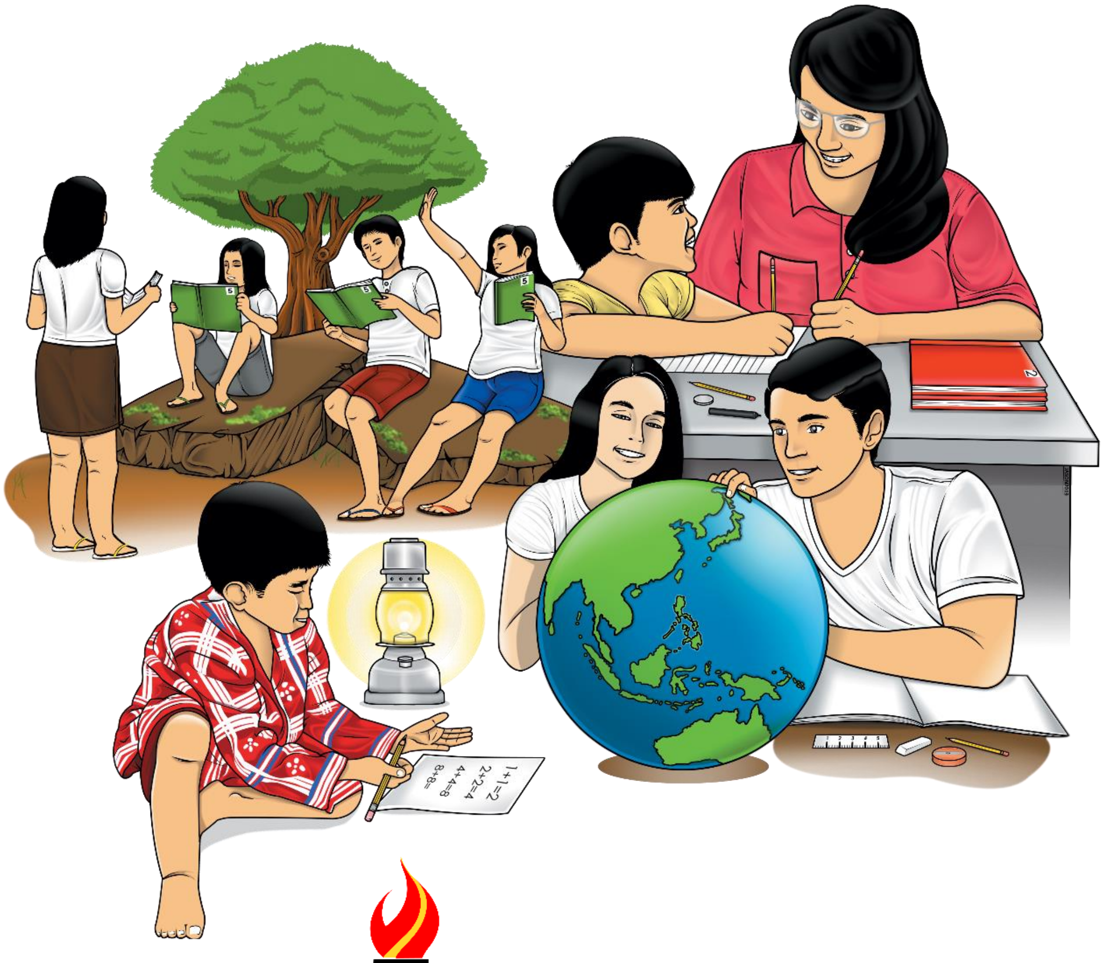
9

Mathematics

Quarter 2 – Module 7

Simplifying Radical Expressions Using the Laws of Radicals



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Mathematics

Quarter 2 – Module 7
Simplifying Radical Expressions Using the Laws of Radicals

DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

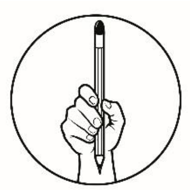
Thank you.

What I Need to Know

LEARNING COMPETENCY

The learners will be able to:

- Simplify radical expression using the laws of radicals
- Rationalize a fraction with radical in the denominator



What I Know

Find out how much you already know about the module. Choose the letterof the best answer. After taking and checking this short test, take note of the items that you were not able to answer correctly and look for the right answer as you go through this module.

