Algebra 2
Glencoe

Name: ______________________________
Period: __________

Chapter 5: Polynomials
Part 2: 5.6-5.9

Section	Lesson Objectives	Assignment Problems	Due	Score
5.6	Be able to +, -, x and ÷ **radical expressions**	15-49 odd, 59, 61, 63 (21 problems)	Nov 2	
5.7	Be able to move between **exponential & radical form**	21-69 odd, 62 (26 problems)	Nov 3	
Quiz	**5.6-5.7**	**Quiz on 5.6-5.7**	**Nov 4**	
5.8	Be able to solve **radical equations & inequalities**	13-41 odd, 45, 46, 47,49, 51 (20 problems)	Nov 4	
5.9 A	**Complex #s**	Worksheets: (39 problems) 1. "Graphing & Absolute Value of Complex Numbers" = 1-6 all 2. Pg 287 = 1-15 all 3. Pg 288 = 1-18 all	Nov 5	
5.9 B	**Complex #s**	5.9 in textbook page 273=19-59 odd, 67, 68, 71, 73, 75 (26 problems)	Nov 6	
Quiz	**5.8 & 5.9**	**Quiz on 5,8 & 5.9**	**Nov 9**	
5.9 C	Complex #s	Page 839 Section 5-9 do 1-24 all	Nov 9	
Test	**5.6-5.9**	**Partner Pre-Test on 5.6-5.9**	**Nov 10**	
Review	5.6-5.9	Text p 279 = 43-75 all (32 problems)	Nov 12	
TEST	**5.6-5.9**	**TEST on 5.6-5.9**	**Nov 12**	

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5-8 Study Guide and Intervention

Radical Equations and Inequalities

Solve Radical Equations The following steps are used in solving equations that have variables in the radicand. Some algebraic procedures may be needed before you use these steps.

Step 1	Isolate the radical on one side of the equation.
Step 2	To eliminate the radical, raise each side of the equation to a power equal to the index of the radical.
Step 3	Solve the resulting equation.
Step 4	Check your solution in the original equation to make sure that you have not obtained any extraneous roots.

Example 1 **Solve $2\sqrt{4x+8} - 4 = 8$.**

$2\sqrt{4x+8} - 4 = 8$ Original equation

$2\sqrt{4x+8} = 12$ Add 4 to each side.

$\sqrt{4x+8} = 6$ Isolate the radical.

$4x + 8 = 36$ Square each side.

$4x = 28$ Subtract 8 from each side.

$x = 7$ Divide each side by 4.

Check

$2\sqrt{4(7)+8} - 4 \stackrel{?}{=} 8$

$2\sqrt{36} - 4 \stackrel{?}{=} 8$

$2(6) - 4 \stackrel{?}{=} 8$

$8 = 8$

The solution $x = 7$ checks.

Example 2 **Solve $\sqrt{3x+1} = \sqrt{5x} - 1$.**

$\sqrt{3x+1} = \sqrt{5x} - 1$ Original equation

$3x + 1 = 5x - 2\sqrt{5x} + 1$ Square each side.

$2\sqrt{5x} = 2x$ Simplify.

$\sqrt{5x} = x$ Isolate the radical.

$5x = x^2$ Square each side.

$x^2 - 5x = 0$ Subtract $5x$ from each side.

$x(x - 5) = 0$ Factor.

$x = 0$ or $x = 5$

Check

$\sqrt{3(0)+1} = 1$, but $\sqrt{5(0)} - 1 = -1$, so 0 is not a solution.

$\sqrt{3(5)+1} = 4$, and $\sqrt{5(5)} - 1 = 4$, so the solution is $x = 5$.

Exercises

Solve each equation.

