

## Integrated II: Unit 2 Study Guide

|  |  |   |
|--|--|---|
| 1. Find the value of $r$ .<br>$(r + 4)^2 = 48$   | 2. Find the value of $s$ .<br>$(s - 2)^2 = 200$  | 3. Find the value of $d$ .<br>$(d + 3)^2 = 12$  |
| 4. Determine the roots of the equation $x^2 + 5x - 36 = 0$ .   | 5. Determine the roots of the equation $x^2 - x - 42 = 0$ .  | 6. Determine the roots of the equation $x^2 - 5x - 14 = 0$ .  |
| 7. Calculate the roots of the quadratic equation, if possible. Verify your solution.<br>$3x^2 + 10x + 8 = 0$ | 8. Calculate the roots of the quadratic equation, if possible. Verify your solution.<br>$4x^2 + 10x + 6 = 0$ | 9. Calculate the roots of the quadratic equation, if possible. Verify your solution.<br>$5x^2 + 7x - 6 = 0$ |

10. Use the quadratic formula to find the zeros.

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

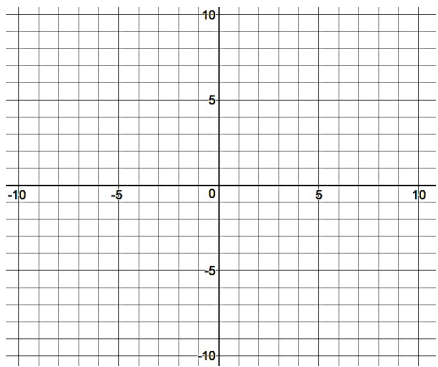
11. Use the quadratic formula to find the zeros.

$$f(x) = x^2 - 8x + 1$$

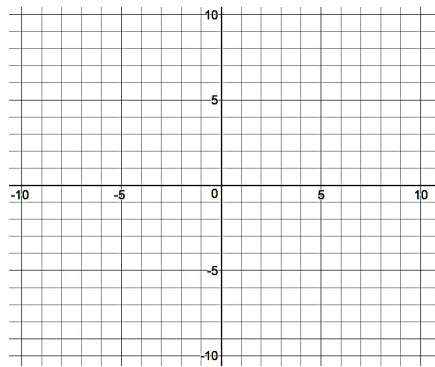
12. Use the quadratic formula to find the zeros.