1 When an exact answer is asked, we must express it as a radical expression in
   a.simplified form
   b. radical form
   c. exponential form
   d. rational form

2. Which of the following is a radical expression?
   a. 5
   b. -5
   c. x^5
   d. $\sqrt{5}$

3. Numbers such as 4, 9, and 25 whose square roots are integers are called ______.
   a. perfect cube
   b. perfect square
   c. nth root
   d. roots

4. Numbers such as 8, 27, and 125 whose cube roots are integers are called _____
   a. perfect cube
   b. perfect square
   c. nth root
   d. roots

5. It is the process of eliminating the radical expression in the denominator. factorization
   a. factorization
   b. extracting the roots
   c. rationalization
   d. simplifying radicals

6. It is the reverse process of raising a number to the second power.
   a. rationalization
   b. simplifying
   c. extracting the roots
   d. squaring a number

7. Which of the following is a square root of 196?
   a. 14
   b. 24
   c. 96
   d. 98

8. Between what two consecutive whole numbers does $\sqrt{31}$ lie?
   a. 4 and 5
   b. 6 and 7
   c. 5 and 6
   d. 7 and 8

9. Find the square root of 64.
   a. 9
   b. 32
   c. 8
   d. 4096

10. The simplest form of $\sqrt[3]{40x^8y^9z^{10}}$ is
    a. $2x^2y^3z^3\sqrt[3]{5x^2z}$
    b. $3x^2y^3z^3\sqrt[3]{5x^2z}$
    c. $2xyz\sqrt[3]{5xyz}$
    d. $3xyz\sqrt[3]{5xyz}$

11. Simplify $\sqrt{\frac{121}{49}}$
    a. $\frac{11}{7}$
    b. $\frac{3}{7}$
    c. $\frac{11}{9}$
    d. $\frac{1}{7}$

12. Simplify the expression $\sqrt{\frac{28x^3y^2z}{7xy^2}}$
    a. $4\sqrt{xz}$
    b. $2x\sqrt{z}$
    c. $2\sqrt{xz}$
    d. $4x\sqrt{z}$

13. Rationalize the denominator $\frac{4}{3\sqrt{2x}}$

a. $\frac{2\sqrt{2x}}{3x}$
b. $\frac{2}{\sqrt{x}}$
c. $\frac{2}{x}$
d. 2x

14. Simplify $\sqrt[3]{\sqrt[2]{x^{24}}}$

a. $\sqrt{x}$
b. x^4
c. $x\sqrt{x}$
d. $\sqrt[12]{x}$

15. What is the simplified form of $\sqrt[5]{\frac{32}{x}}$?

a. $\frac{\sqrt[5]{x}}{x}$
b. $\frac{2\sqrt[5]{x^4}}{x}$
c. 2x
d. X

Lesson 1	SIMPLIFYING EXPRESSIONS WITH RATIONAL EXPONENTS

You've learned about rational expressions and radical expressions from previous modules. This time, you will learn how to simplifying radical expressions using the laws of radicals.

What's In

Am I PERFECT or NOT?

Simplify each radical and determine whether it has **PERFECT nth root** or **NOT**.

Write P for perfect nth root and N if not.

1. $\sqrt{1}$
2. $\pm\sqrt{49}$
3. $-\sqrt{81}$
4. $\sqrt[2]{50}$
5. $\sqrt{242}$
6. $\sqrt[3]{8}$
7. $\sqrt[3]{-64}$
8. $-\sqrt[3]{108}$
9. $\sqrt[3]{32}$
10. $\sqrt[3]{-1}$

Do you still remember the Laws of Radicals?

If we have $\left(\sqrt[5]{x}\right)^6$ this means, it is also equivalent to $\sqrt[5]{x^6}$.

How about $\sqrt{3}\cdot\sqrt{y}$? We may also write it as $\sqrt{3y}$. It has a somewhat same idea when we have $\frac{\sqrt{3}}{\sqrt{y}}$ then it can also be written as $\sqrt{\frac{3}{y}}$.

While we also know that when the index and the exponent is the same, $\sqrt[3]{z^3}$ then we can simply write it as z.

This time, we will use the laws of radicals we learned in simplifying radicals.

