Math 2201 Practice Test No. 2 for Radicals Unit IV 2019---Exam Friday Nov 29, Period   2

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

_____ 1. Which of these equations are true?

I. $\sqrt{18} = \pm 3\sqrt{2}$
II. $\sqrt{18} = 3\sqrt{2}$

   a. neither I nor II
   b. II only
   c. I and II
   d. I only

_____ 2. Which of these equations are true?

I. $3\sqrt{15} = \sqrt{135}$ **II.** $5\sqrt{25} = 25$ **III.** $\sqrt{32} = 4\sqrt{8}$

   a. I and II
   b. I only
   c. II only
   d. I, II, and III

_____ 3. Which number is **not** a mixed radical?

   a. $7\sqrt{46}$
   b. $9\sqrt{22}$
   c. $\sqrt{19}$
   d. $4\sqrt{50}$

_____ 4. Which choice expresses each of these numbers as an entire radical?

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

   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. $\sqrt{18},\ \sqrt{67},\ \sqrt{15},\ \sqrt[3]{91}$

_____ 5. Which choice lists these numbers in increasing order?

$4\sqrt{8},\ 2\sqrt{35},\ \sqrt{33},\ 3\sqrt{12}$

   a. $2\sqrt{35},\ \sqrt{33},\ 4\sqrt{8},\ 3\sqrt{12}$
   b. $3\sqrt{12},\ \sqrt{33},\ 2\sqrt{35},\ 4\sqrt{8}$

c. $\sqrt{33}, 3\sqrt{12}, 4\sqrt{8}, 2\sqrt{35}$

d. $\sqrt{33}, 3\sqrt{12}, 2\sqrt{35}, 4\sqrt{8}$

_____ 6. Which set contains like radicals?

    a. $14\sqrt{2}, 5\sqrt{16}, -\sqrt{8}, 21\sqrt{6}$

    b. $6\sqrt{3}, \sqrt{12}, -2\sqrt{3}, \sqrt{27}$

    c. $\sqrt{25}, -9\sqrt{15}, 5\sqrt{2}, 3\sqrt{5}$

    d. $17(\sqrt[3]{64}), 10\sqrt{4}, 7\sqrt{16}, -\sqrt{4}$

_____ 7. Which is the simplest form of $-6\sqrt{3} - 4\sqrt{3} - 7\sqrt{3}$?

    a. $17\sqrt{9}$

    b. $-17\sqrt{3}$

    c. $-5\sqrt{3}$

    d. $17\sqrt{27}$

_____ 8. Which is the simplest form of $-\sqrt{54} - \sqrt{6} - \sqrt{96}$?

    a. $2\sqrt{6}$

    b. $-2\sqrt{6}$

    c. $-8\sqrt{6}$

    d. $-26\sqrt{6}$

_____ 9. Which expression is the simplest form of $6\sqrt{5} \cdot \sqrt{4}$?

    a. $24\sqrt{5}$

    b. $12\sqrt{5}$

    c. $6\sqrt{20}$

    d. $30\sqrt{2}$

_____ 10. Which expression is the rationalized form of $\dfrac{-7\sqrt{76}}{\sqrt{8}}$?

    a. $\dfrac{-7\sqrt{38}}{2}$

    b. $\dfrac{-7\sqrt{608}}{8}$

    c. $-7\sqrt{\dfrac{19}{2}}$

    d. $-\dfrac{7}{8} \cdot 4\sqrt{38}$

_____ 11. Which restrictions apply to the variable in $\sqrt{15x^3}$?

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

  a. I, IV, and V
  b. II and IV
  c. I and IV
  d. III and V

_____ 12. Which restrictions apply to the variable in $8\sqrt{x^4}$?

I. $x \neq 0$ **II.** $x \geq 0$ **III.** $x > 0$ **IV.** $x \in R$ **V.** $x \in N$

  a. I, III, and V
  b. V
  c. I, II, and IV
  d. IV

_____ 13. What is the value of x in $\sqrt{x - 11} = 4$?

  a. 5
  b. 7
  c. 27
  d. 15

_____ 14. What is the value of x in $\sqrt[3]{x + 30} = 5$?

  a. 95
  b. 155
  c. −15
  d. 5

_____ 15. What is the value of x in $\sqrt{9x + 10} - 6 = 2$?

  a. $3\dfrac{1}{3}$

  b. $\dfrac{2}{3}$

  c. 0
  d. 6

Short Answer

16. Express $\sqrt{7500}$ as a mixed radical in simplest form.

17. Express $\sqrt[3]{832}$ as a mixed radical in simplest form.

18. Express $13\sqrt{15}$ as an entire radical.

19. Expand the expression $\sqrt{3}\left(6 - \sqrt{12}\right)$.

20. A photograph has a width of $8\sqrt{3}$ cm and an area of $15\sqrt{72}$ cm^2. Determine the length of the photograph.

