

Review Unit 2

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- ___ 1. Which choice expresses each of these numbers as an entire radical?

$$3\sqrt{6}, 5\sqrt{42}, 2\sqrt{11}, 4^3\sqrt{27}$$

- a. 7.3, 32.4, 6.6, 12
- b. $\sqrt{54}, \sqrt{1050}, \sqrt{44}, \sqrt[3]{1728}$
- c. $\sqrt{18}, \sqrt{210}, \sqrt{22}, \sqrt[3]{108}$
- d. $\sqrt{18}, \sqrt{67}, \sqrt{15}, \sqrt[3]{91}$

- ___ 2. Which choice expresses these numbers as the product of two radicals?

$$\sqrt{1089}, \sqrt{1764}, \sqrt{225}, \sqrt{1024}$$

- a. $\sqrt{3} \cdot \sqrt{11}, \sqrt{6} \cdot \sqrt{7}, \sqrt{3} \cdot \sqrt{5}, \sqrt{4} \cdot \sqrt{8}$
- b. $\sqrt{9} \cdot \sqrt{121}, \sqrt{36} \cdot \sqrt{49}, \sqrt{9} \cdot \sqrt{25}, \sqrt{16} \cdot \sqrt{64}$
- c. $33 \cdot 33, 42 \cdot 42, 15 \cdot 15, 32 \cdot 32$
- d. $3 \cdot 11, 6 \cdot 7, 3 \cdot 5, 4 \cdot 8$

- ___ 3. Which is the simplest form of $-\sqrt{45} + \sqrt{180} - \sqrt{125}$?

- a. $-2\sqrt{5}$
- b. $3\sqrt{5}$
- c. $4\sqrt{5}$
- d. $3\sqrt{5} - 5$

- ___ 4. Which expressions are equivalent to $3\sqrt{10} \cdot \sqrt{52}$ in simplest form and entire form?

- a. $3\sqrt{52}, \sqrt{468}$
- b. $60\sqrt{13}, \sqrt{46800}$
- c. $6\sqrt{130}, \sqrt{4680}$
- d. $9\sqrt{520}, \sqrt{4680}$

- ___ 5. Which restrictions apply to the variable in $7\sqrt{x^2}$?

I. $|x| \neq 0$ II. $x \geq 0$ III. $x > 0$ IV. $x \in \mathbb{R}$ V. $x \in \mathbb{N}$

- a. V
- b. III and V
- c. IV
- d. I and IV

- ___ 6. Which restrictions apply to the variable in $\sqrt{(x-9)^5}$?
- I.** $|x| \neq 9$ **II.** $x+9 \geq 0$ **III.** $x \geq 9$ **IV.** $x \in \mathbb{N}$ **V.** $x \in \mathbb{R}$
- a. II and V
b. I, III, and IV
c. III and V
d. I, II, and V

- ___ 7. Which restrictions apply to the variable in $\frac{-2\sqrt{x^2}}{11\sqrt{x^3}}$?
- I.** $|x| \neq 0$ **II.** $x > 0$ **III.** $x \geq 0$ **IV.** $x \in \mathbb{N}$ **V.** $x \in \mathbb{R}$
- a. I, III, and IV
b. I and V
c. III and V
d. II and V

- ___ 8. Which restrictions apply to the variables in $\frac{5\sqrt{xy^3} + \sqrt{x^2}}{\sqrt{x^3y^2}}$?
- I.** $x > 0$ **II.** $x \geq 0$ **III.** $y > 0$ **IV.** $y \neq 0$ **V.** $x, y \in \mathbb{R}$
- a. I, IV, and V
b. I, III, and V
c. II, IV, and V
d. II, III, and V

- ___ 9. What is the value of x in $\sqrt{\frac{17-x}{2}} = 3$?
- a. 1
b. -11
c. 11
d. -1

- ___ 10. How many solutions are there for $\sqrt{x+6} + 5 = 8$?
- a. none
b. two: 3, -3
c. one: 3
d. one: 33