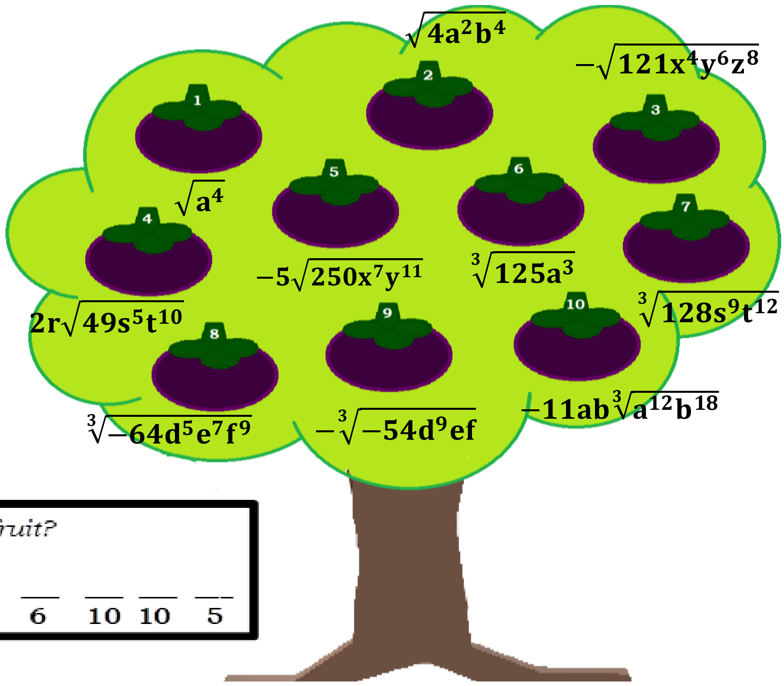
What's New

Communication and Critical Thinking)

INVESTIGATE 1

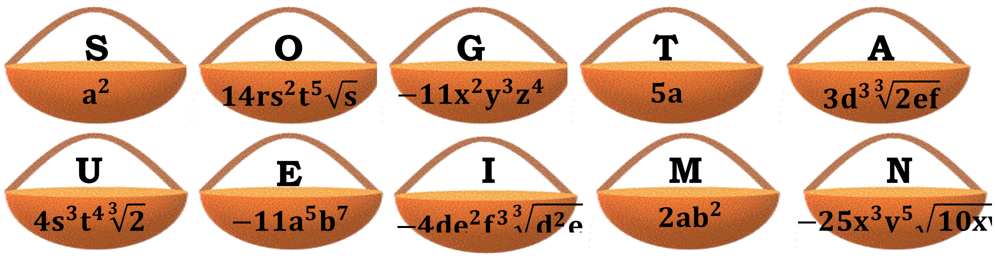
What are the ROOTS?

DIRECTION: Find the roots of each given expressions. Choose your answer from the basket. Use your answer to decode, what kind of fruits I have?



What is the name of my fruit?

__ __ __ __ __ __ __ __ __ __
2 9 5 3 4 1 6 10 10 5



Questions:

1. How did you answer the exercises?
2. Did you understand the process to simplify the given radical expressions?
3. Did you answer the exercises correctly?
4. What concepts or skills did you learn from the previous exercises?

Recall the Laws of Radicals

$$\sqrt[n]{x^m} = (\sqrt[n]{x})^m$$

$$x^{m/n} = (\sqrt[n]{x})^m = \sqrt[n]{x^m}$$

$$\sqrt[n]{x} \cdot \sqrt[n]{y} = \sqrt[n]{xy}$$

$$\frac{\sqrt[n]{x}}{\sqrt[n]{y}} = \sqrt[n]{\frac{x}{y}}$$

$$(\sqrt[n]{x})^m = x$$

What is It

(Communication and Critical Thinking)

SIMPLIFYING RADICAL EXPRESSIONS

Let us study the examples below about simplifying radical expressions

Examples:

Simplify each expression.

1. $\sqrt{a^4} = \mathbf{a^2}$ *since* $a^{\frac{4}{2}} = a^2$ *and* $a^2 \bullet a^2 = a^4$

2. $\sqrt{4a^2b^4c^6} = (4a^2b^4c^6)^{\frac{1}{2}}$

   $= 2^{\frac{2}{2}}a^{\frac{2}{2}}b^{\frac{4}{2}}c^{\frac{6}{2}}$

   $= \boldsymbol{2ab^2c^3}$

   (***note*** *that* $4 = 2^2$)

3. $\sqrt[3]{-54x^4y^8} = \sqrt[3]{(-27)(2)x^3 \bullet x \bullet y^6 \bullet y^2}$

   $= \sqrt[3]{(-3)^3x^3(y^2)^3} \bullet \sqrt[3]{2xy^2}$ Factor out the perfect cube.

   $= \boldsymbol{-3xy^2\sqrt[3]{2xy^2}}$ Simplify the perfect root.

INVESTIGATE 2

Make me SIMPLE

DIRECTION: Write each radical in simplest form.

