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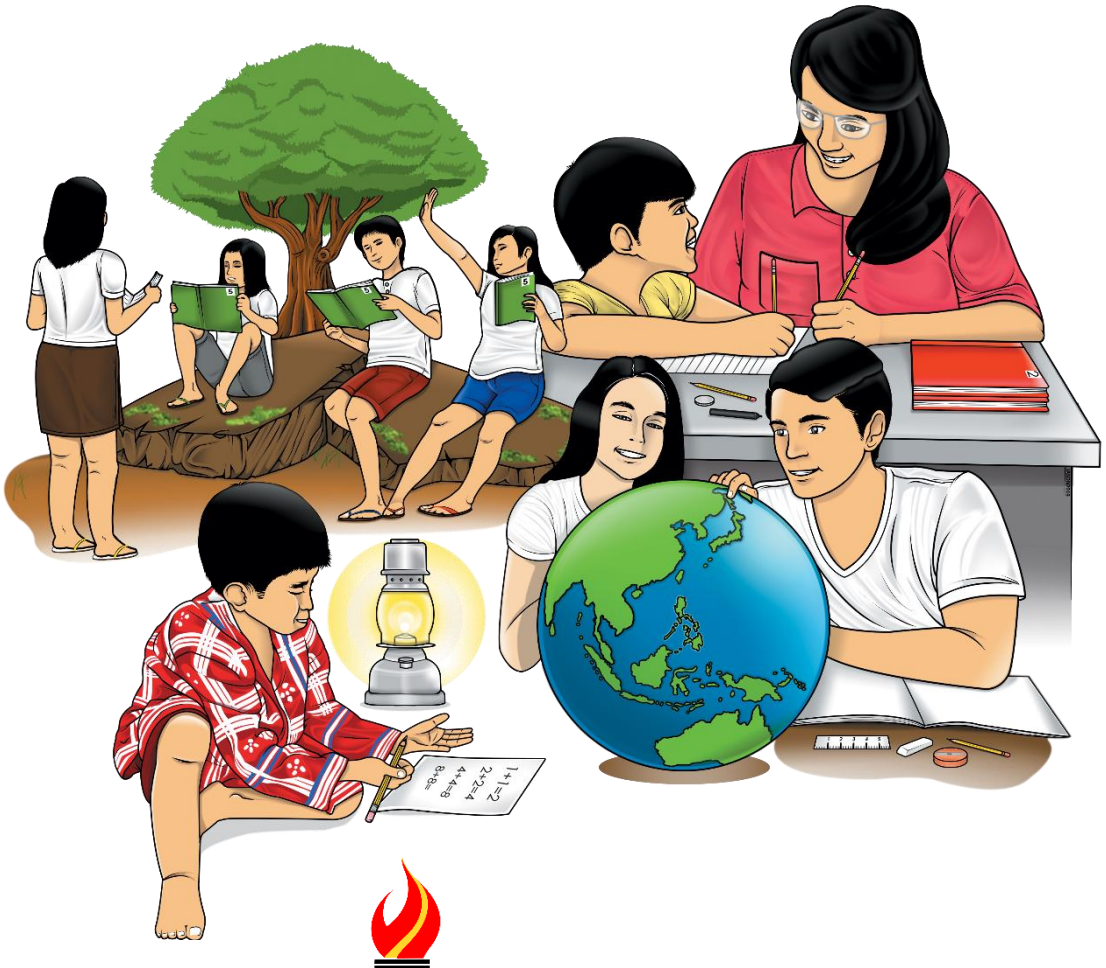
Mathematics

Quarter 2 – Module 5
Simplifying Expressions with Rational Exponents



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Mathematics

Quarter 2 – Module 5: Simplifying Expressions with Rational Exponents

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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.

Lesson 1 Simplifying Expressions with Rational Exponents

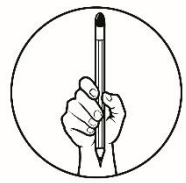
You have learned how to use exponents to express powers of numbers. In this module, you will learn to simplify expressions with rational exponents applying the laws of exponents on integers provided that the roots indicated in the denominator exist.

What I Need to Know

LEARNING COMPETENCY:

The learners will be able to:

- simplify expressions with rational exponents. (**M9AL-IIe-f-22**)



What I Know

Find out how much you already know about the module. Choose the letter of the best answer. Assume all variables are positive. 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. Write your answer on a separate answer sheet.