1. $3 + 2x\sqrt{3} = 5$

2. $2\sqrt{3x+4} + 1 = 15$

3. $8 + \sqrt{x+1} = 2$

4. $\sqrt{5-x} - 4 = 6$

5. $12 + \sqrt{2x-1} = 4$

6. $\sqrt{12-x} = 0$

7. $\sqrt{21} - \sqrt{5x-4} = 0$

8. $10 - \sqrt{2x} = 5$

9. $\sqrt{x^2+7x} = \sqrt{7x-9}$

10. $4\sqrt[3]{2x+11} - 2 = 10$

11. $2\sqrt{x+11} = \sqrt{x+2} + \sqrt{3x-6}$

12. $\sqrt{9x-11} = x + 1$

Lesson 5-8

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5-8 Study Guide and Intervention *(continued)*

Radical Equations and Inequalities

Solve Radical Inequalities A **radical inequality** is an inequality that has a variable in a radicand. Use the following steps to solve radical inequalities.

Step 1	If the index of the root is even, identify the values of the variable for which the radicand is nonnegative.
Step 2	Solve the inequality algebraically.
Step 3	Test values to check your solution.

Example **Solve $5 - \sqrt{20x + 4} \geq -3$.**

Since the radicand of a square root must be greater than or equal to zero, first solve

$20x + 4 \geq 0.$

$$20x + 4 \geq 0$$
$$20x \geq -4$$
$$x \geq -\frac{1}{5}$$

Now solve $5 - \sqrt{20x + 4} \geq -3$.

$5 - \sqrt{20x + 4} \geq -3$ Original inequality

$\sqrt{20x + 4} \leq 8$ Isolate the radical.

$20x + 4 \leq 64$ Eliminate the radical by squaring each side.

$20x \leq 60$ Subtract 4 from each side.

$x \leq 3$ Divide each side by 20.

It appears that $-\frac{1}{5} \leq x \leq 3$ is the solution. Test some values.

$x = -1$	$x = 0$	$x = 4$
$\sqrt{20(-1) + 4}$ is not a real number, so the inequality is not satisfied.	$5 - \sqrt{20(0) + 4} = 3$, so the inequality is satisfied.	$5 - \sqrt{20(4) + 4} \approx -4.2$, so the inequality is not satisfied

Therefore the solution $-\frac{1}{5} \leq x \leq 3$ checks.

Exercises

Solve each inequality.

1. $\sqrt{c - 2} + 4 \geq 7$

2. $3\sqrt{2x - 1} + 6 < 15$

3. $\sqrt{10x + 9} - 2 > 5$

4. $5\sqrt[3]{x + 2} - 8 < 2$

5. $8 - \sqrt{3x + 4} \geq 3$

6. $\sqrt{2x + 8} - 4 > 2$

7. $9 - \sqrt{6x + 3} \geq 6$

8. $\frac{20}{\sqrt{3x + 1}} \leq 4$

9. $2\sqrt{5x - 6} - 1 < 5$

10. $\sqrt{2x + 12} + 4 \geq 12$

11. $\sqrt{2d + 1} + \sqrt{d} \leq 5$

12. $4\sqrt{b + 3} - \sqrt{b - 2} \geq 10$

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5-8 Study Guide and Intervention

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$\sqrt{3x + 1} = \sqrt{5x} - 1$ Original equation
$3x + 1 = 5x - 2\sqrt{5x} + 1$ Square each side.
$2\sqrt{5x} = 2x$ Simplify.
$\sqrt{5x} = x$ Isolate the radical.
$5x = x^2$ Square each side.
$x^2 - 5x = 0$ Subtract 5x from each side.
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$\sqrt{3(0) + 1} = 1$, but $\sqrt{5(0)} - 1 = -1$, so 0 is not a solution.
$\sqrt{3(5) + 1} = 4$, and $\sqrt{5(5)} - 1 = 4$, so the solution is $x = 5$.

Exercises

Solve each equation.

1. $3 + 2x\sqrt{3} = 5$ — $\frac{\sqrt{3}}{3}$
2. $2\sqrt{3x + 4} + 1 = 15$ — 15
3. $8 + \sqrt{x + 1} = 2$ — no solution
4. $\sqrt{5 - x} - 4 = 6$ — −95
5. $12 + \sqrt{2x - 1} = 4$ — no solution
6. $\sqrt{12 - x} = 0$ — 12
7. $\sqrt{21} - \sqrt{5x - 4} = 0$ — 5
8. $10 - \sqrt{2x} = 5$ — 12.5
9. $\sqrt{x^2 + 7x} = \sqrt{7x - 9}$ — no solution
10. $4\sqrt[3]{2x + 11} - 2 = 10$ — 8
11. $2\sqrt{x + 11} = \sqrt{x + 2} + \sqrt{3x - 6}$ — 14
12. $\sqrt{9x - 11} = x + 1$ — 3, 4

Lesson 5-8

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5-8 Study Guide and Intervention (continued)

Radical Equations and Inequalities

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$20x \le 60$ Subtract 4 from each side.
$x \le 3$ Divide each side by 20.