1. $\sqrt{\frac{9}{16}}$
2. $\frac{\sqrt{25}}{\sqrt{100}}$
3. $-\sqrt{\frac{4}{5}}$
4. $\frac{2}{\sqrt{2}}$
5. $-\frac{1}{3\sqrt{2}}$
6. $\sqrt[3]{\frac{8}{27}}$
7. $-\frac{\sqrt[3]{3}}{\sqrt[3]{5}}$
8. $\sqrt[3]{\frac{7}{6}}$
9. $\frac{3}{\sqrt[3]{2}}$
10. $-\frac{3}{2\sqrt[3]{3}}$

Questions:

1. How did you find the answers in the previous exercises?
2. Did you answer the exercises correctly?
3. Did you understand the process the get the correct the answer in each given?
4. What skills/concepts did you learn from the previous exercises?

SIMPLIFYING RADICAL EXPRESSIONS

Let us study the next set of examples about simplifying radical expressions.

Simplify.

1. $\sqrt{\frac{75}{36}}$

Solution: $\sqrt{\frac{75}{36}} = \frac{\sqrt{75}}{\sqrt{36}}$ By Quotient Law of Radicals

$= \frac{\sqrt{25}\sqrt{3}}{6}$ By the Multiplication Law of Radicals

$= \frac{\mathbf{5\sqrt{3}}}{\mathbf{6}}$ Since $\sqrt{25} = 5$

2. $\sqrt{\frac{18x^3}{49xy^2}}$

Solution: $\sqrt{\frac{18x^3}{49xy^2}} = \sqrt{\frac{18x^2}{49y^2}}$ Simplify

$= \frac{\sqrt{18x^2}}{\sqrt{49y^2}}$ By Quotient Law of Radicals

$= \frac{\sqrt{9x^2 \bullet 2}}{\sqrt{49y^2}}$ By the Multiplication property

$= \frac{3x\sqrt{2}}{7y}$ Since $\sqrt{9x^2} = 3x$ and $\sqrt{49y^2} = 7y$

What if we are asked to simplify $\frac{1}{\sqrt{2}}$ or $\sqrt{\frac{1}{2}}$?
How do we simplify these?

Simplifying these kind of expressions is called the process of **rationalizing the denominator**.

In this case, to eliminate the radical in the denominator, we may multiply $\sqrt{2}$ on both numerator and denominator. Through that, the denominator will become a perfect square.

Multiplying $\sqrt{2}$ on both numerator and denominator is equivalent to multiplying the fraction by 1, therefore there will be no changes in the value.

DIRECTION:

From the box below choose the radicals that will help you rationalize the given expressions.

$\sqrt[3]{x^2}$	$\sqrt[3]{a^2}$	$\sqrt{5x}$	$\sqrt[3]{9x}$	$\sqrt[2]{3b}$
$\sqrt{m}$	$\sqrt{2ab^2}$	$\sqrt[3]{5x^2y^2}$	$\sqrt[3]{x^2y^2}$	$\sqrt{2b}$

1. $\frac{1}{\sqrt{2b^3}}$
2. $\sqrt[2]{\frac{5}{3b}}$
3. $\frac{2\sqrt{5r}}{\sqrt{m^3}}$
4. $\frac{\sqrt{32c^5d^3}}{\sqrt{2ab}}$
5. $\frac{6\sqrt{45y^3}}{3\sqrt{5x}}$
6. $\frac{x^2}{\sqrt[3]{x}}$
7. $\frac{2a}{\sqrt[3]{a}}$
8. $\frac{8}{\sqrt[3]{3x^2}}$
9. $\frac{8}{\sqrt[3]{3x^2}}$
10. $\frac{\sqrt[3]{5z^7b^4}}{\sqrt[3]{25xy}}$

TAKE NOTE:

The choices given for this exercise are not the answers. These will be used to rationalize the given radical expression.

Questions:

1. How did you find the answers in the previous exercises?
2. Did you answer the exercises correctly?
3. Did you understand the process the get the correct the answer in each given?
4. What skills/concepts did you learn from the previous exercises?

A radical expression is not considered in simplest form when its denominator contains a radical. The process of rewriting the quotient so that the denominator doesn't contain any radical expression is called ***rationalizing the denominator***.

To rationalize the denominator, we multiply the denominator by an appropriate expression such that the product will be a perfect *n^th^* root.

Examples:

Rationalize the denominator.

