - 10x = -29$. Homework Help

a. Is $x = 5 + 2i$ a solution to the equation? How can you be sure without solving?

b. Without solving, predict another solution to the equation. Verify your prediction by checking it.

c. Where does the parabola $y = x^2 - 10x + 29$ intersect the x-axis? Explain.

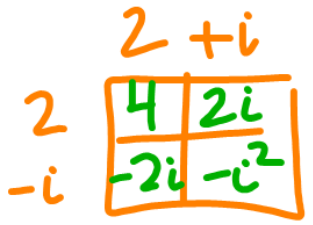
8-58. In parts (a) through (d) below, look for patterns as you calculate the sum and the product for each pair of complex numbers whose imaginary parts have opposite signs. Pairs of complex numbers such as these are called **complex conjugates**. Use any patterns you discover to answer parts (e) through (g).

a. $2 + i,\ 2 - i$ $(2+i)+(2-i)=4$

b. $3 - 5i,\ 3 + 5i$ Sum: 6 Product: 34

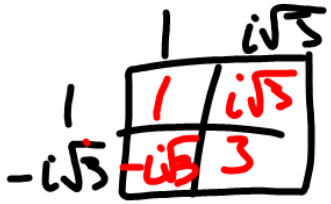
c. $-4 + i,\ -4 - i$ -8 17

d. $1 + i\sqrt{3},\ 1 - i\sqrt{3}$ 2 4



$4 - i^2$

$4-(-1)=5$



$(i\sqrt{3})(-i\sqrt{3})$

$-i^2\sqrt{9}$

$-(-1)(3)$

e. What complex number can you multiply $3 + 2i$ by to get a real number? $3-2i$

f. What is the complex conjugate of $a + bi$? $a-bi$

g. What happens when you multiply any complex number by its conjugate?

8-69. Multiply and simplify each expression.

a. $(3 + 2i)(4 + i)$

d. $(a + bi)(a - bi)$