4-4 HW Answer Key

1. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
2. $b^2 - 4ac$
3. 2 complex solutions
4. 1 real solution
5. 2 real solutions
6. discriminant = -324; 2 complex solutions; $x = \pm 9i$
7. discriminant = -104; 2 complex solutions; $x = \frac{2}{3} \pm \frac{i\sqrt{26}}{3}$
8. discriminant = 16; 2 real solutions; $x = 3, -1$
9. discriminant = 0; 1 real solution; $x = 2$
10. discriminant = -56; 2 complex solutions; $x = \frac{2}{5} \pm \frac{i\sqrt{14}}{10}$

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Name Key Alg 2 Homework 4-4

1. Write the quadratic formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
2. What is the discriminant? $b^2 - 4ac$
3. If discriminant is negative, what kind of solutions do you have? 2 complex solutions
4. If discriminant is zero, what kind of solutions do you have? 1 real solution
5. If discriminant is positive, what kind of solutions do you have? 2 real solutions

For 6 - 10 do the following:

1. Compute the value of the discriminant of the quadratic equation.
2. Use the value of the discriminant to predict the number and type of solutions.
3. Find all real and complex solutions.

6. $x^2 + 81 = 0$

1. $b^2 - 4ac = 0 - 4(1)(81) = -324$
2. 2 complex solutions
3. $x = \frac{0 \pm \sqrt{-324}}{2(1)} = \frac{\pm 18i}{2} = \pm 9i$ $\{\pm 9i\}$

7. $3x^2 - 4x + 10 = 0$

1. $b^2 - 4ac = 16 - 4(3)(10) = -104$
2. 2 complex solutions
3. $x = \frac{4 \pm \sqrt{-104}}{2(3)} = \frac{4 \pm i\sqrt{4}\sqrt{26}}{6} = \frac{2 \pm i\sqrt{26}}{3}$ $\left\{\frac{2}{3} \pm \frac{i\sqrt{26}}{3}\right\}$

$\frac{4}{6} \pm \frac{2i\sqrt{26}}{6}$

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8. $x^2 - 2x - 3 = 0$

1. $b^2 - 4ac = 4 - 4(1)(-3) = 16$
2. 2 real solutions
3. $x = \frac{2 \pm \sqrt{16}}{2(1)} = \frac{2 \pm 4}{2} = 1 \pm 2 \to 3, -1$ $\{3, -1\}$

9. $x^2 + 4 = 4x$ $x^2 - 4x + 4 = 0$

1. $b^2 - 4ac = 16 - 4(1)(4) = 0$
2. 1 real solution
3. $x = \frac{4 \pm \sqrt{0}}{2(1)} = 2$ $\{2\}$

10. $9x - 9x^2 = 3 + x + x^2$ $0 = 10x^2 - 8x + 3$

1. $b^2 - 4ac = 64 - 4(10)(3) = -56$
2. 2 complex solutions
3. $x = \frac{8 \pm \sqrt{-56}}{2(10)} = \frac{8 \pm i\sqrt{4}\sqrt{14}}{20} = \frac{8 \pm 2i\sqrt{14}}{20} = \frac{4 \pm i\sqrt{14}}{10}$ $\left\{\frac{2}{5} \pm \frac{i\sqrt{14}}{10}\right\}$

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Day 5 Review Answer Key

1. a) 4 + 9i b) 20 + 3i c) 3 + 10i d) 5 + 3i
2. a) 11 + 41i b) 6 + 22i c) -17 - 17i
3. 26, which is a real number
4. 13i, which is an imaginary number
5. a) 20i b) 8 c) 8 + 20i
6. i; $\sqrt{-1}$
7. $i^4 = 1$ and $i^{\text{any mult. of 4}} = 1$, so $i^{\text{any power}} = i, -1, -i$, or 1
8. -1, -i, 1, i, -1
9. $i\sqrt{r}$
10. 10i
11. -12i
12. $4i\sqrt{5}$
13. $15i\sqrt{6}$
14. -42
15. $-2\sqrt{30}$
16. $-3i\sqrt{10}$
17. -19
18. 30 - 4i
19. -6 + 29i
20. 51 + 18i
21. $x^2 + 25$
22. See diagram in slide
23. x = 6, y = 9
24. Discriminant = -80

Answer = $\left\{-\frac{1}{4} \pm \frac{i\sqrt{5}}{4}\right\}$

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Review Algebra 2 Unit 4 Day 5

1. Find each of the following sums and differences.

a) (-2 + 7i) + (6 + 2i) b) (8 + 4i) + (12 - i)

c) (5 + 3i) - (2 - 7i) d) (-3 + 5i) - (-8 + 2i)

2. Find the following products. Write each of your answers as a complex number in the form a+bi.

Calc Check $i^2 = -1$

a) (3 + 5i)(7 + 2i) b) (-2 + 6i)(3 - 2i) c) (4 + i)(-5 - 3i)

$21 + 6i + 35i + 10i^2$

$21 - 10$

$11 + 41i$

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3. Show that the product of (2+3i) and (4-6i) results in a purely real number.

4. Show that the product of (2+3i) and (3+2i) results in a purely imaginary number.

5. Give an example of each number:
   a) Pure imaginary _____
   b) Pure real _____
   c) Complex (not pure imaginary or pure real) _____

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6. The imaginary number _____ is equal to _____.
7. Explain the 'cycle' of i.