	Multiply by $\frac{\sqrt{5}}{\sqrt{5}}$ since $\sqrt{5} \bullet \sqrt{5} = \sqrt{25} = 5$
1. $\frac{1}{\sqrt{5}} = \frac{1}{\sqrt{5}} \bullet \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{5}}{\sqrt{25}}$	The quotient $\frac{\sqrt{5}}{5}$ has been rationalized.
$= \mathbf{\frac{\sqrt{5}}{5}}$	Write the numerator and denominator as two separate square roots using the Quotient Rule for Radicals
2. $\sqrt{\frac{7}{18}} = \frac{\sqrt{7}}{\sqrt{18}}$	To rationalize the denominator of a fraction containing a square root, simply multiply both the numerator and denominator by the denominator over itself
$= \frac{\sqrt{7}}{\sqrt{18}} \bullet \frac{\sqrt{18}}{\sqrt{18}}$	Be sure to simplify the radical in the numerator completely by removing any factors that are perfect squares.
$= \frac{\sqrt{126}}{18} = \frac{\sqrt{9} \bullet \sqrt{14}}{18}$	Be sure to also simplify the fraction by cancelling any common factors between the numerator and denominator.
$= \frac{3 \bullet \sqrt{14}}{18} = \frac{3 \bullet \sqrt{14}}{3 \cdot 6}$	The final answer should not contain any radicals in the denominator. Also, any radicals in the numerator should be simplified completely. And the fraction should be simplified as well.
$= \mathbf{\frac{\sqrt{14}}{6}}$	
3. $\frac{4}{3\sqrt{2x}} = \frac{4}{3\sqrt{2x}} \bullet \frac{\sqrt{2x}}{\sqrt{2x}}$	Multiply by $\frac{\sqrt{2x}}{\sqrt{2x}}$ since $\sqrt{2x} \bullet \sqrt{2x} = \sqrt{4x^2} = 2x$.
$= \frac{4\sqrt{2x}}{3\sqrt{4x^2}} = \frac{4\sqrt{2x}}{3(2x)} = \frac{4\sqrt{2x}}{6x}$	Multiply 2x and 3
	Remove common factors of 4 and 6
$= \mathbf{\frac{2\sqrt{2x}}{3x}}$	Multiply by $\frac{\sqrt[4]{x^3}}{\sqrt[4]{x^3}}$ since $\sqrt[4]{x} \bullet \sqrt[4]{x^3} = \sqrt[4]{x^4} = x$
4. $\frac{5y}{\sqrt[4]{x}} = \frac{5y}{\sqrt[4]{x}} \bullet \frac{\sqrt[4]{x^3}}{\sqrt[4]{x^3}}$	Simply both the numerator and denominator.
$= \frac{5y\sqrt[4]{x^3}}{\sqrt[4]{x^4}} = \frac{5y\sqrt[4]{x^3}}{x}$	The denominator is a binomial, therefore we multiply it by its **conjugate.** The **conjugate of a binomial** is a binomial of the same terms but of different sign of its second term. In this case, the conjugate of $\sqrt{y} + 2$ is $\sqrt{y} - 2$.
5. $\frac{3}{\sqrt{y}+2} = \frac{3}{\sqrt{y}+2} \bullet \frac{\sqrt{y}-2}{\sqrt{y}-2}$	
$= \frac{3\sqrt{y} - 6}{\sqrt{y^2} - 4} = \frac{3\sqrt{y} - 6}{y - 4}$	Multiply the numerators then denominators and simplify. Multiplying the conjugates would result to $\sqrt{y^2} + 0 + 0 - 4$ or simply $y - 4$. Which gives us a binomial without the radical sign on both terms.

What's More

A. Simplify each radical.

1. $\sqrt{x^5}$
2. $\sqrt[3]{b^7}$
3. $\sqrt[2]{45x^3y^8}$
4. $\sqrt{60x^4y^5}$
5. $-2x\sqrt{3xy^3z^7}$
6. $\sqrt[3]{125x^5y^{18}}$
7. $\sqrt[3]{56m^{10}n^{12}}$
8. $\sqrt[3]{-16x^6y^3z^{12}}$
9. $\sqrt[4]{16x^{12}y^{21}}$
10. $\sqrt[4]{81p^{25}q^{37}}$

B. Simplify.

1. $\frac{1}{\sqrt{25}}$
2. $\sqrt{\frac{1}{49}}$
3. $\sqrt{\frac{5}{4}}$
4. $\frac{3}{\sqrt{49}}$
5. $\sqrt{\frac{2}{121}}$
6. $\sqrt{\frac{4}{9}}$
7. $\frac{-\sqrt{36}}{\sqrt{64}}$
8. $-\sqrt{\frac{16}{144}}$
9. $\frac{\sqrt{11}}{-\sqrt{36}}$
10. $\frac{-3}{-\sqrt{9}}$