Short Answer

11. Express $10\sqrt{54} + 3\sqrt{150} - \sqrt{36} + \sqrt{600}$ in simplest form.

12. State any restrictions on the variables, then simplify.

$$4\sqrt{2y^3(x-1)^2} + y\sqrt{9(x-1)^2}$$

13. State any restrictions on the variables, then multiply.

$$(4\sqrt{y} + 12)(0.5\sqrt{y^2} - 2)$$

14. State any restrictions on the variable, then divide.

$$\frac{6\sqrt{x^5}}{\sqrt{25x^2}}$$

15. State any restrictions on the variable, then divide.

$$\frac{5\sqrt{x^3}}{20x^3}$$

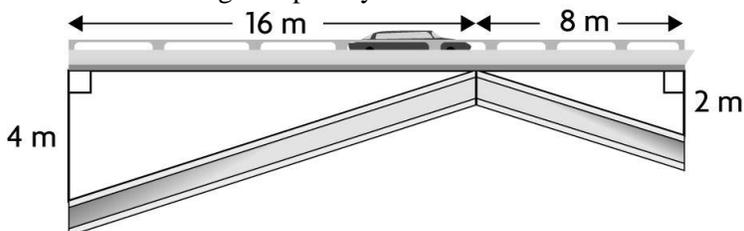
Problem

16. Lottie made an error while expressing $\sqrt{16\,000}$ as a mixed radical.

$$\begin{aligned}\sqrt{16\,000} &= \sqrt{2^8 \cdot 5^3} \\ &= 2^4 \cdot 5\sqrt{5} \\ &= 80\sqrt{5}\end{aligned}$$

Identify her error and correct the solution.

17. A design for a specific overpass is shown. Determine the total length of steel needed to form the angled section of the bridge. Express your answer in lowest radical form.



18. Caitlin is designing the puzzle page of the school newspaper. The square crossword covers an area of 150 cm^2 and the sudoku puzzle covers an area of 54 cm^2 . Both puzzles and the answer to last week's crossword must fit down one column, which is exactly $12\sqrt{6}$ cm long. What is the length of the crossword answer?

19. A space station needs to rotate a certain number of times each minute to create the effect of gravity. Otherwise, the crew are weightless. A formula for determining the number of times a station needs to rotate to reproduce Earth's gravity is $N = \frac{42}{\pi} \sqrt{\frac{5}{r}}$, where N is the number of revolutions per minute and r is the radius of the station. Suppose a station rotates 5.4 times per minute. Determine the radius of the space station.
20. The formula for the motion of a pendulum is $T = 2\pi\sqrt{\frac{L}{4.9}}$, where T is the time in seconds and L is the length of the pendulum in metres. A pendulum took 2 s to swing back and forth once. Determine the length of pendulum.