$$f(x) = -x^2 - 10x + 9$$

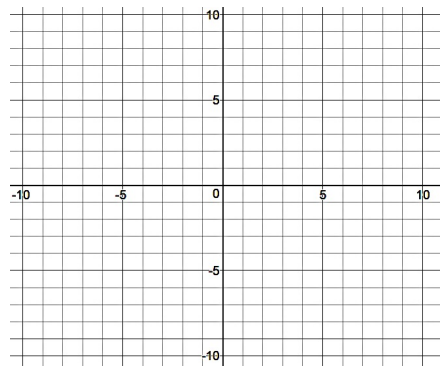
13. Graph.  $f(x) = x^2 - 2x - 3$



14. Graph.  $f(x) = -x^2 - 6x - 8$



15. Graph.  $f(x) = -x^2 - 8x - 7$



16. Find the zeros and write them in interval notation.

$$f(x) < x^2 - 2x - 3$$

17. Find the zeros and write them in interval notation.

$$f(x) \leq -x^2 - 6x - 8$$

18. Find the zeros and write them in interval notation.

$$f(x) \geq -x^2 - 8x - 7$$

|  |   |   |         |                 |                   |             |                  |                |  |  |                |              |         |                 |                   |             |                  |                |  |  |                |              |         |                 |                   |             |                  |                |  |
|--|---|---|---------|-----------------|-------------------|-------------|------------------|----------------|--|--|----------------|--------------|---------|-----------------|-------------------|-------------|------------------|----------------|--|--|----------------|--------------|---------|-----------------|-------------------|-------------|------------------|----------------|--|
| <p>19. Solve the system of equations algebraically over the set of real numbers.</p> $\begin{cases} y = 2x - 5 \\ y = 4x^2 + 10x - 17 \end{cases}$   | <p>20. Solve the system of equations algebraically over the set of real numbers.</p> $\begin{cases} y = -3x + 7 \\ y = 2x^2 + 9x + 7 \end{cases}$   | <p>21. Solve the system of equations algebraically over the set of real numbers.</p> $\begin{cases} y = 5x + 1 \\ y = 3x^2 + 5x - 11 \end{cases}$   |         |                 |                   |             |                  |                |  |  |                |              |         |                 |                   |             |                  |                |  |  |                |              |         |                 |                   |             |                  |                |  |
| <p>22. Simplify each expression by using <math>i</math>.</p> <p>a. <math>i^{47}</math></p> <p>b. <math>\sqrt{-64}</math></p> <p>c. <math>5 + \sqrt{-147}</math></p> <p>d. <math>(2 + 3i)(4 - 9i)</math></p>  | <p>23. Simplify each expression by using <math>i</math>.</p> <p>a. <math>i^{77}</math></p> <p>b. <math>\sqrt{-169}</math></p> <p>c. <math>2 + \sqrt{-128}</math></p> <p>d. <math>(5 - i)(2 + 4i)</math></p> | <p>24. Simplify each expression by using <math>i</math>.</p> <p>a. <math>i^{66}</math></p> <p>b. <math>\sqrt{-625}</math></p> <p>c. <math>7 - \sqrt{-243}</math></p> <p>d. <math>(11 - 2i)(5 + 3i)</math></p> |         |                 |                   |             |                  |                |  |  |                |              |         |                 |                   |             |                  |                |  |  |                |              |         |                 |                   |             |                  |                |  |
| <p>25. List <i>all</i> words from the box that describe the number, <math>5 + 3i</math>.</p> <table border="1" data-bbox="142 1545 568 1776"> <tbody> <tr> <td>Natural Number</td> <td>Whole Number</td> <td>Integer</td> </tr> <tr> <td>Rational Number</td> <td>Irrational Number</td> <td>Real Number</td> </tr> <tr> <td>Imaginary Number</td> <td>Complex Number</td> <td></td> </tr> </tbody> </table> | Natural Number  | Whole Number  | Integer | Rational Number | Irrational Number | Real Number | Imaginary Number | Complex Number |  | <p>26. List <i>all</i> words from the box that describe the number, 19.5.</p> <table border="1" data-bbox="597 1545 1023 1776"> <tbody> <tr> <td>Natural Number</td> <td>Whole Number</td> <td>Integer</td> </tr> <tr> <td>Rational Number</td> <td>Irrational Number</td> <td>Real Number</td> </tr> <tr> <td>Imaginary Number</td> <td>Complex Number</td> <td></td> </tr> </tbody> </table> | Natural Number | Whole Number | Integer | Rational Number | Irrational Number | Real Number | Imaginary Number | Complex Number |  | <p>27. List <i>all</i> words from the box that describe the number, <math>\sqrt{7}</math>.</p> <table border="1" data-bbox="1052 1545 1477 1776"> <tbody> <tr> <td>Natural Number</td> <td>Whole Number</td> <td>Integer</td> </tr> <tr> <td>Rational Number</td> <td>Irrational Number</td> <td>Real Number</td> </tr> <tr> <td>Imaginary Number</td> <td>Complex Number</td> <td></td> </tr> </tbody> </table> | Natural Number | Whole Number | Integer | Rational Number | Irrational Number | Real Number | Imaginary Number | Complex Number |  |
| Natural Number   | Whole Number  | Integer   |         |                 |                   |             |                  |                |  |  |                |              |         |                 |                   |             |                  |                |  |  |                |              |         |                 |                   |             |                  |                |  |
| Rational Number  | Irrational Number   | Real Number   |         |                 |                   |             |                  |                |  |  |                |              |         |                 |                   |             |                  |                |  |  |                |              |         |                 |                   |             |                  |                |  |
| Imaginary Number   | Complex Number  |   |         |                 |                   |             |                  |                |  |  |                |              |         |                 |                   |             |                  |                |  |  |                |              |         |                 |                   |             |                  |                |  |
| Natural Number   | Whole Number  | Integer   |         |                 |                   |             |                  |                |  |  |                |              |         |                 |                   |             |                  |                |  |  |                |              |         |                 |                   |             |                  |                |  |
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| Imaginary Number   | Complex Number  |   |         |                 |                   |             |                  |                |  |  |                |              |         |                 |                   |             |                  |                |  |  |                |              |         |                 |                   |             |                  |                |  |
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| Imaginary Number   | Complex Number  |   |         |                 |                   |             |                  |                |  |  |                |              |         |                 |                   |             |                  |                |  |  |                |              |         |                 |                   |             |                  |                |  |

28. A ball on an unknown planet is tossed upward from a height of 84 feet with an initial vertical velocity of 7 feet per second. Its height can be modeled by the quadratic function  $h(t) = -7x^2 + 7x + 84$ , where  $h(t)$  is the height, in feet, of the ball, and  $t$  is the time the ball has been in the air, in seconds.

a. Determine the values of  $a$ ,  $b$ , and  $c$ .

b. How long will it take for the ball to reach the ground after it has been tossed? Round to the nearest hundredth.

c. Find the maximum height the ball will reach.

29. A ball on an unknown planet is tossed upward from a height of 60 feet with an initial vertical velocity of 48 feet per second. Its height can be modeled by the quadratic function  $h(t) = -12x^2 + 48x + 60$ , where  $h(t)$  is the height, in feet, of the ball, and  $t$  is the time the ball has been in the air, in seconds.

a. Determine the values of  $a$ ,  $b$ , and  $c$ .

b. How long will it take for the ball to reach the ground after it has been tossed? Round to the nearest hundredth.

c. Find the maximum height the ball will reach.