C. Simplify by rationalizing the denominator.

1. $\sqrt{\frac{2x}{y}}$
2. $\frac{1}{\sqrt{3ab}}$
3. $\frac{3\sqrt{3}}{\sqrt{6m}}$
4. $\frac{4\sqrt{2}}{\sqrt{20p}}$
5. $\sqrt{\frac{5m}{7n^2}}$
6. $\frac{\sqrt{8x}}{\sqrt{3y}}$
7. $\sqrt{\frac{2x}{5y}}$
8. $\frac{\sqrt{5a}}{\sqrt{b}}$
9. $\sqrt{\frac{3m}{2n}}$
10. $\frac{5}{\sqrt{18y}}$

What I Have Learned

Simplifying Radicals

a. Removing Perfect nth Powers $\sqrt[n]{ab} = \sqrt[n]{a} . \sqrt[n]{b}$

b. Reducing the index to the lowest possible order $\sqrt[m]{\sqrt[n]{a}} = \sqrt[mn]{a} = \sqrt[n]{\sqrt[m]{a}}$

c. Rationalizing the denominator of the radicand

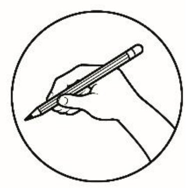
- The process of rewriting the quotient so that the denominator doesn't contain any radical expression is called ***rationalizing the denominator***.
- To rationalize the denominator, we multiply the denominator by an appropriate expression such that the product will be a perfect n^{th} root.
- When the denominator is a binomial, we multiply it by its conjugate. The

What I Can Do

DIRECTION:

Draw a line to match **Column A** with the correct answer in **Column B**.

A	B
1. $\sqrt{3^3 6^3}$	**a.** $-2x^{18}$
2. $\sqrt[3]{2^4 5^5}$	**b.** $\frac{2\sqrt[5]{x^4}}{x}$
3. $\sqrt{63m^2}$	**c.** $\frac{2\sqrt{15}}{5}$
4. $\sqrt[3]{-40x^9y^{10}}$	**d.** $-2x^3y^3\sqrt[3]{5y}$
5. $-2x\sqrt{3xy^3z^7}$	**e.** $10\sqrt[3]{50}$
6. $\frac{6\sqrt{5}}{5\sqrt{3}}$	**f.** $54\sqrt{2}$
7. $\frac{4}{\sqrt[4]{8m^2}}$	**g.** $3m\sqrt{7}$
8. $\sqrt[5]{\frac{32}{x}}$	**h.** $-2xyz^3\sqrt{3xyz}$
9. $5x^4y^2\sqrt{\frac{4}{25}x^{20}y^{30}}$	**i.** $\frac{2\sqrt[4]{2m^2}}{m}$
10. $20x^6\sqrt[3]{\frac{-1}{1000}x^{36}}$	**j.** $2x^{14}y^{17}$



Assessment

Read each item carefully. Choose the letter of the correct answer.

1. Simplify $\sqrt{72}$. 2
   a. $6\sqrt{2}$
   b. $2\sqrt{6}$
   c. 12
2. $\sqrt{98}$ is equal to
   a. $7\sqrt{2}$
   b. 14
   c. $7\sqrt{8}$
   d. 8
3. Find the root of $\sqrt[3]{8}$
   a. 3
   b. 4
   c. ±2
   d. 2
4. Which of the following is equal to $\sqrt[3]{-729}$
   a. -9
   b. 27
   c. 81
   d. ±9
5. $\sqrt[3]{\frac{1}{8}}$ when simplify is equal to
   a. $\frac{1}{4}$
   b. 2
   c. $\frac{1}{\sqrt[3]{2}}$
   d. $\frac{1}{2}$
6. $\sqrt{49x^8}$ in simplified form
   a. $a\sqrt{24.5}$
   b. $7x^8$
   c. $7x^4$
   d. $7\sqrt{5x^8}$
7. Simplify $\sqrt{250x^4y^5}$
   a. $xy\sqrt{125}$
   b. $5\sqrt{10x^4y^5}$
   c. $5x^2y^2\sqrt{10y}$
   d. $5\sqrt{10x^4y^5}$
8. Evaluate the expression $\sqrt{160a^5b^4}$
   a. $ab\sqrt{80}$
   b. $4\sqrt{10a^5b^4}$
   c. $4\sqrt{10a^5b^4}$
   d. $4a^2b^2\sqrt{10a}$