It appears that $-\frac{1}{5} \le x \le 3$ is the solution. Test some values.

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Therefore the solution $-\frac{1}{5} \le x \le 3$ checks.

Exercises

Solve each inequality.

1. $\sqrt{c - 2} + 4 \ge 7$ — $c \ge 11$
2. $3\sqrt{2x - 1} + 6 < 15$ — $\frac{1}{2} \le x < 5$
3. $\sqrt{10x + 9} - 2 > 5$ — $x > 4$
4. $5\sqrt[3]{x + 2} - 8 < 2$ — $x < 6$
5. $8 - \sqrt{3x + 4} \ge 3$ — $-\frac{4}{3} \le x \le 7$
6. $\sqrt{2x + 8} - 4 > 2$ — $x > 14$
7. $9 - \sqrt{6x + 3} \ge 6$ — $-\frac{1}{2} \le x \le 1$
8. $\frac{20}{\sqrt{3x + 1}} \le 4$ — $x \ge 8$
9. $2\sqrt{5x - 6} - 1 < 5$ — $\frac{6}{5} \le x < 3$
10. $\sqrt{2x + 12} + 4 \ge 12$ — $x \ge 26$
11. $\sqrt{2d + 1} + \sqrt{d} \le 5$ — $0 \le d \le 4$
12. $4\sqrt{b + 3} - \sqrt{b - 2} \ge 10$ — $b \ge 6$

Answers

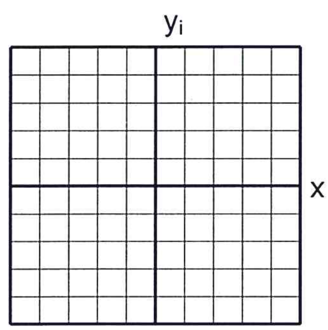
Algebra II
Graphing and Absolute Value of Complex Numbers

Check for understanding 3103.2.7 – Graph complex numbers in the complex plane and recognize differences and similarities with the graphical representations of real numbers graphed on the number line.

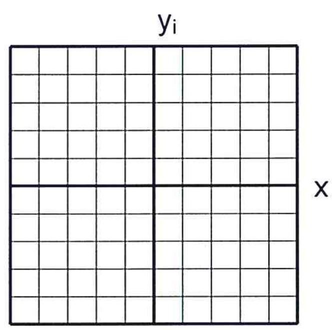
Check for understanding 3103.2.9 Find and describe geometrically the absolute value of a complex number.

Graph each of the following complex numbers.

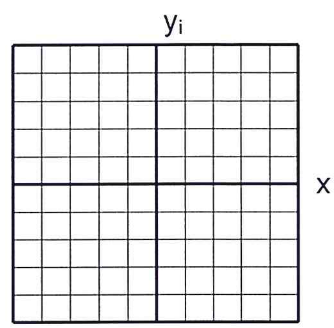
1. $5 + 3i$



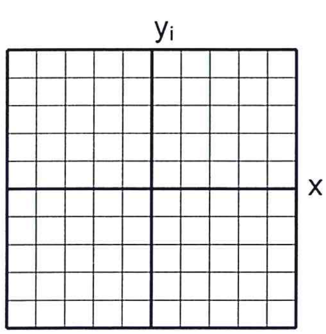
2. $3 - 4i$



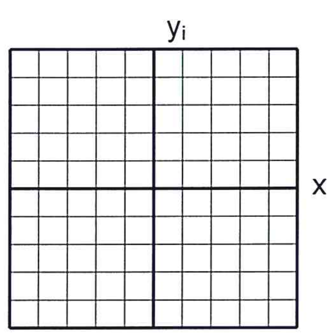
3. $-1 + 2i$



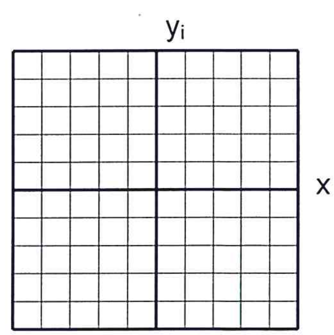
4. $-3 - i$



5. -2



6. $4i$



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5-9 Study Guide and Intervention