1. Simplify $a^{\frac{1}{2}} \cdot a^{\frac{1}{3}}$

A. $a^{\frac{1}{6}}$ B. $a^{\frac{1}{3}}$ C. $a^{\frac{2}{5}}$ D. $a^{\frac{5}{6}}$

2. Find $\dfrac{x^{\frac{1}{4}}}{x^{\frac{1}{5}}}$

A. x B. $x^{\frac{1}{20}}$ C. $x^{\frac{1}{10}}$ D. $x^{\frac{2}{9}}$

3. Which of the following is the simplified form of $\left(27y^{\frac{2}{5}}\right)^{\frac{1}{3}}$?

A. $3y^{\frac{2}{15}}$ B. $9y^{\frac{1}{5}}$ C. $27y^{\frac{2}{15}}$ D. $27y^{\frac{1}{5}}$

4. Simplify $\left(\frac{-8x^6}{y^{\frac{1}{2}}z^{\frac{3}{2}}}\right)^{\frac{2}{3}}$

A. $\frac{4x^4}{y^{\frac{1}{3}}z}$ B. $-\frac{8x^2}{y^{\frac{2}{3}}z}$ C. $-\frac{8x^4}{y^3z}$ D. $-\frac{2x^{12}}{y^3z}$

5. What is $(x^{16})^{\frac{3}{2}}$ in simplified form?

A. x^{48} B. x^{32} C. x^{24} D. $x^{19/2}$

6. $5^{-\frac{2}{5}}$ is written in simplified form as

A. $\frac{1}{5^{\frac{2}{5}}}$ B. $-5^{\frac{2}{5}}$ C. $5^{\frac{5}{2}}$ D. $\frac{1}{2}$

7. $\left(\frac{x^{\frac{1}{2}}y^{-2}}{yx^{-\frac{7}{4}}}\right)^4$ is equal to

A. $\frac{x^5}{y^4}$ B. $\frac{x^9}{y^{12}}$ C. $\frac{x^6}{y^9}$ D. $\frac{x^{15}}{y^{10}}$

8. Simplify $\frac{(x^3y^2)^{\frac{3}{2}}}{\left(x^{-1}y^{-\frac{2}{3}}\right)^{\frac{1}{4}}}$

A. $\frac{x^{\frac{19}{4}}}{y^{\frac{19}{6}}}$ B. $\frac{x^{\frac{17}{4}}}{y^{\frac{17}{6}}}$ C. $x^{\frac{19}{4}}y^{\frac{19}{6}}$ D. $x^{\frac{17}{4}}y^{\frac{17}{6}}$

9. Andrew said that $x^{-\frac{1}{4}}$ will be equal to $-x^4$. Is he correct?

A. Yes, he is correct.

B. No, it should be $-x^{\frac{1}{4}}$

C. No, it should be $\frac{1}{x^{\frac{1}{4}}}$

D. No, it should be x^4

10. To simplify the expression $m^{\frac{1}{4}} \cdot m^{\frac{2}{3}}$, what will you do with their exponents?

A. add B. divide C. multiply D. subtract

What's In

A. Simplify the following expressions. Write your answer on a separate sheet of paper.

Remember to apply the laws of exponents

1. $x \cdot x$ _____
2. $(y^2)^3$ _____
3. $(2xy^3)^5$ _____
4. $\frac{n}{n^4}$ _____
5. $\frac{x^{10}}{x^3}$ _____
6. $(5a^6b^3)^0$ _____
7. $(mn^4)^{-1}$ _____
8. $\left(\frac{x^2}{y^3}\right)^{-1}$ _____
9. $\left(\frac{6ab^0}{2a^4b}\right)^3$ _____
10. $\left(\frac{4x^{-2}y^5}{8x^6y^{-2}}\right)^{-2}$ _____

B. Shade in the circle if the given is an expression with rational exponent(s). Do this in your answer sheet.

○ $\left(\frac{1}{x}\right)^2$	○ $\frac{1}{y^{\frac{3}{5}}}$	○ $\frac{2}{5}x^2yz^6$	○ $\frac{1}{y^{\frac{3}{5}}}$
○ $3x^{\frac{1}{5}}$	○ $\frac{7m^3}{n^2}$	○ $a^{\frac{3}{4}}b^{-9}$	○ $\left(\frac{a}{b^2}\right)^{\frac{1}{5}}$

What's New

(Communication and Critical Thinking)

BODY SIZE AND SURFACE AREA

Mammals include humans and all other animals that are warm-blooded vertebrates (vertebrates have backbones) with hair. They feed their young with milk and have a more well-developed brain than other types of animals.

Why do we need to know the amount of surface that a mammal presents to its environment? That is because the body heat can be either lost to or gained from the external environment via the body surface. The larger the surface area of a mammal, the greater the potential rate of heat loss or gain. For a mammal struggling to regulate its body temperature at a relatively constant value, heat lost to the outside, via the surface, must be replaced by heat obtained from the breakdown of food.

For example, a mammal's surface area S (in square centimeters) can be approximated by the model

$$S = \left(k^{\frac{3}{2}}m\right)^{\frac{2}{3}}$$

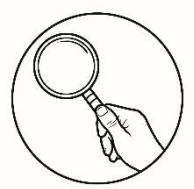
where m is the mass (in grams) of the mammal and k is a constant.