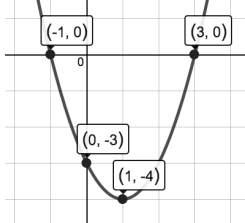
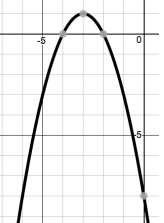
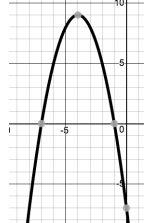
30. A ball on an unknown planet is tossed upward from a height of 88 feet with an initial vertical velocity of 22 feet per second. Its height can be modeled by the quadratic function  $h(t) = -11x^2 + 22x + 88$ , where  $h(t)$  is the height, in feet, of the ball, and  $t$  is the time the ball has been in the air, in seconds.

a. Determine the values of  $a$ ,  $b$ , and  $c$ .

b. How long will it take for the ball to reach the ground after it has been tossed? Round to the nearest hundredth.

c. Find the maximum height the ball will reach.

Integrated II Unit 2 Study Guide Answers

|   |  |   |
|---|--|---|
| 1. $r = -4 \pm 4\sqrt{3}$   | 2. $s = 2 \pm 10\sqrt{2}$  | 3. $d = -3 \pm 2\sqrt{3}$   |
| 4. $(-9, 0)$ or $(4, 0)$  | 5. $(-6, 0)$ or $(7, 0)$   | 6. $(7, 0)$ or $(-2, 0)$  |
| 7. $(-2, 0)$ or $(-\frac{4}{3}, 0)$ or<br>$(-2, 0)$ or $(-1.\bar{3}, 0)$  | 8. $(-\frac{3}{2}, 0)$ or $(-1, 0)$ or<br>$(-1.5, 0)$ or $(-1, 0)$   | 9. $(-2, 0)$ or $(\frac{3}{5}, 0)$ or<br>$(-2, 0)$ or $(0.6, 0)$  |
| 10. $(1 - 2i\sqrt{2}, 0)$ or $(1 + 2i\sqrt{2}, 0)$  | 11. $(4 - \sqrt{15}, 0)$ or $(4 + \sqrt{15}, 0)$   | 12. $(-5 - \sqrt{34}, 0)$ or $(-5 + \sqrt{34}, 0)$  |
| 13.    | 14. Vertex: $(-3, 1)$<br>Zeros:<br>$(-4, 0)$ or $(-2, 0)$<br>y-intercept:<br>$(0, -8)$    | 15. Vertex: $(-4, 9)$<br>Zeros:<br>$(-7, 0)$ or $(-1, 0)$<br>y-intercept:<br>$(0, -7)$   |
| 16. $(-\infty, -1)$ or $(3, \infty)$  | 17. $[-4, -2]$   | 18. $(-\infty, -7]$ or $[-1, \infty)$   |
| 19. $(-3, -11)$ or $(1, -3)$  | 20. $(0, 7)$ & $(-6, 25)$  | 21. $(2, 11)$ & $(-2, -9)$  |
| 22. a. $i^3 = \boxed{-i}$<br>b. $8i$<br>c. $5 + 7i\sqrt{3}$<br>d. $35 - 6i$   | 23. a. $i^1 = \boxed{i}$<br>b. $13i$<br>c. $2 + 8i\sqrt{2}$<br>d. $14 + 18i$   | 24. a. $i^2 = \boxed{-1}$<br>b. $25i$<br>c. $7 - 9\sqrt{3}$<br>d. $61 + 23i$  |
| 25. Complex Number  | 26. Rational, Real, & Complex Number   | 27. Irrational, Real, & Complex Number  |
| 28. a. $a = -7, b = 7, c = 84$<br><u>or, if you divided out the -7 first...</u><br>$a = 1, b = -1, c = -12$<br>b. $(-3, 0)$ & $(4, 0)$<br>c. 85.75 feet<br><i>(Since the vertex is <math>(0.5, 85.75)</math>, so the maximum is <math>y = 85.75</math>)</i> | 29. a. $a = -12, b = 48, c = 60$<br><u>or, if you divided by the -12 first...</u><br>$a = 1, b = -4, c = -5$<br>b. $(-1, 0)$ & $(5, 0)$<br>c. 108 feet<br><i>(Since the vertex is <math>(2, 108)</math>, the maximum height is <math>y = 108</math>)</i> | 30. a. $a = -11, b = 22, c = 88$<br><u>or, if you divided by the -11 first...</u><br>$a = 1, b = -2, c = -8$<br>b. $(-2, 0)$ & $(4, 0)$<br>c. 99 feet<br><i>(Since the vertex is <math>(1, 99)</math>, the maximum height is <math>y = 99</math>)</i> |