Complex Numbers

Add and Subtract Complex Numbers

Complex Number	A complex number is any number that can be written in the form $a + bi$, where a and b are real numbers and i is the imaginary unit ($i^2 = -1$). a is called the real part, and b is called the imaginary part.
Addition and Subtraction of Complex Numbers	Combine like terms. $(a + bi) + (c + di) = (a + c) + (b + d)i$ $(a + bi) - (c + di) = (a - c) + (b - d)i$

Example 1 **Simplify $(6 + i) + (4 - 5i)$.**

$(6 + i) + (4 - 5i)$
$= (6 + 4) + (1 - 5)i$
$= 10 - 4i$

Example 2 **Simplify $(8 + 3i) - (6 - 2i)$.**

$(8 + 3i) - (6 - 2i)$
$= (8 - 6) + [3 - (-2)]i$
$= 2 + 5i$

To solve a quadratic equation that does not have real solutions, you can use the fact that $i^2 = -1$ to find complex solutions.

Example 3 **Solve $2x^2 + 24 = 0$.**

$2x^2 + 24 = 0$	Original equation
$2x^2 = -24$	Subtract 24 from each side.
$x^2 = -12$	Divide each side by 2.
$x = \pm\sqrt{-12}$	Take the square root of each side.
$x = \pm 2i\sqrt{3}$	$\sqrt{-12} = \sqrt{4} \cdot \sqrt{-1} \cdot \sqrt{3}$

Exercises

Simplify.

1. $(-4 + 2i) + (6 - 3i)$

2. $(5 - i) - (3 - 2i)$

3. $(6 - 3i) + (4 - 2i)$

4. $(-11 + 4i) - (1 - 5i)$

5. $(8 + 4i) + (8 - 4i)$

6. $(5 + 2i) - (-6 - 3i)$

7. $(12 - 5i) - (4 + 3i)$

8. $(9 + 2i) + (-2 + 5i)$

9. $(15 - 12i) + (11 - 13i)$

10. i^4

11. i^6

12. i^{15}

Solve each equation.

13. $5x^2 + 45 = 0$

14. $4x^2 + 24 = 0$

15. $-9x^2 = 9$

Lesson 5-9

5-9 Study Guide and Intervention *(continued)*

Complex Numbers

Multiply and Divide Complex Numbers

Multiplication of Complex Numbers	Use the definition of i^2 and the FOIL method: $(a + bi)(c + di) = (ac - bd) + (ad + bc)i$

To divide by a complex number, first multiply the dividend and divisor by the **complex conjugate** of the divisor.

Complex Conjugate	$a + bi$ and $a - bi$ are complex conjugates. The product of complex conjugates is always a real number.

Example 1 **Simplify $(2 - 5i) \cdot (-4 + 2i)$.**

$(2 - 5i) \cdot (-4 + 2i)$

$= 2(-4) + 2(2i) + (-5i)(-4) + (-5i)(2i)$ FOIL

$= -8 + 4i + 20i - 10i^2$ Multiply.

$= -8 + 24i - 10(-1)$ Simplify.

$= 2 + 24i$ Standard form

Example 2 **Simplify $\frac{3 - i}{2 + 3i}$.**

$\frac{3 - i}{2 + 3i} = \frac{3 - i}{2 + 3i} \cdot \frac{2 - 3i}{2 - 3i}$ Use the complex conjugate of the divisor.

$= \frac{6 - 9i - 2i + 3i^2}{4 - 9i^2}$ Multiply.

$= \frac{3 - 11i}{13}$ $i^2 = -1$

$= \frac{3}{13} - \frac{11}{13}i$ Standard form

Exercises

Simplify.