Review Unit 2

Answer Section

MULTIPLE CHOICE

- ANS: B PTS: 1 DIF: Grade 11 REF: Lesson 4.1
OBJ: 3.1 Compare and order radical expressions with numerical radicands. | 3.2 Express an entire radical with a numerical radicand as a mixed radical. | 3.3 Express a mixed radical with a numerical radicand as an entire radical. TOP: Mixed and entire radicals KEY: radical
- ANS: B PTS: 1 DIF: Grade 11 REF: Lesson 4.1
OBJ: 3.1 Compare and order radical expressions with numerical radicands. | 3.2 Express an entire radical with a numerical radicand as a mixed radical. | 3.3 Express a mixed radical with a numerical radicand as an entire radical. TOP: Mixed and entire radicals KEY: radical
- ANS: A PTS: 1 DIF: Grade 11 REF: Lesson 4.2
OBJ: 3.4 Perform one or more operations to simplify radical expressions with numerical or variable radicands. TOP: Adding and subtracting radicals KEY: radical
- ANS: C PTS: 1 DIF: Grade 11 REF: Lesson 4.3
OBJ: 3.4 Perform one or more operations to simplify radical expressions with numerical or variable radicands. TOP: Mixed and entire radicals KEY: radical
- ANS: C PTS: 1 DIF: Grade 11 REF: Lesson 4.4
OBJ: 3.4 Perform one or more operations to simplify radical expressions with numerical or variable radicands. | 3.6 Identify values of the variable for which the radical expression is defined.
TOP: Mixed and entire radicals KEY: radical | absolute value | restrictions
- ANS: C PTS: 1 DIF: Grade 11 REF: Lesson 4.4
OBJ: 3.4 Perform one or more operations to simplify radical expressions with numerical or variable radicands. | 3.6 Identify values of the variable for which the radical expression is defined.
TOP: Mixed and entire radicals KEY: radical | absolute value | restrictions
- ANS: D PTS: 1 DIF: Grade 11 REF: Lesson 4.4
OBJ: 3.4 Perform one or more operations to simplify radical expressions with numerical or variable radicands. | 3.5 Rationalize the monomial denominator of a radical expression. | 3.6 Identify values of the variable for which the radical expression is defined. TOP: Mixed and entire radicals
KEY: radical | absolute value | restrictions
- ANS: B PTS: 1 DIF: Grade 11 REF: Lesson 4.4
OBJ: 3.4 Perform one or more operations to simplify radical expressions with numerical or variable radicands. | 3.5 Rationalize the monomial denominator of a radical expression. | 3.6 Identify values of the variable for which the radical expression is defined. TOP: Mixed and entire radicals
KEY: radical | restrictions
- ANS: D PTS: 1 DIF: Grade 11 REF: Lesson 4.5
OBJ: 4.2 Determine, algebraically, the roots of a radical equation, and explain the process used to solve the equation. | 4.3 Verify, by substitution, that the values determined in solving a radical equation are roots of the equation. TOP: Exploring radical equations KEY: radical
- ANS: C PTS: 1 DIF: Grade 11 REF: Lesson 4.6
OBJ: 4.1 Determine any restrictions on values for the variable in a radical equation. | 4.2 Determine, algebraically, the roots of a radical equation, and explain the process used to solve the equation. | 4.3 Verify, by substitution, that the values determined in solving a radical equation are roots of the equation. | 4.5 Solve problems by modelling a situation with a radical equation and solving the equation.
TOP: Solving simple radical equations KEY: radical

SHORT ANSWER

11. ANS:

$$30\sqrt{6} + 15\sqrt{6} - 6 + 10\sqrt{6} = 55\sqrt{6} - 6$$

PTS: 1 DIF: Grade 11 REF: Lesson 4.2

OBJ: 3.4 Perform one or more operations to simplify radical expressions with numerical or variable radicands. TOP: Adding and subtracting radicals KEY: radical

12. ANS:

$$y \geq 0; x, y \in \mathbb{R}$$
$$y(x-1)\left(4\sqrt{2y+3}\right)$$

PTS: 1 DIF: Grade 11 REF: Lesson 4.4

OBJ: 3.4 Perform one or more operations to simplify radical expressions with numerical or variable radicands. | 3.5 Rationalize the monomial denominator of a radical expression. | 3.6 Identify values of the variable for which the radical expression is defined.

TOP: Simplifying algebraic expressions involving radicals KEY: radical | restrictions

13. ANS:

$$y \geq 0; y \in \mathbb{R}$$
$$2y\sqrt{y} - 8\sqrt{y} + 6y - 24$$

PTS: 1 DIF: Grade 11 REF: Lesson 4.4

OBJ: 3.4 Perform one or more operations to simplify radical expressions with numerical or variable radicands. | 3.5 Rationalize the monomial denominator of a radical expression. | 3.6 Identify values of the variable for which the radical expression is defined.

TOP: Simplifying algebraic expressions involving radicals KEY: radical | restrictions

14. ANS:

$$x > 0; x \in \mathbb{R}$$
$$\frac{6x\sqrt{x}}{5}$$

PTS: 1 DIF: Grade 11 REF: Lesson 4.4

OBJ: 3.4 Perform one or more operations to simplify radical expressions with numerical or variable radicands. | 3.5 Rationalize the monomial denominator of a radical expression. | 3.6 Identify values of the variable for which the radical expression is defined.

TOP: Simplifying algebraic expressions involving radicals KEY: radical | restrictions

15. ANS:

$$x > 0; x \in \mathbb{R}$$
$$\frac{1}{4\sqrt{x^3}}$$

PTS: 1 DIF: Grade 11 REF: Lesson 4.4

OBJ: 3.4 Perform one or more operations to simplify radical expressions with numerical or variable radicands. | 3.5 Rationalize the monomial denominator of a radical expression. | 3.6 Identify values of the variable for which the radical expression is defined.