8. What are the values of: i^2 = _____ i^3 = _____ i^4 = _____ i^5 = _____ i^{30} = _____

9. How do you simplify $\sqrt{-r}$? _____

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Simplify:

10. $\sqrt{-100}$ = _____
11. $-\sqrt{-144}$ = _____
12. $\sqrt{-80}$ = _____
13. $5\sqrt{-54}$ = _____
14. $\sqrt{-49} \cdot \sqrt{-36}$ = _____
15. $\sqrt{-5} \cdot \sqrt{-24}$ = $i\sqrt{5} \cdot i\sqrt{24} : i^2\sqrt{120}$
16. $-\sqrt{-18} \cdot \sqrt{5}$ = _____
17. $(\sqrt{-19})^2$ = _____

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Add or subtract the following complex numbers.

18. $(22 + 7i) + (8 - 11i)$ = _____

19. $(2 + 16i) - (8 - 13i)$ = _____

Multiply the following complex numbers.

20. $(3 + 4i)(9 - 6i)$ =

21. $(x + 5i)(x - 5i)$ =

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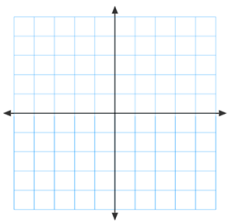
22. Plot and label a complex number in each quadrant and on both axes on the graph below. Be sure to label the axes.



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23. Find the real values of x and y if $11x + 8yi = 66 + 72i$.

$11x : 66$ $8y : 72$

x = _____

y = _____

24. Compute the value of the discriminant of the quadratic equation, and then solve using the quadratic formula.

$8x^2 + 4x + 3 = 0$

Discriminant _____

Answer _____

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Review Algebra 2 Unit 4 Day 5

1. Find each of the following sums and differences.

a) $(-2 + 7i) + (6 + 2i) = 4 + 9i$ b) $(8 + 4i) + (12 - i) = 20 + 3i$

c) $(5 + 3i) - (2 - 7i) = 3 + 10i$ d) $(-3 + 5i) - (-8 + 2i) = 5 + 3i$

2. Find the following products. Write each of your answers as a complex number in the form a+bi.

a) $(3 + 5i)(7 + 2i)$
$= 21 + 6i + 35i + 10i^2$
$= 21 + 41i - 10$
$= 11 + 41i$

b) $(-2 + 6i)(3 - 2i)$
$= -6 + 4i + 18i - 12i^2$
$= -6 + 22i + 12$
$= 6 + 22i$

c) $(4 + i)(-5 - 3i)$
$= -20 - 12i - 5i - 3i^2$
$= -20 - 17i + 3$
$= -17 - 17i$

3. Show that the product of (2+3i) and (4-6i) results in a purely real number.
$(2 + 3i)(4 - 6i) = 8 - 12i + 12i - 18i^2$
$= 8 + 18$
$= 26 \rightarrow$ Real #

4. Show that the product of (2+3i) and (3+2i) results in a purely imaginary number.
$(2 + 3i)(3 + 2i) = 6 + 4i + 9i + 6i^2$
$= 6 + 13i - 6$
$= 13i \rightarrow$ Imag. #

5. Give an example of each number:
a) Pure imaginary 20i
b) Pure real 8
c) Complex (not pure imaginary or pure real) 8 + 20i

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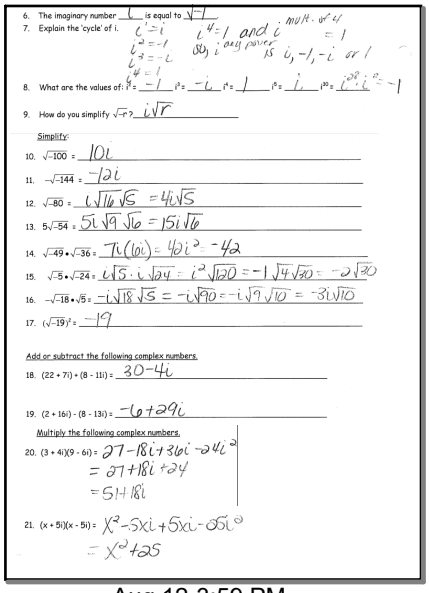

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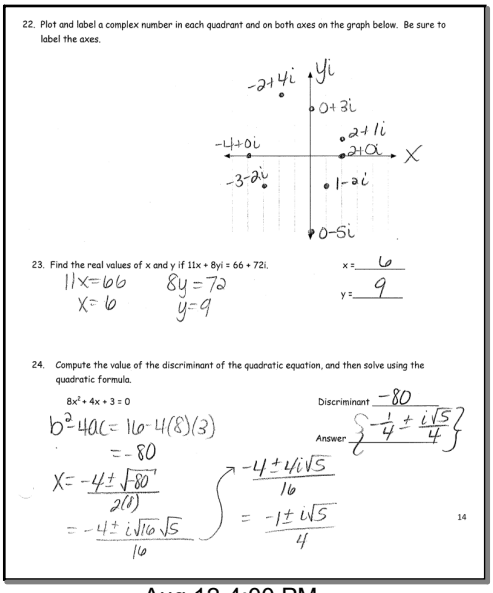

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25. Solve the equation $2x^2 + 5x + 8 = 0$. Express the answer in a + bi form.

$b^2 - 4ac = 25 - 4(2)(8)$

$= -39$

$$x = \frac{-5 \pm \sqrt{-39}}{2(2)}$$

$$x = \frac{-5 \pm i\sqrt{39}}{4}$$

$$x = \frac{-5}{4} \pm \frac{\sqrt{39}}{4}i$$

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