1. $(2 + i)(3 - i)$

2. $(5 - 2i)(4 - i)$

3. $(4 - 2i)(1 - 2i)$

4. $(4 - 6i)(2 + 3i)$

5. $(2 + i)(5 - i)$

6. $(5 - 3i)(-1 - i)$

7. $(1 - i)(2 + 2i)(3 - 3i)$

8. $(4 - i)(3 - 2i)(2 + i)$

9. $(5 - 2i)(1 - i)(3 + i)$

10. $\frac{5}{3 + i}$

11. $\frac{7 - 13i}{2i}$

12. $\frac{6 - 5i}{3i}$

13. $\frac{4 - 2i}{3 + i}$

14. $\frac{-5 - 3i}{2 - 2i}$

15. $\frac{3 + 4i}{4 - 5i}$

16. $\frac{3 + i\sqrt{5}}{3 - i\sqrt{5}}$

17. $\frac{4 - i\sqrt{2}}{i\sqrt{2}}$

18. $\frac{\sqrt{6} + i\sqrt{3}}{\sqrt{2} - i}$

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5-9 Study Guide and Intervention

Complex Numbers

Add and Subtract Complex Numbers

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$(8 + 3i) - (6 - 2i)$
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$x^2 = -12$	Divide each side by 2.
$x = \pm\sqrt{-12}$	Take the square root of each side.
$x = \pm 2i\sqrt{3}$	$\sqrt{-12} = \sqrt{4} \cdot \sqrt{-1} \cdot \sqrt{3}$

Exercises

Simplify.

1. $(-4 + 2i) + (6 - 3i)$ $2 - i$
2. $(5 - i) - (3 - 2i)$ $2 + i$
3. $(6 - 3i) + (4 - 2i)$ $10 - 5i$
4. $(-11 + 4i) - (1 - 5i)$ $-12 + 9i$
5. $(8 + 4i) + (8 - 4i)$ 16
6. $(5 - 2i) - (-6 - 3i)$ $11 + 5i$
7. $(12 - 5i) - (4 + 3i)$ $8 - 8i$
8. $(9 + 2i) + (-2 + 5i)$ $7 + 7i$
9. $(15 - 12i) + (11 - 13i)$ $26 - 25i$
10. i^4 1
11. i^6 -1
12. i^{15} $-i$

Solve each equation.

13. $5x^2 + 45 = 0$ $\pm 3i$
14. $4x^2 + 24 = 0$ $\pm i\sqrt{6}$
15. $-9x^2 = 9$ $\pm i$

Lesson 5-9

NAME ______________ DATE ________ PERIOD _____

5-9 Study Guide and Intervention *(continued)*

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$\frac{3 - 11i}{13}$	$i^2 = -1$
$= \frac{3}{13} - \frac{11}{13}i$	Standard form

Exercises

Simplify.

1. $(2 + i)(3 - i)$ $7 + i$
2. $(5 - 2i)(4 - i)$ $18 - 13i$
3. $(4 - 2i)(1 - 2i)$ $-10i$
4. $(4 - 6i)(2 + 3i)$ 26
5. $(2 + i)(5 - i)$ $11 + 3i$
6. $(5 - 3i)(-1 - i)$ $-8 - 2i$
7. $(1 - i)(2 + 2i)(3 - 3i)$ $12 - 12i$
8. $(4 - i)(3 - 2i)(2 + i)$ $31 - 12i$
9. $(5 - 2i)(1 - i)(3 + i)$ $16 - 18i$
10. $\frac{5}{3 + i}$ $\frac{3}{2} - \frac{1}{2}i$
11. $\frac{7 - 13i}{2i}$ $-\frac{13}{2} - \frac{7}{2}i$
12. $\frac{6 - 5i}{3i}$ $-\frac{5}{3} - 2i$
13. $\frac{4 - 2i}{3 + i}$ $1 - i$
14. $\frac{-5 - 3i}{2 - 2i}$ $-\frac{1}{2} - 2i$
15. $\frac{3 + 4i}{4 - 5i}$ $-\frac{8}{41} + \frac{31}{41}i$
16. $\frac{3 + i\sqrt{5}}{3 - i\sqrt{5}}$ $\frac{2}{7} + \frac{3i\sqrt{5}}{7}$
17. $\frac{4 - i\sqrt{2}}{i\sqrt{2}}$ $-1 - 2i\sqrt{2}$
18. $\frac{\sqrt{6} + i\sqrt{3}}{\sqrt{2} - i}$ $\frac{\sqrt{3}}{3} + \frac{2i\sqrt{6}}{3}$

[Le]sson 5-8 16. no solution 19. $-0.2 < y < 3$

(pages 263–267)

[So]lve each equation or inequality.