The values of k for several mammals are given in the table.

Mammal	Mouse	Cat	Large dog	Cow	Rabbit	Human
k	9.0	10.0	11.2	9	9.75	11.0

Guide Questions:

1. Why are humans considered mammals?
2. Why should the amount of surface that a mammal presents to its environment be of interest?
3. What is the formula in determining the surface area of a mammal?
4. Does the formula have expression with rational exponent(s)?
5. If the mass of a cat is 8,000 grams, find the approximate surface area of the cat.
6. What is the surface area of a cow if the approximate mass is 1,000 kilograms?



What is It

(Communication and Critical Thinking)

Let's investigate,

The formula for a mammal's surface area S (in square centimeters) is

$$S = \left(k^{\frac{3}{2}}m\right)^{\frac{2}{3}}$$

where m is the mass (in grams) of the mammal and k is a constant.

The expression $\left(k^{\frac{3}{2}}m^3\right)^{\frac{2}{3}}$ has rational exponents

Applying the laws of exponents for integers we will have

$$k^{\left(\frac{3}{2}\cdot\frac{2}{3}\right)}\, m^{\left(1\cdot\frac{2}{3}\right)} = k^1\, m^{\frac{2}{3}} = km^{\frac{2}{3}}$$

So, the formula can be simplified as

$$S = km^{\frac{2}{3}}$$

If a cat has a mass of 8,000 grams and k = 10 (from the table), its approximate surface area will be

$$S = 10(8000)^{\frac{2}{3}} = 10(20^3)^{\frac{2}{3}} = 10(400) = \mathbf{4,000\ cm^2}$$

For a cow with a mass of 1,000 kilograms and k = 9,

(Take note: 1,000 kg = 1,000,000 grams or (1 x 10^6) in scientific notation)

the surface area will be:

$$S = 9(1 \times 10^6)^{\frac{2}{3}} = 9(1 \times 10^4) = 9(10{,}000) = \mathbf{90,000\ cm^2}$$

Because there are no real even roots of negative numbers, the expressions

$$a^{\frac{1}{2}}\ , x^{-\frac{3}{4}}, and\ ,\ \ y^{\frac{1}{6}}$$

are not real numbers if the variables have negative values.

To simplify matters, we sometimes assume the variables represent only positive numbers when we are working with expressions involving variables with rational exponents. That way we do not have to be concerned with undefined expressions and absolute value.

PROPERTIES OF RATIONAL EXPONENTS

The properties of integral exponents can also be applied to rational exponents.

Let a and b be positive real numbers and let m and n be rational numbers. The following properties have the same names as those listed on properties of integral exponents, but now apply to rational exponents as illustrated.

	PROPERTY		EXAMPLE
1.	Product of Powers	$a^m \cdot a^n = a^{m+n}$	$a^{\frac{1}{2}} \cdot a^{\frac{3}{2}} = a^{\left(\frac{1}{2}+\frac{3}{2}\right)} = a^2$
2.	Power of Power	$(a^m)^n = a^{mn}$	$\left(4^{\frac{3}{2}}\right)^2 = 4^{\left(\frac{3}{2}\cdot 2\right)} = 4^3 = 64$
3.	Power of a Product	$(ab)^m = a^m b^m$	$\left(xy^{\frac{2}{5}}\right)^{\frac{1}{2}} = x^{\frac{1}{2}}y^{\left(\frac{2}{5}\cdot\frac{1}{2}\right)} = x^{\frac{1}{2}}y^{\frac{1}{5}}$
4.	Quotient of Powers	$\frac{a^m}{a^n} = a^{m-n}, \quad a \neq 0$	$\frac{6^{\frac{5}{2}}}{6^{\frac{1}{2}}} = 6^{\left(\frac{5}{2}-\frac{1}{2}\right)} = 6^2 = 36$
5.	Power of a Quotient	$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m} \quad b \neq 0$	$\left(\frac{8}{27}\right)^{\frac{1}{3}} = \frac{8^{\frac{1}{3}}}{27^{\frac{1}{3}}} = \frac{(2^3)^{\frac{1}{3}}}{(3^3)^{\frac{1}{3}}} = \frac{2}{3}$
6.	Negative Exponent	$a^{-m} = \frac{1}{a^m}, \quad a \neq 0$	$25^{-\frac{1}{2}} = \frac{1}{25^{\frac{1}{2}}} = \frac{1}{(5^2)^{\frac{1}{2}}} = \frac{1}{5}$

Illustrative Examples: Use the rules of exponents to simplify the following. Write the expression with positive exponents. Assume all variables represent positive real numbers. Do this in your answer sheet.