21. State any restrictions on the variable, then simplify.

$$\frac{-72\sqrt{y^9}}{6\sqrt{y^3}}$$

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

$$3\sqrt{xy} \cdot 5\sqrt{x^3}$$

23. State any restrictions on the variable, then multiply.

$$\left(3\sqrt{x} - 1\right)\left(2\sqrt{x} + 7\right)$$

24. The speed of a tsunami can be modelled by $S = 356\sqrt{d}$, where S is the speed in kilometres per hour and d is the average depth of the water in kilometres. Determine the average depth of the waves of a tsunami travelling at 150 km/h to the nearest hundredth of a kilometre.

Problem

25. Rationalize each expression to compare the radical expressions. Show each step.

A. $\dfrac{\sqrt{7}}{\sqrt{3x}}$ B. $\dfrac{14}{3\sqrt{x}}$

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Answer Section

MULTIPLE CHOICE

1. 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

2. ANS: A   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

3. ANS: C   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

4. 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

5. ANS: C   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

6. ANS: B   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

7. ANS: B   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

8. ANS: C   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

9. ANS: B   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

10. ANS: A   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. | 3.5 Rationalize the monomial denominator of a radical expression.
    TOP: Mixed and entire radicals   KEY: radical | rationalize the denominator

11. 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. | 3.6 Identify values of the variable for which the radical expression is defined.
    TOP: Mixed and entire radicals   KEY: radical | absolute value | restrictions

12. 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. | 3.6 Identify values of the variable for which the radical expression is defined.
    TOP: Mixed and entire radicals   KEY: radical | restrictions

13. 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

14. ANS: A   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

15. ANS: D   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

16. ANS:
$$50\sqrt{3}$$

PTS: 1   DIF: Grade 11   REF: Lesson 4.1
OBJ: 3.2 Express an entire radical with a numerical radicand as a mixed radical.
TOP: Mixed and entire radicals   KEY: radical

17. ANS:
$$4\sqrt[3]{13}$$

PTS: 1   DIF: Grade 11   REF: Lesson 4.1
OBJ: 3.2 Express an entire radical with a numerical radicand as a mixed radical.
TOP: Mixed and entire radicals   KEY: radical

18. ANS:
$$\sqrt{2535}$$

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

19. ANS:
$$6\sqrt{3} - 6$$

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: Multiplying and dividing radicals   KEY: radical

20. ANS:

$$\frac{15\sqrt{6}}{4} \text{ cm}$$

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. | 3.5 Rationalize the monomial denominator of a radical expression.
TOP: Multiplying and dividing radicals   KEY: radical

21. ANS:
$y > 0; y \in \mathbb{R}$
$-12y^3$

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

22. ANS:
$x, y \geq 0; x, y \in \mathbb{R}$
$15x^2 \sqrt{y}$

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

23. ANS:
$x \geq 0; x \in \mathbb{R}$
$6x + 19\sqrt{x} - 7$

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

24. ANS:
$d = 0.18$ km

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

PROBLEM

25. ANS:

A.
$$\frac{\sqrt{7}}{\sqrt{3x}} \cdot \frac{\sqrt{3x}}{\sqrt{3x}} = \frac{\sqrt{21x}}{\sqrt{9x^2}}$$

$$\frac{\sqrt{7}}{\sqrt{3x}} \cdot \frac{\sqrt{3x}}{\sqrt{3x}} = \frac{\sqrt{21x}}{3x}$$

$$\frac{\sqrt{7}}{\sqrt{3x}} \cdot \frac{\sqrt{3x}}{\sqrt{3x}} = \frac{\sqrt{21}\sqrt{x}}{3x}$$

B.
$$\frac{14}{3\sqrt{x}} = \frac{14}{3\sqrt{x}} \cdot \frac{\sqrt{x}}{\sqrt{x}}$$

$$\frac{14}{3\sqrt{x}} = \frac{14\sqrt{x}}{3\sqrt{x^2}}$$

$$\frac{14}{3\sqrt{x}} = \frac{14\sqrt{x}}{3x}$$

The restriction of both expressions is $x > 0$ since x cannot be 0 or a negative number.
Since the denominators are the same, compare the numerators.

Since both numerators contain $\sqrt{x}$ and $\sqrt{21} < 14$, then $\dfrac{\sqrt{7}}{\sqrt{3x}} < \dfrac{14}{3\sqrt{x}}$.

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 | rationalize the denominator