1. $\sqrt{x} = 16$ 256
2. $\sqrt{z + 3} = 7$ 46
3. $\sqrt[3]{a + 5} = 1$ -4
4. $5\sqrt{s} - 8 = 3$ $\frac{121}{25}$
5. $\sqrt[4]{m + 7} + 11 = 9$ no solution
6. $d + \sqrt{d^2 - 8} = 4$ 3
7. $g\sqrt{5} + 4 = g + 4$ 0
8. $\sqrt{x - 8} = \sqrt{13 + x}$ no solution
9. $\sqrt{3x + 10} = 1 + \sqrt{2x + 5}$ $-2, 2$
10. $\sqrt{3x + 9} > 2$ $x > -\frac{5}{3}$
11. $\sqrt{3n - 1} \le 5$ $\frac{1}{3} \le n \le \frac{26}{3}$
12. $2 - 4\sqrt{21 - 6c} < -6$ $c < \frac{17}{6}$
13. $\sqrt{5y + 4} > 8$ $y > 12$
14. $\sqrt{2w + 3} + 5 \ge 7$ $w \ge 0.5$
15. $\sqrt{x + 29} - 3 = \sqrt{x - 16}$ 52
16. $\sqrt{3x + 25} + \sqrt{10 - 2x} = 0$
17. $\sqrt{2c + 3} - 7 > 0$ $c > 23$
18. $\sqrt{3z - 5} - 3 = 1$ 7
19. $\sqrt{5y + 1} + 6 < 10$
20. $\sqrt{3n + 1} - 2 \le 6$
21. $\sqrt{y - 5} - \sqrt{y} \ge 1$ no solution
22. $(5n - 1)^{\frac{1}{3}} = 0$ $\frac{1}{5}$
23. $(7x - 6)^{\frac{1}{3}} + 1 = 3$ 2
24. $(6a - 8)^{\frac{1}{4}} + 9 \ge 10$ $a \ge 1.5$
25. $-\frac{1}{3} \le n \le 21$

[Le]sson 5-9

(pages 270–275)

[Si]mplify. 10. $6 + 14i$

1. $\sqrt{-289}$ $17i$
2. $\sqrt{-\frac{25}{121}}$ $\frac{5}{11}i$
3. $\sqrt{-625b^8}$ $25b^4i$
4. $\sqrt{-\frac{28t^6}{27s^5}}$ $\frac{2t^3i\sqrt{21s}}{9s^3}$
5. $(7i)^2$ -49
6. $(6i)(-2i)(11i)$ $132i$
7. $(\sqrt{-8})(\sqrt{-12})$ $-4\sqrt{6}$
8. $-i^{22}$ 1
9. $i^{17} \cdot i^{12} \cdot i^{26}$ $-i$
10. $(14 - 5i) + (-8 + 19i)$
11. $(7i) - (2 + 3i)$ $-2 + 4i$
12. $(2 + 2i) - (5 + i)$ $-3 + i$
13. $(7 + 3i)(7 - 3i)$ 58
14. $(8 - 2i)(5 + i)$ $42 - 2i$
15. $(6 + 8i)^2$ $-28 + 96i$
16. $\frac{3}{6 - 2i}$ $\frac{9 + 3i}{20}$
17. $\frac{5i}{3 + 4i}$ $\frac{4 + 3i}{5}$
18. $\frac{3 - 7i}{5 + 4i}$ $\frac{-13 - 47i}{41}$

[So]lve each equation.