1. $a^{\frac{2}{3}} \cdot a^{\frac{1}{2}}$
   Solution: (Product of Power)
   $a^{\frac{2}{3}} \cdot a^{\frac{1}{2}} = a^{\left(\frac{2}{3}+\frac{1}{2}\right)} = a^{\left(\frac{4+3}{6}\right)} = \boldsymbol{a^{\frac{7}{6}}}$

2. $a^{-\frac{2}{3}}$
   Solution: (Negative Exponent)
   $a^{-\frac{2}{3}} = \boldsymbol{\frac{1}{a^{\frac{2}{3}}}}$

3. $(7mn)^{\frac{1}{2}}$
   Solution: (Power of a Product)
   $(7mn)^{\frac{1}{2}} = \boldsymbol{7^{\frac{1}{2}}m^{\frac{1}{2}}n^{\frac{1}{2}}}$

4. $(x^3)^{\frac{2}{3}}$
   Solution: (Power of Power)
   $x^{\left(3\cdot\frac{2}{3}\right)} = x^{\frac{6}{3}} = \boldsymbol{x^2}$

5. $\left(\frac{5}{a}\right)^{\frac{3}{4}}$
   Solution: (Power of a Quotient)
   $\left(\frac{5}{a}\right)^{\frac{3}{4}} = \boldsymbol{\frac{5^{\frac{3}{4}}}{a^{\frac{3}{4}}}}$

6. $\frac{2^{\frac{3}{4}}}{2^{\frac{1}{5}}}$
   Solution: (Quotient of Powers)
   $\frac{2^{\frac{3}{4}}}{2^{\frac{1}{5}}} = 2^{\left(\frac{3}{4}-\frac{1}{5}\right)} = 2^{\left(\frac{15-4}{20}\right)} = \boldsymbol{2^{\frac{11}{20}}}$

7. $\left(\frac{2}{3}\right)^{-\frac{1}{4}}$

Solution:

$\left(\frac{2}{3}\right)^{-\frac{1}{4}} = \left(\frac{3}{2}\right)^{\frac{1}{4}} = \frac{\mathbf{3^{\frac{1}{4}}}}{\mathbf{2^{\frac{1}{4}}}}$

8. $(8x^9)^{\frac{2}{3}}$

Solution:

$(8x^9)^{\frac{2}{3}} = (2^3)^{\frac{2}{3}}\,(x^9)^{\frac{2}{3}} = 2^{\left(3\cdot\frac{2}{3}\right)}x^{\left(9\cdot\frac{2}{3}\right)}$

$= 2^{\frac{6}{3}}x^{\frac{18}{3}} = 2^2x^6 = \mathbf{4x^6}$

9. $\dfrac{3x^{-\frac{1}{2}}\cdot 3x^{\frac{1}{2}}y^{-\frac{1}{3}}}{3y^{-\frac{7}{4}}}$

Solution:

$= \dfrac{9x^{\left(-\frac{1}{2}+\frac{1}{2}\right)}y^{\left(-\frac{1}{3}+\frac{7}{4}\right)}}{3} = \dfrac{9x^0y^{\left(\frac{-4+21}{12}\right)}}{3}$

$= \mathbf{3y^{\frac{17}{12}}}$

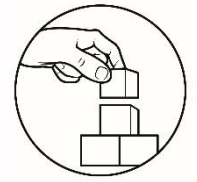
10. $\dfrac{\left(x^{-\frac{1}{2}}y^2\right)^{-\frac{5}{4}}}{x^2y^{\frac{1}{2}}}$

Solution:

$= \dfrac{x^{\left[\left(-\frac{1}{2}\right)\cdot\left(-\frac{5}{4}\right)\right]}y^{\left(2\cdot-\frac{5}{4}\right)}}{x^2y^{\frac{1}{2}}} = \dfrac{x^{\frac{5}{8}}y^{-\frac{5}{2}}}{x^2y^{\frac{1}{2}}}$

$= x^{\left(\frac{5}{8}-2\right)}y^{\left(-\frac{5}{2}-\frac{1}{2}\right)} = x^{\left(\frac{5-16}{8}\right)}y^{\left(\frac{-5-1}{2}\right)}$

$= \mathbf{x^{-\frac{11}{8}}y^{-3}} = \mathbf{\dfrac{1}{x^{\frac{11}{8}}y^3}}$



What's More

(Critical Thinking)

Activity 1: TRY THIS OUT!

Simplify each expression. Write your answers with positive exponents. Assume that all variables represent positive real numbers. Do this in your answer sheet.

