

MAT 0020 Basic Algebra II

KEY CONCEPT REVIEW

SECTIONS 8.3, 8.4, AND 9.3

TO RECEIVE CREDIT, DO ALL PROBLEMS, MAKE CORRECTIONS, AND SHOW ALL WORK.

1) To add or subtract radical expressions, what must be true about their radicands?

2) Consider the following sum.

$$\sqrt{2} + 3\sqrt{8} + 5\sqrt{18}$$

How is the product rule used to add or subtract radical expressions? Explain. What does the expression simplify to?

3) Which of the following expressions contain like radicands? If an expression contains like radicands, simplify the expression.

A) $5\sqrt{6x} - x\sqrt{24x}$

B) $2\sqrt{8} - 4\sqrt{32}$

C) $\sqrt{3(2x+1)} + \sqrt{24x+12}$

D) $5\sqrt{3} + 3\sqrt{5} - \sqrt{15}$

Add or subtract as indicated.

4) $21\sqrt{5x} - 11\sqrt{5x} - \sqrt{5x}$

A) $33\sqrt{5x}$

B) $9\sqrt{5x}$

C) 9

D) 45

5) $\sqrt{3a} - 3\sqrt{27a} - 7\sqrt{75a}$

6) $8\sqrt{50} - 9\sqrt{32} - 10\sqrt{72}$

A) $-56\sqrt{2}$

B) $8\sqrt{2}$

C) $-16\sqrt{2}$

D) $16\sqrt{2}$

7) $\sqrt{3x^3} + x\sqrt{9x}$

8) Explain why $-6\sqrt{12}$ is not the correct result.

$$\sqrt{108} - 5\sqrt{48} + \sqrt{12} =$$

$$3\sqrt{12} - 10\sqrt{12} + \sqrt{12} = -6\sqrt{12}$$

9) Two students are working together to solve the following problem: $\sqrt{16y} - \sqrt{y^3}$

One student simplifies the expression as

$$\sqrt{16y} - \sqrt{y^3} = 4\sqrt{y} - y\sqrt{y} = 3y\sqrt{y}$$

The second student writes the answer as

$$\sqrt{16y} - \sqrt{y^3} = 4\sqrt{y} - y\sqrt{y}$$

When they check the answer key, they find the following:

$$\sqrt{16y} - \sqrt{y^3} = (4 - y)\sqrt{y}$$

Does either student have the correct answer? Did the author make a mistake?

10) Simplify: $\sqrt{3}\sqrt{15} + 2\sqrt{20}$

11) $\sqrt{2}(\sqrt{7} - 3\sqrt{6})$

- A) $\sqrt{14} - 3\sqrt{12}$ B) $-5\sqrt{11}$
 C) $\sqrt{14} - 6\sqrt{3}$ D) $-11\sqrt{2}$

12) $\sqrt{5x}(\sqrt{5} + 2\sqrt{x})$

13) $(\sqrt{10} + 3)(\sqrt{10} - 3)$

- A) 7 B) 19
 C) 1 D) $\sqrt{10} - 2\sqrt{3}$

14) $(3x + 5\sqrt{7})^2$

15) $(3\sqrt{2} + 2\sqrt{3})(5\sqrt{2} - 2\sqrt{5})$

- A) $30 - 6\sqrt{10} + 10\sqrt{6} - 4\sqrt{15}$
 B) $30 - 4\sqrt{15}$
 C) 0
 D) $30 - 8\sqrt{30}$

Solve each equation by factoring.

16) $9x^2 - 24x + 16 = 0$

17) $7x^2 = -42x$

- A) -6, 0 B) 6, 0
 C) -6 D) 0

18) $x^2 - 4 = 0$

19) Can the equation $x^2 - x - 5 = 0$ be solved by factoring? Explain why or why not.

20) What is the quadratic formula? What type of equations does the quadratic formula solve? Can it be used to solve the equation in Problem 23?

Identify the values of a, b and c, and then use the quadratic formula to solve each equation.

21) $6m^2 + 10m + 2 = 0$

- A) $\frac{-10 \pm \sqrt{13}}{6}$ B) $\frac{-5 \pm \sqrt{13}}{6}$
 C) $\frac{-5 \pm \sqrt{13}}{12}$ D) $\frac{-5 \pm \sqrt{37}}{6}$

22) $x^2 = 5 - 8x$

23) $5n^2 = -12n - 1$

- A) $\frac{-6 \pm \sqrt{31}}{10}$ B) $\frac{-6 \pm \sqrt{31}}{5}$
 C) $\frac{-6 \pm \sqrt{41}}{5}$ D) $\frac{-12 \pm \sqrt{31}}{5}$

24) $3m^2 - 27 = 0$

25) $\frac{4}{9}w^2 - \frac{4}{3}w + 1 = 0$ (Hint: rewrite the equation by multiplying each term by the LCD.)

- A) $\frac{3 \pm 2\sqrt{2}}{2}$ B) $-3/2$
 C) No real solution D) $3/2$

26) A student uses the quadratic formula and obtains the following answer:

$$x = \frac{4 \pm \sqrt{2}}{2}$$

The student then simplifies the answer as follows:

$$x = \frac{\cancel{4} \pm \sqrt{2}}{\cancel{2}} = 2 \pm \sqrt{2}$$

Is this correct? Explain why or why not.

27) One student solves $-3x^2 - 4x + 8 = 0$ and obtains the solutions:

$$x = \frac{2 \pm 2\sqrt{7}}{-3}$$

A second student solves $-3x^2 - 4x + 8 = 0$ and obtains the solutions:

$$x = \frac{-2 \pm 2\sqrt{7}}{3}$$

Which of these solutions is correct?