Name: **Course/Section:** **Instructor:**

Chapter 7 Radical Expressions and Functions
7.4 Operations on Radical Expressions

Addition and Subtraction ~ Multiplication ~ Rationalizing the Denominator

STUDY PLAN

Read: Read Section 7.4 on pages 521-530 in your textbook or eText.

Practice: Do your assigned exercises in your ☐ Book ☐ MyMathLab ☐ Worksheets

Review: Keep your corrected assignments in an organized notebook and use them to review for the test.

Key Terms

Exercises 1-3: Use the vocabulary terms listed below to complete each statement. Note that some terms or expressions may not be used.

conjugate
radicand
like radical
radical expression
rationalizing the denominator

1. _____(s) have the same index and the same radicand.

2. The process of removing any radical expressions from the denominator is called _____.

3. The _____ of $\sqrt{a}-\sqrt{b}$ is $\sqrt{a}+\sqrt{b}$.

Addition and Subtraction

Exercises 1-24: Refer to Examples 1-9 on pages 522-526 in your text and the Section 7.4 lecture video.

If possible, add the expressions and simplify.

1. $5\sqrt{7}+8\sqrt{7}$ **1.** _____

2. $4\sqrt[3]{5}+\sqrt[3]{5}$ **2.** _____

3. $3+2\sqrt{3}$ **3.** _____

4. $\sqrt{6}+\sqrt{10}$ **4.** _____

Write each pair of terms as like radicals, if possible.

5. $\sqrt{75},\ \sqrt{48}$ **5.** _____

6. $\sqrt{8},\ \sqrt{4}$ **6.** _____

7. $7\sqrt[3]{24},\ 2\sqrt[3]{81}$ **7.** _____

Add the expressions and simplify.

8. $\sqrt{18}+4\sqrt{2}$ **8.** _____

9. $\sqrt[3]{24}+\sqrt[3]{3}$ **9.** _____

10. $5\sqrt{2}+\sqrt{8}+\sqrt{18}$ **10.** _____

Add the expressions and simplify. Assume that all variables are positive.

11. $\sqrt[4]{32}+3\sqrt[4]{2}$ **11.** _____

12. $-4\sqrt{9x}+\sqrt{x}$ **12.** _____

13. $2\sqrt{5b}+8\sqrt{20b}+3\sqrt{45b}$ **13.** _____

Simplify the expressions.

14. $6\sqrt{5}-2\sqrt{5}$ **14.** _____

15. $4\sqrt[3]{7}-3\sqrt[3]{7}+\sqrt[3]{10}$ **15.** _____

16. $6\sqrt{t}+\sqrt[3]{t}-3\sqrt{t}$ **16.** _____

Subtract and simplify. Assume that all variables are positive.

17. $5\sqrt[3]{m^2n} - \sqrt[3]{m^2n}$ **17.** _____

18. $\sqrt{9y^3} - \sqrt{y^3}$ **18.** _____

19. $\sqrt[3]{\frac{7x}{8}} - \frac{\sqrt[3]{7x}}{4}$ **19.** _____

20. The functions given by $N(x) = 650\sqrt{x} + 5000$ (new technology) and $O(x) = 225\sqrt{x} + 1700$ (old technology) approximate the increase in revenue resulting from investing x dollars in equipment (per worker).

(a) Find their difference $D(x) = N(x) - O(x)$. Simplify your answer. **20.(a)**_____

(b) Evaluate $D(40{,}000)$ and interpret the result. **(b)**_____

Subtract and simplify. Assume that all variables are positive.

21. $\frac{7\sqrt{2}}{4} - \frac{2\sqrt{2}}{3}$ **21.** _____

22. $\sqrt[4]{81x^6y^9} - \sqrt[4]{16x^2y}$ **22.** _____

23. $2\sqrt[3]{\frac{t^4}{8}} - 4\sqrt[3]{t}$ **23.** _____

24. Find the exact perimeter of a rectangle with length $\sqrt{75}$ feet and width $\sqrt{12}$ feet. Then approximate your answer to the nearest hundredth of a foot. **24.** _____

Muliplication

Exercises 25-26: Refer to Example 10 on pages 526-527 in your text and the Section 7.4 lecture video.

Multiply and simplify.

25. $\left(\sqrt{a}+6\right)\left(\sqrt{a}-2\right)$ **25.** _____

26. $\left(2-\sqrt{5}\right)\left(2+\sqrt{5}\right)$ **26.** _____

Rationalizing the Denominator

Exercises 27-35: Refer to Examples 11-15 on pages 527-530 in your text and the Section 7.4 lecture video.

Rationalize each denominator. Assume that all variables are positive.

27. $\dfrac{1}{\sqrt{3}}$ **27.** _____

28. $\dfrac{2}{7\sqrt{2}}$ **28.** _____

29. $\sqrt{\dfrac{y}{50}}$ **29.** _____

30. $\dfrac{x^2y}{\sqrt{x^3}}$ **30.** _____

31. An equilateral triangle has sides of length $\frac{x}{\sqrt{3}}$. Find the perimeter and rationalize the denominator. **31.** _____

Rationalize the denominator.

32. $\frac{3}{\sqrt{5}+2}$ **32.** _____

33. $\frac{2-\sqrt{3}}{3+\sqrt{3}}$ **33.** _____

34. $\frac{\sqrt{x}}{\sqrt{x}-4}$ **34.** _____

35. Rationalize the denominator of $\frac{4}{\sqrt[3]{y}}$. **35.** _____