TOP: Simplifying algebraic expressions involving radicals KEY: radical | restrictions

PROBLEM

16. ANS:

She made an error in step 1. The correct factor of 16 000 is 2^7 , not 2^5 .

The correct solution is:

$$\begin{aligned}\sqrt{16\,000} &= \sqrt{2^7 \cdot 5^3} \\ &= 2^3 \cdot 5\sqrt{2 \cdot 5} \\ &= 40\sqrt{10}\end{aligned}$$

PTS: 1 DIF: Grade 11 REF: Lesson 4.1

OBJ: 3.1 Compare and order radical expressions with numerical radicands. | 3.2 Express an entire radical with a numerical radicand as a mixed radical. | 3.3 Express a mixed radical with a numerical radicand as an entire radical. TOP: Mixed and entire radicals KEY: radical

17. ANS:

$$2\sqrt{17} + 4\sqrt{17} = 6\sqrt{17} \text{ m}$$

PTS: 1 DIF: Grade 11 REF: Lesson 4.2

OBJ: 3.4 Perform one or more operations to simplify radical expressions with numerical or variable radicands. TOP: Adding and subtracting radicals KEY: radical

18. ANS:

$$\begin{aligned}12\sqrt{6} - \sqrt{150} - \sqrt{54} &= 12\sqrt{6} - 5\sqrt{6} - 3\sqrt{6} \\ &= 4\sqrt{6}\end{aligned}$$

The length of the crossword answers is $4\sqrt{6}$ cm.

PTS: 1 DIF: Grade 11 REF: Lesson 4.2

OBJ: 3.4 Perform one or more operations to simplify radical expressions with numerical or variable radicands. TOP: Adding and subtracting radicals KEY: radical

19. ANS:

$$N = \frac{42}{\pi} \sqrt{\frac{5}{r}}$$

$$5.4 = \frac{42}{\pi} \sqrt{\frac{5}{r}}$$

$$\left(\frac{\pi}{42}\right)5.4 = \left(\frac{\pi}{42}\right)\frac{42}{\pi} \sqrt{\frac{5}{r}}$$

$$(0.403\dots)^2 = \left(\sqrt{\frac{5}{r}}\right)^2$$

$$0.163\dots = \frac{5}{r}$$

$$\left(\frac{r}{0.163\dots}\right)0.163\dots = \left(\frac{r}{0.163\dots}\right)\frac{5}{r}$$

$$r = \frac{5}{0.163\dots}$$

$$r = 30.646\dots$$

The space station has a radius of about 30.6 m.

PTS: 1 DIF: Grade 11 REF: Lesson 4.6

OBJ: 4.1 Determine any restrictions on values for the variable in a radical equation. | 4.2 Determine, algebraically, the roots of a radical equation, and explain the process used to solve the equation. | 4.3 Verify, by substitution, that the values determined in solving a radical equation are roots of the equation. | 4.5 Solve problems by modelling a situation with a radical equation and solving the equation.

TOP: Solving simple radical equations KEY: radical

20. ANS:

$$T = 2\pi\sqrt{\frac{L}{4.9}}$$

$$2 = 2\pi\sqrt{\frac{L}{4.9}}$$

$$\frac{2}{2\pi} = \sqrt{\frac{L}{4.9}}$$

$$\left(\frac{1}{\pi}\right)^2 = \left(\sqrt{\frac{L}{4.9}}\right)^2$$

$$\frac{1}{\pi^2} = \frac{L}{4.9}$$

$$\frac{4.9}{\pi^2} = L$$

$$0.496\dots = L$$

The pendulum is about 50 cm long.

PTS: 1 DIF: Grade 11 REF: Lesson 4.6

OBJ: 4.1 Determine any restrictions on values for the variable in a radical equation. | 4.2 Determine, algebraically, the roots of a radical equation, and explain the process used to solve the equation. | 4.3 Verify, by substitution, that the values determined in solving a radical equation are roots of the equation. | 4.5 Solve problems by modelling a situation with a radical equation and solving the equation.

TOP: Solving simple radical equations KEY: radical