9. Which of the following is equal with $\sqrt{\sqrt[3]{64}}$?
   a. $\sqrt[6]{64}$
   b. $\sqrt[3]{64}$
   c. $\sqrt[2]{64}$
   d. $\sqrt[2]{8}$
10. It is the process of eliminating the radicals in the denominator of a fraction.
   a. Elimination
   b. Rationalization
   c. Fractionalization
   d. Simplification
11. Simplify $\sqrt{\frac{a^4b^4}{c^3}}$.
   a. $\sqrt{\frac{a^2b^2}{2}}$.
   b. $\frac{a^2b^2}{c^2}\sqrt{c}$
   c. $\frac{a^2b^2}{c}\sqrt{c}$
   d. $\frac{a^2b^2}{c^2}\sqrt{c^2}$
12. Which of the following is equal to $\sqrt[8]{36a^{12}b^6}$?
   a. $\sqrt[3]{6ab^3}$
   b. $a\sqrt[4]{6ab^3}$
   c. $a\sqrt[4]{6a^2b^3}$
13. $a\sqrt[4]{6ab^4}$ Which of the following is true?
   a. $\sqrt[3]{\frac{3}{x}} = \frac{\sqrt[3]{3x^2}}{x}$
   b. $\sqrt[3]{\frac{3}{x}} = \frac{\sqrt[3]{x^2}}{x}$
   c. $\sqrt[3]{\frac{3}{x}} = \frac{\sqrt[3]{3x}}{x^2}$
   d. $\sqrt[3]{\frac{3}{x}} = \frac{\sqrt[2]{3x^2}}{x}$
14. Which of the following is equal to $\frac{3}{\sqrt[5]{2}}$?
   a. $\frac{3\sqrt[5]{16}}{2}$
   b. $\frac{3\sqrt[5]{8}}{2}$
   c. $\frac{3\sqrt[5]{2}}{16}$
   d. $\frac{3\sqrt[5]{4}}{2}$

.15. Which of the following needs to be rationalized?
   a. $\frac{a^2b^2}{c^2}\sqrt{c}$
   b. $\frac{a^2b^2\sqrt{c}}{c}$
   c. $\frac{ab}{c^2}\sqrt{c}$
   d. $\frac{a^2b^2}{\sqrt{c}}$

Additional Activities

Critical Thinking)

What you choose to do does not just take up your space, it also takes up your time and what takes up your time adds up to how you live your life. Simplify your lives. It increases beliefs and build confidence that may lead to your dreams and success!

Your thought about it:

____

____

____

E-Search

To further explore the concept learned today and if it is possible to connect the internet, you may visit the following links:

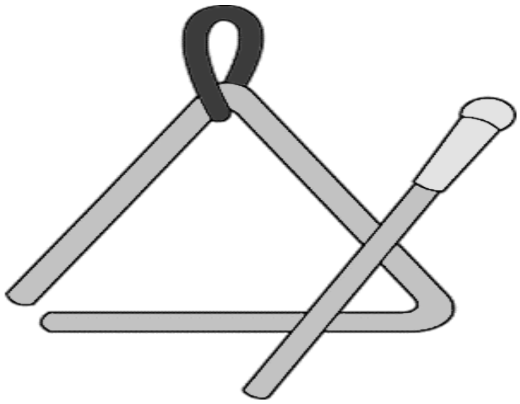
- https://www.youtube.com/watch?v=4Gq3LPORQ-U
  (Simplifying Radical Expressions Adding, Subtracting, Multiplying, Dividing, & Rationalize)
- https://www.youtube.com/watch?v=BPY7gmT32XE
  (How to Simplify Radicals (Nancy Pi))
- https://www.youtube.com/watch?v=2YpE4_HIAn8
  (Simplify a radical expression with variables)
- https://www.youtube.com/watch?v=X-ZAOc5gdFY
  (Simplifying Radical Expressions with variables)
- https://www.youtube.com/watch?v=Y1tDYBA5uIA
  (Rationalizing a Denominator)

PISA BASED WORKSHEET

MAKING MELODIES WITH MY TRIANGLE

To honor the front liners, Savannah is planning to serenade them using her favorite musical instrument.

This musical instrument is a three-sided figure with equal sides. One of the sides measures $\frac{\sqrt{18x^3y}}{\sqrt{2x^4y^2}}$.



Let's Analyze

1. What is Savannah's favorite musical instrument?
2. What kind of polygon is her favorite musical instrument?
3. What do you mean by rationalizing the denominator?
4. How will you know if the given radical is in simplified form?
5. Find the simplified form of $\frac{\sqrt{18x^3y}}{\sqrt{2x^4y^2}}$?