19. $x^2 + 8 = 3$ $\pm i\sqrt{5}$
20. $\frac{4x^2}{49} + 6 = 3$ $\pm\frac{7i\sqrt{3}}{2}$
21. $8x^2 + 5 = 1$ $\pm\frac{i\sqrt{2}}{2}$
22. $12 - 9x^2 = 38$ $\pm\frac{i\sqrt{26}}{3}$
23. $9x^2 + 7 = 4$ $\pm\frac{i\sqrt{3}}{3}$
24. $\frac{1}{2}x^2 + 1 = 0$ $\pm i\sqrt{2}$

Radical Expressions

See pages ...56.

Concept Summary

For any real numbers a and b and any integer $n > 1$,

- Product Property: $\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$
- Quotient Property: $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$

Example Simplify $6\sqrt[5]{32m^3} \cdot 5\sqrt[5]{1024m^2}$.

$6\sqrt[5]{32m^3} \cdot 5\sqrt[5]{1024m^2} = 6 \cdot 5\sqrt[5]{(32m^3 \cdot 1024m^2)}$	Product Property of Radicals
$= 30\sqrt[5]{2^5 \cdot 4^5 \cdot m^5}$	Factor into exponents of 5 if possible.
$= 30\sqrt[5]{2^5} \cdot \sqrt[5]{4^5} \cdot \sqrt[5]{m^5}$	Product Property of Radicals
$= 30 \cdot 2 \cdot 4 \cdot m$ or $240m$	Write the fifth roots.

Exercises Simplify. *See Examples 1–6 on pages 250–253.* **47. $20 + 8\sqrt{6}$**

43. $\sqrt[6]{128}$ **$2\sqrt[6]{2}$**
44. $\sqrt{5} + \sqrt{20}$ **$3\sqrt{5}$**
45. $5\sqrt{12} - 3\sqrt{75}$ **$-5\sqrt{3}$**
46. $6\sqrt[5]{11} - 8\sqrt[5]{11}$ **$-2\sqrt[5]{11}$**
47. $(\sqrt{8} + \sqrt{12})^2$
48. $\sqrt{8} \cdot \sqrt{15} \cdot \sqrt{21}$ **$6\sqrt{70}$**
49. $\frac{\sqrt{243}}{\sqrt{3}}$ **9**
50. $\frac{1}{3 + \sqrt{5}}$ **$\frac{3 - \sqrt{5}}{4}$**
51. $\frac{\sqrt{10}}{4 + \sqrt{2}}$ **$\frac{2\sqrt{10} - \sqrt{5}}{7}$**

5-7 Radical Exponents

See pages 257–262.

Concept Summary

- For any nonzero real number b, and any integers m and n, with $n > 1$, $b^{\frac{m}{n}} = \sqrt[n]{b^m} = (\sqrt[n]{b})^m$

Examples

1 Write $32^{\frac{4}{5}} \cdot 32^{\frac{2}{5}}$ in radical form.

$32^{\frac{4}{5}} \cdot 32^{\frac{2}{5}} = 32^{\frac{4}{5} + \frac{2}{5}}$	Product of powers
$= 32^{\frac{6}{5}}$	Add.
$= (2^5)^{\frac{6}{5}}$	$32 = 2^5$
$= 2^6$ or 64	Power of a power

2 Simplify $\frac{3x}{\sqrt[3]{z}}$.

$\frac{3x}{\sqrt[3]{z}} = \frac{3x}{z^{\frac{1}{3}}}$	Rational exponents
$= \frac{3x}{z^{\frac{1}{3}}} \cdot \frac{z^{\frac{2}{3}}}{z^{\frac{2}{3}}}$	Rationalize the denominator.
$= \frac{3xz^{\frac{2}{3}}}{z}$ or $\frac{3x\sqrt[3]{z^2}}{z}$	Rewrite in radical form.