1. $(n^4)^{\frac{3}{2}}$ _____
2. $(9r^4)^{\frac{1}{2}}$ _____
3. $(b^2)^{\frac{1}{2}}$ _____
4. $\dfrac{b^4}{b^{\frac{1}{2}}}$ _____
5. $\dfrac{3x^{\frac{1}{4}}}{9x^{\frac{4}{3}}}$ _____
6. $(2m^2)^{-1}\left(4m^{\frac{3}{2}}\right)$ _____
7. $(x^{\frac{2}{3}}y^{\frac{1}{4}})^{\frac{1}{2}}$ _____
8. $5^{\frac{1}{4}}\cdot 5^{\frac{4}{5}}$ _____
9. $\left(q^{\frac{2}{3}}\right)^{\frac{3}{4}}$ _____
10. $\dfrac{4x^2}{2x^{\frac{1}{2}}}$ _____

Activity 2: FACTS ABOUT MAMMALS!

(Collaboration, Creative and Critical Thinking)

Simplify the following expressions with rational exponents. Find your answers in the rectangle below. SHADE IN the box containing the correct answer in your answer sheet. When you finish, there will be boxes NOT SHADED. Write the letters in these boxes in the bottom row of boxes in your answer sheet.

1. $x \cdot x^{\frac{1}{2}}$ _____
2. $(xy^{\frac{2}{3}})^{\frac{1}{2}}$ _____
3. $(x^{-\frac{1}{3}})^{-\frac{1}{6}}$ _____
4. $\dfrac{x^{\frac{1}{4}}y}{x^{\frac{3}{4}}y^{\frac{1}{2}}}$ _____
5. $(3x^0y^{\frac{1}{5}})^{\frac{5}{3}}$ _____
6. $x^{\frac{2}{3}} \cdot x^{\frac{4}{3}}$ _____
7. $(x^{\frac{1}{2}}y^{-3})^{\frac{1}{2}}$ _____
8. $\left(\dfrac{x^2}{y^{\frac{1}{3}}}\right)^{-\frac{1}{2}}$ _____

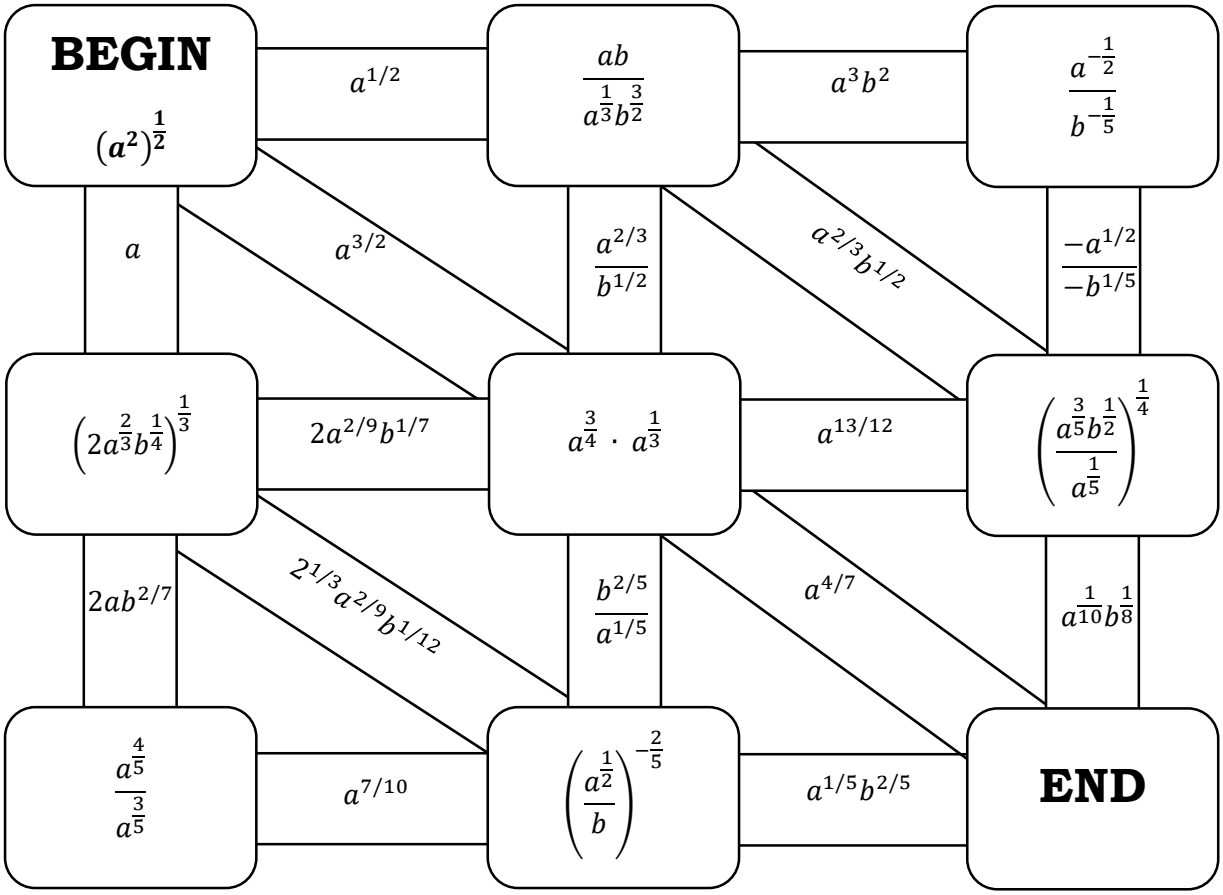
MAMM $\dfrac{y^{1/6}}{x}$	**THEB** $\dfrac{x^{1/4}}{y^{3/2}}$	**ALSI** $\dfrac{y^{1/2}}{x^{1/2}}$	**BATS** $\dfrac{x}{y^{1/6}}$
WHIC x^2	**ARET** $x^{1/4}y^{3/2}$	**HEON** $y^{1/3}$	**ANIM** $3^{5/3}y^{1/3}$
LYMA $3xy^{2/5}$	**ALST** $x^{1/2}y^{1/3}$	**MMAL** $xy^{3/2}$	**STHA** $x^{2/9}$
TCA $x^{8/9}$	**HISA** $x^{1/18}$	**NCAN** $x^{3/2}$	**NFLY** $x^{1/2}$