Answer Key

WHAT I KNOW

1. A	4. A	7. A	10. A	13. A
2. D	5. C	8. C	11. A	14. B
3. B	6. C	9. C	12. B	15. B

WHAT'S IN

1. 1 Perfect	4. $5\sqrt[3]{2}$ Not	7. -4 Perfect	10. -1 Perfect
2. ± 7 Perfect	5. $11\sqrt{2}$ Not	8. $-3\sqrt[3]{4}$ Not	
3. -9 Perfect	6. 2 Perfect	9. $2\sqrt[3]{4}$ Not	

WHAT'S NEW

Investigate 1 **WHAT'S MY FROOTS**

M	A	N	G	O	S	T	E	E	N
2	**9**	**5**	**3**	**4**	**1**	**6**	**10**	**10**	**5**

6.	**S**	a^2	1.	**T**	$5a$
7.	**M**	$2ab^2$	2.	**U**	$4s^3t^4\sqrt[3]{2}$
8.	**G**	$-11x^2y^3z^4$	3.	**I**	$-4de^2f^3\sqrt[3]{d^2e}$
9.	**O**	$14rs^2t^5\sqrt{s}$	4.	**A**	$3d^3\sqrt[3]{2ef}$
10.	**N**	$-25x^3y^5\sqrt{10xy}$	5.	**E**	$-11a^5b^7$

Investigate 2 **MAKE ME SIMPLE**

1. $\frac{3}{4}$
2. $\frac{1}{2}$
3. $\frac{-2\sqrt{5}}{5}$
4. $\sqrt{2}$
5. $-\frac{\sqrt{2}}{6}$
6. $\frac{z}{3}$
7. $-\frac{\sqrt[3]{75}}{5}$
8. $\frac{\sqrt[3]{252}}{6}$
9. $\frac{3\sqrt[3]{4}}{2}$
10. $-\frac{\sqrt[3]{9}}{z}$

Investigate 3 ***The CLUE***

1. $\frac{\sqrt{2b}}{2b^2}$
2. $\frac{3\sqrt[3]{b}}{3b^2}$
3. $\frac{2\sqrt{5mr}}{m^2}$
4. $4a^2\sqrt{b}$
5. $5x$
6. $x\sqrt[3]{x^2}$
7. $2\sqrt[3]{a^2}$
8. $\frac{8\sqrt[3]{9x}}{3x}$
9. $3y^2$
10. $\frac{x^3y^2\sqrt[3]{25}}{5x^5y^6}$

WHAT'S MORE

A.

1. $x^2\sqrt{x}$
2. $b^2\sqrt[3]{b}$
3. $3xy^4\sqrt{5x}$
4. $2x^2y^2\sqrt{15y}$
5. $-2yxz^3\sqrt{3xyz}$
6. $5xy^6\sqrt[3]{x^2}$
7. $2m^3n^4\sqrt[3]{7m}$
8. $-2x^2yz^4\sqrt[3]{2}$
9. $2x^3y^5\sqrt[4]{y}$
10. $3p^6q^9\sqrt[4]{pq}$

B.

1. $\frac{1}{5}$
2. $\frac{1}{7}$
3. $\frac{\sqrt{5}}{2}$
4. $\frac{3}{7}$
5. $\frac{\sqrt{2}}{11}$
6. $\frac{2}{3}$
7. $-\frac{3}{4}$
8. $-\frac{1}{3}$
9. $-\frac{\sqrt{11}}{6}$
10. 1

C.

1. $\frac{\sqrt{2xy}}{y}$
2. $\frac{\sqrt{3ab}}{3ab}$
3. $\frac{3\sqrt{2m}}{2m}$
4. $\frac{2\sqrt{10p}}{5p}$
5. $\frac{\sqrt{35m}}{7n}$
6. $\frac{2\sqrt{6xy}}{3y}$
7. $\frac{\sqrt{10xy}}{5y}$
8. $\frac{\sqrt{5ab}}{b}$
9. $\frac{\sqrt{6mn}}{2n}$
10. $\frac{5\sqrt{2y}}{6y}$

WHAT I CAN DO

1. F
2. E
3. G
4. D
5. H
6. C
7. I
8. B
9. J
10. A

ASSESSMENT

1. B
2. A
3. D
4. A
5. D
6. C
7. C
8. D
9. A
10. B
11. B
12. C
13. A
14. A
15. D

PISA BASED

1. Savannah's favorite musical instrument is triangle instrument.
2. It is a polygon classified as a triangle.
3. Rationalizing the denominator is the process of rewriting the quotient so that the denominator contains no n^{th} roots
4. • The radicand has no factors except 1
   • No fraction appears in a radicand
   • No radical appears in the denominator of a fraction
5. $\frac{3\sqrt{xy}}{xy}$

References

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