Exercises Evaluate. *See Examples 3 and 5 on pages 258 and 259.*

52. $27^{-\frac{2}{3}}$ **$\frac{1}{9}$**
53. $9^{\frac{1}{3}} \cdot 9^{\frac{5}{3}}$ **81**
54. $\left(\frac{8}{27}\right)^{-\frac{2}{3}}$ **$\frac{9}{4}$**

Simplify. *See Example 5 on page 259.*

55. $\frac{1}{y^{\frac{2}{5}}}$ **$\frac{y^{\frac{3}{5}}}{y}$**
56. $\frac{xy}{\sqrt[3]{z}}$ **$\frac{xyz^{\frac{2}{3}}}{z}$**
57. $\frac{3x + 4x^2}{x^{-\frac{2}{3}}}$ **$3x^{\frac{5}{3}} + 4x^{\frac{8}{3}}$**

Chapter 5 Study Guide and Review 279

Chapter 5 For More ...
• Extra Practice, see pages 836–839.
• Mixed Problem Solving, see page 866.

5-8 Radical Equations and Inequalities

See pages 263–267.

Concept Summary

- To solve a radical equation, isolate the radical. Then raise each side of the equation to a power equal to the index of the radical.

Example Solve $\sqrt{3x-8}+1=3$.

$\sqrt{3x-8}+1=3$	Original equation
$\sqrt{3x-8}=2$	Subtract 1 from each side.
$(\sqrt{3x-8})^2=2^2$	Square each side.
$3x-8=4$	Evaluate the squares.
$x=4$	Solve for x.

Exercises Solve each equation. *See Examples 1–3 on pages 263 and 264.*

58. $\sqrt{x}=6$ **36**
59. $y^{\frac{1}{3}}-7=0$ **343**
60. $(x-2)^{\frac{3}{2}}=-8$ **no solution**
61. $\sqrt{x+5}-3=0$ **4**
62. $\sqrt{3t-5}-3=4$ **18**
63. $\sqrt{2x-1}=3$ **5**
64. $\sqrt[4]{2x-1}=2$ **8.5**
65. $\sqrt{y+5}=\sqrt{2y-3}$ **8**
66. $\sqrt{y+1}+\sqrt{y-4}=5$ **8**

5-9 Complex Numbers

See pages 270–275.

Concept Summary

- $i^2=-1$ and $i=\sqrt{-1}$
- Complex conjugates can be used to simplify quotients of complex numbers.

Examples

1 Simplify $(15-2i)+(-11+5i)$.

$(15-2i)+(-11+5i)=[15+(-11)]+(-2+5)i$ Group the real and imaginary parts.

$=4+3i$ Add.

2 Simplify $\frac{7i}{2+3i}$.

$\frac{7i}{2+3i}=\frac{7i}{2+3i}\cdot\frac{2-3i}{2-3i}$ $2+3i$ and $2-3i$ are conjugates.

$=\frac{14i-21i^2}{4-9i^2}$ Multiply.

$=\frac{21+14i}{13}$ or $\frac{21}{13}+\frac{14}{13}i$ $i^2=-1$

Exercises Simplify. *See Examples 1–3 and 6–8 on pages 270, 272, and 273.*

67. $\sqrt{-64m^{12}}$ **$8m^6i$**
68. $(7-4i)-(-3+6i)$ **$10-10i$**
69. $-6\sqrt{-9}\cdot 2\sqrt{-4}$ **72**
70. i^6 **−1**
71. $(3+4i)(5-2i)$ **$23+14i$**
72. $(\sqrt{6}+i)(\sqrt{6}-i)$ **7**
73. $\frac{1+i}{1-i}$ **i**
74. $\frac{4-3i}{1+2i}$ **$-\frac{2}{5}-\frac{11}{5}i$**
75. $\frac{3-9i}{4+2i}$ **$\frac{-3-21i}{10}$**

Chapter 5

Vocabu

Choose the
1. [2] x^2 –
2. $4x$[2] –
3. $9x^2+2$

Skills a

Simplify. 6
4. $(5b)^4(6c)$

Evaluate. E
7. (3.16 ×

Simplify.
9. $(x^4-x^3$
x^3+x^2

Factor comp
11. x^2-14

Simplify.
14. $\sqrt{175}$ 5
17. $\frac{9}{5-\sqrt{3}}$
20. $\sqrt[6]{256s^1}$

Solve each
23. $\sqrt{b+1}$
26. $\sqrt[3]{2w-}$

Simplify.
29. $(5-2i)$
31. SKYDIV
a distan
before tl
period?
32. GEOME
by $\sqrt{s(s}$
of a trian
radical f
33. STANDA
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