Write the letters here from the UNSHADED boxes. Start from the first row.

Activity 3: RAT-EXPO MAZE

(Collaboration, Creative and Critical Thinking)

Simplify the given expressions with rational exponents to determine the path from BEGIN to END. SHADE the box of the correct answer in your answer sheet.



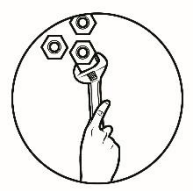
What I Have Learned

The laws of exponents for integral exponents may be used in simplifying expressions with rational exponents.

Let m and n be rational numbers and a and b real numbers.

$a^m \cdot a^n = a^{m+n}$ $\quad (a^m)^n = a^{mn}$ $\quad (ab)^m = a^m b^m$

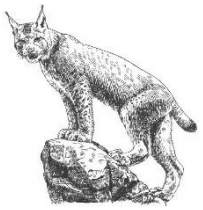
$\frac{a^m}{a^n} = a^{m-n},\ a \neq 0$ $\quad \left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}\ b \neq 0$ $\quad a^{-m} = \frac{1}{a^m},\ a \neq 0$



What I Can Do

(Communication, Creative and Critical Thinking)

BIOLOGY CONNECTION



You are studying a Canadian lynx whose mass is twice the mass of an average house cat. Is its surface area also twice that of an average house cat?

The formula for a mammal's surface area S (in square centimeters) is $S = km^{\frac{2}{3}}$ where m is the mass (in grams) of the mammal and k is a constant

Assessment

Read each item carefully. Choose the letter of the best answer. Assume that all variables represent positive real numbers. Write your answer on a separate sheet of paper.

1. Find $x^{\frac{3}{4}} \cdot x^{\frac{1}{5}}$

A. $x^{\frac{19}{20}}$ B. $x^{\frac{4}{9}}$ C. $x^{\frac{3}{20}}$ D. $x^{\frac{1}{5}}$

2. Which of the following mathematical statement is CORRECT?

A. $a^{-\frac{1}{5}} = -a^{\frac{1}{5}}$ B. $a^{\frac{1}{5}} \cdot a^{\frac{1}{5}} = a^{\frac{1}{25}}$ C. $\left(a^{\frac{1}{5}}\right)^{\frac{1}{2}} = a^{\frac{1}{10}}$ D. $(a^2)^{\frac{1}{5}} = a^{\frac{3}{5}}$

3. Simplify $\frac{w^{\frac{1}{3}}}{w^3}$

A. $w^{\frac{2}{3}}$ B. $w^{\frac{8}{3}}$ C. $\frac{1}{w^{8/3}}$ D. $\frac{1}{w^{2/3}}$

4. What is the simplified form of $\left(y^{\frac{1}{2}}z^{-\frac{1}{3}}\right)(yz)$?

A. $y^{3/2}z^{2/3}$ B. $y^{3/2}z^{4/3}$ C. $\frac{y^{1/2}}{z^{1/3}}$ D. $\frac{y^{3/2}}{z^{4/3}}$

5. Simplify the expression $(2x)^{-\frac{1}{4}}$ with positive exponent.

A. $\frac{1}{2^{\frac{1}{4}}x^{\frac{1}{4}}}$ B. $2x$ C. $2x^{\frac{1}{4}}$ D. $\frac{1}{2x}$

6. To simplify $\left(5x^{\frac{2}{3}}y^{\frac{7}{5}}\right)^{\frac{1}{7}}$, what will you do with the exponents?

A. add B. divide C. multiply D. subtract

7. Which of the following is the simplified form of $\left(a^{-\frac{m}{2}}b^{-\frac{n}{3}}\right)^{-6}$?

A. $a^{12m}b^{18n}$ B. $a^{3m}b^{2n}$ C. $a^{\frac{m}{3}}b^{\frac{n}{2}}$ D. $\frac{1}{a^{\frac{m}{3}}b^{\frac{n}{2}}}$

8. To simplify $x^{\frac{2}{9}} \cdot x^{\frac{3}{10}}$, what will you do with the exponents?

A. add B. divide C. multiply D. subtract

9. Find $\left(a^{-1}b^{\frac{1}{3}} \cdot a^{-\frac{4}{3}}b^{2}\right)^{2}$

A. $a^{\frac{14}{3}}b^{\frac{14}{3}}$ B. $a^{\frac{5}{3}}b^{\frac{1}{3}}$ C. $\frac{b^{\frac{14}{3}}}{a^{\frac{14}{3}}}$ D. $\frac{a^{\frac{14}{3}}}{b^{\frac{1}{3}}}$

10. Andrea simplified the expression $\left(\frac{a}{b}\right)^{-\frac{4}{5}}$ and her answer was $-a^{\frac{4}{5}}b^{\frac{4}{5}}$. Is she correct?

A. Yes, she is correct.

B. No, the correct answer is $\frac{a^{\frac{5}{4}}}{b^{\frac{5}{4}}}$

C. No, the correct answer is $a^{\frac{5}{4}}b^{\frac{5}{4}}$

D. No, the correct answer is $\frac{b^{\frac{4}{5}}}{a^{\frac{4}{5}}}$

Additional Activities

(Collaboration and Critical Thinking)

ERROR ANALYSIS

Explain the error made in simplifying the expression

$$\left(\frac{x}{y^8}\right)^{\frac{1}{3}} = \frac{x^{\frac{1}{3}}}{(y^8)^{\frac{1}{3}}} = \frac{x^{\frac{1}{3}}}{y^{\frac{25}{3}}}$$

E-Search

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

- https://www.youtube.com/watch?v=0gicD4STzpg
- https://www.youtube.com/watch?v=TrJUOKLKlsU
- https://www.youtube.com/watch?v=w79rpKCKlF

Answer Key

WHAT I KNOW

1. D	3. A	5. C	7. B	9. C
2. B	4. A	6. A	8. C	10. A

WHAT'S IN

A.

1. x^2	3. $32x^5y^{15}$	5. x^7	7. $\frac{1}{mn^4}$	9. $\frac{27}{a^9b^3}$
2. y^6	4. $\frac{1}{n^3}$	6. 1	8. $\frac{y^3}{x^2}$	10. $\frac{4x^{16}}{y^{14}}$

B.

○	$\left(\frac{1}{x}\right)^2$	●	$\frac{1}{y^{\frac{3}{5}}}$	○	$\frac{2}{5}x^2y2^6$	●	$\frac{1}{y^{\frac{3}{5}}}$
●	$3x^{\frac{1}{3}}$	○	$\frac{7m^3}{n^2}$	●	$a^{\frac{3}{4}}b^{-9}$	●	$\left(\frac{a}{b^2}\right)^{\frac{1}{5}}$

WHATS MORE

ACTIVITY 1: TRY THIS OUT!

1. n^6	3. b	5. $\frac{1}{3x^{13/12}}$	7. $x^{1/3}y^{1/8}$	9. $q^{1/2}$
2. $3r^{-2}$	4. $b^{7/2}$	6. $\frac{2}{m^{1/2}}$	8. $5^{21/20}$	10. $2x^{3/2}$

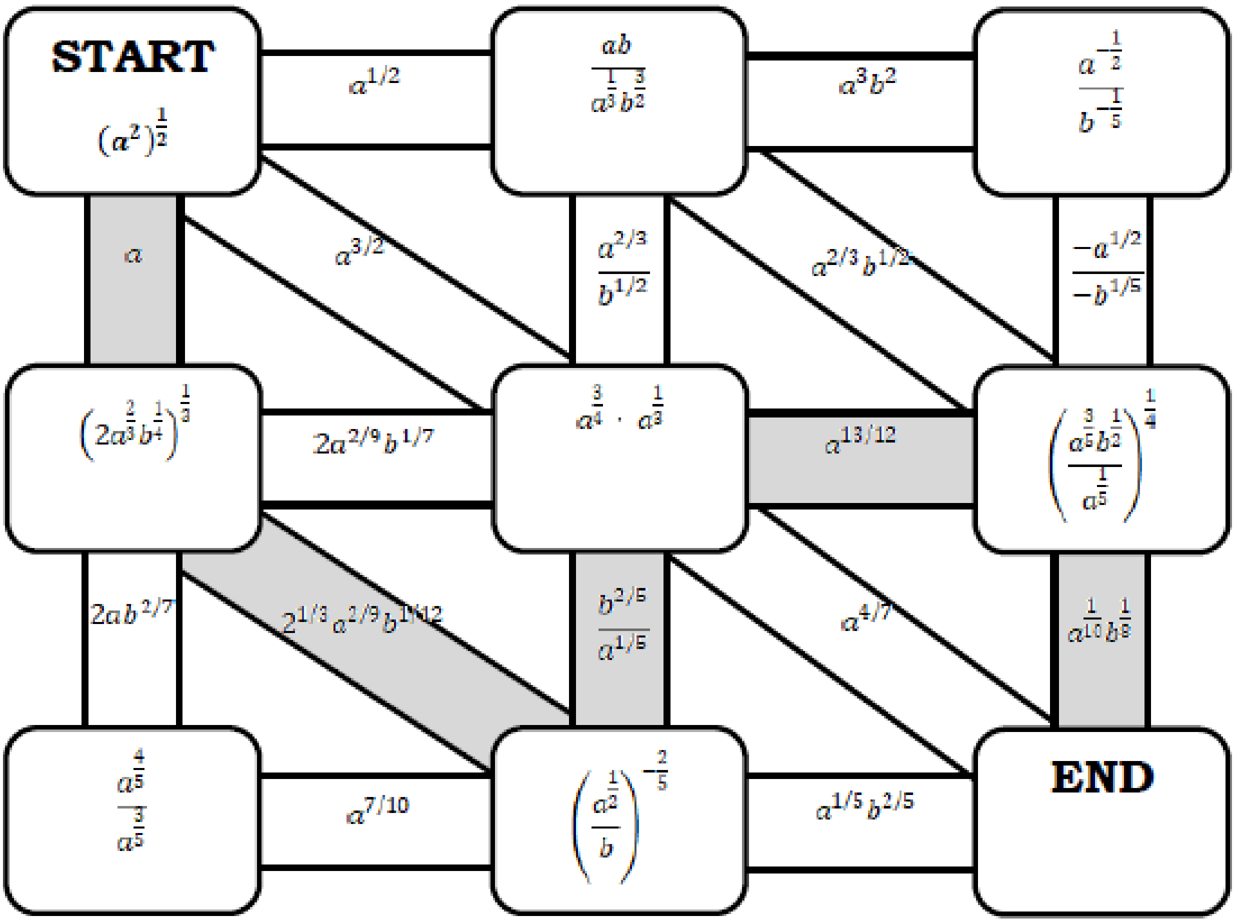
ACTIVITY 2: FACT ABOUT MAMMALS!

1. $x^{\frac{3}{2}}$	3. $x^{\frac{1}{18}}$	5. $3^{\frac{5}{3}}y^{\frac{1}{3}}$	7. $\frac{x^{\frac{1}{4}}}{y^{\frac{3}{2}}}$
2. $x^{\frac{1}{2}}y^{\frac{1}{3}}$	4. $\frac{y^{\frac{1}{2}}}{x^{\frac{1}{2}}}$	6. x^2	8. $\frac{y^{\frac{1}{6}}}{x}$

MAMM $\frac{y^{1/6}}{x}$	**THEB** $\frac{x^{1/4}}{y^{3/2}}$	**ALSI** $\frac{y^{1/2}}{x^{1/2}}$	**BATS** $\frac{x}{y^{1/6}}$
WHIC x^2	**ARET** $x^{1/4}y^{3/2}$	**HEON** $y^{1/3}$	**ANIM** $3^{5/3}y^{1/3}$
LYMA $3xy^{2/5}$	**ALST** $x^{1/2}y^{1/3}$	**MMAL** $xy^{3/2}$	**STHA** $x^{2/9}$
TCA $x^{8/9}$	**HISA** $x^{1/18}$	**NCAN** $x^{3/2}$	**NFLY** $x^{1/2}$

B	A	T	S	A	R	E	T	H	E	O	N	L	Y	M	A	M	M	A	L	S	T	H	A	T	C	A	N	F	L	Y

ACTIVITY 3: RAT-EXPO MAZE



Given k = 10

For a cat the formula will be $S = 10m^{\frac{2}{3}}$

The mass of a Canadian lynx is twice the mass of the cat so the formula will be

$S = 10(2m)^{\frac{2}{3}}$

Simplifying the expression,

$S = 10 \cdot 2^{\frac{2}{3}} \cdot m^{\frac{2}{3}} = \mathbf{10m^{\frac{2}{3}} \cdot 2^{\frac{2}{3}}}$

So, the answer is no because the surface area of the Canadian lynx will be $2^{\frac{2}{3}}$ times of an average house cat.

ASSESSMENT

1. A
2. C
3. C
4. A
5. A
6. C
7. B
8. A
9. C
10. D

ADDITIONAL ACTIVITY

The error is simplifying the denominator $(y^8)^{\frac{1}{3}}$. To simplify this expression, the exponents are multiplied. It will become $y^{\frac{8}{3}}$, applying the Power of Power law of exponent.

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