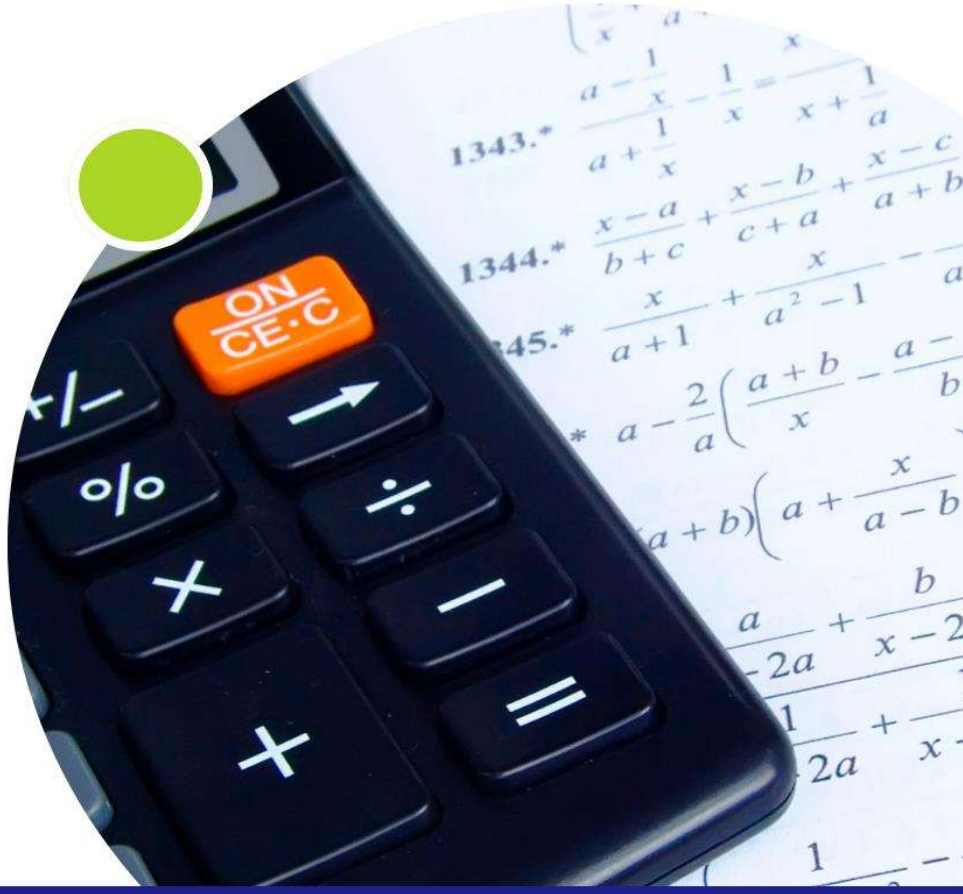
MALMS8

TAILORED LEARNING, PERSONALIZED PROGRESS

LEARNING MODULE 5

Multiply and Divide Simple Monomials, Leading to the Derivation of the Laws of Exponent



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3 MULTIPLY AND DIVIDE SIMPLE MONOMIALS, LEADING TO THE DERIVATION OF THE LAWS OF EXPONENTS

WELCOME, LEARNERS!

Hey there, math enthusiasts! Welcome to our adventure in mastering the art of multiplying and dividing simple monomials, paving our way to uncover the secrets of the laws of exponents! Throughout this course, we'll embark on an exciting journey filled with interactive lessons, fun activities, and real-world examples. Get ready to improve your math skills and discover the magic of exponents as we explore this exciting world of numbers together!

LEARNING OBJECTIVES

1. Evaluate expressions involving multiplication and division of monomials, applying the laws of exponents to solve real-world problems.
2. Create and solve their own mathematical problems involving monomials.
3. Articulate the importance of mastering multiplication and division of monomials as a foundational skill for simplifying complex mathematical problems.

Practical applications of multiplying and dividing monomials

Understanding how to manipulate monomials and exponents is crucial for solving various practical problems, such as calculating areas, volumes, growth rates, and more. By mastering these concepts, you'll be equipped to tackle a wide range of real-life scenarios with confidence and precision.

Scenario 1: Tiling a Kitchen Floor You're renovating your kitchen and plan to tile the floor with square tiles. The kitchen floor is square, with each side measuring $2x^2$ feet. Each tile covers an area of x^2 square feet, and each tile costs $3.	

Given:

Side length of the kitchen floor: $2x^2\ feet$

Area covered by each tile: $x^2\ feet$

Cost of each tile: $3

Question: What is the total cost of tiling the entire kitchen floor?

1. **Determine the Total Area of the Kitchen Floor:**

   Since the kitchen floor is square, the are is calculated by squaring the side length:

   Total area: $(2x^2)^2 = 4x^4\ square\ feet$.

2. **Calculate the Number of Tiles Needed:**

   To find the number of tiles needed, divide the total area of the floor by the area covered by each tile:

   Number of tiles= $\frac{4x^4}{x^2} = 4x^2\ tiles$

3. Find the Total Cost of Tiling:

Multiply the number of tiles by the cost per tile:

Total cost = $4x^2\ (\$3) = \ \$\ 12x^2$

If we are asked to find the exact value, let's assume x =2 for this scenario.

Hence, $\$\ 12x^2\ will\ be$:

= $\$12\ (2)^2$

= $ 12 (4)

=$48

Conclusion:

To tile the entire kitchen floor, you would need $48 worth of tiles.

Scenario 2: Extending the Lifespan of Light Bulbs A company produces light bulbs, and each light bulb has a lifespan of x^5 hours. The company tests a new technology that extends the lifespan of each light bulb to x^8 hours. If a customer used to replace a light bulb every x^2 months, how many months will pass before the customer needs to replace a light bulb with the new technology?	

Given:

- Original lifespan of each light bulb: x^5 hours
- Lifespan of each light bulb with new technology: x^8 hours
- Replacement interval for the original light bulb: x^2 hours

Question: How many months will pass before the customer needs to replace a light bulb with the new technology?

1. **Determine the lifespan ration between the old and new lightbulbs:**
   The new technology extends the lifespan from x^5 hours to x^8 hours.
   So the lifespan of each light bulb with the new technology is:

$$\frac{x^8}{x^5} = x^3 \; times \; longer \; than \; the \; original.$$

2. **Calculate the replacement interval for the new light bulb:**
   Since the lifespan of each light bulb with the new technology is x^3 times longer than the original, the replacement interval for the new light bulb will also be x^3 times longer than before.
   Therefore, the replacement interval for the new light bulb is:

$$\boldsymbol{x^2(x^3) = x^5 \; months}$$

If we are ask to find an exact value, let x= 3 in this scenario, therefore, we have:

$$= \boldsymbol{x^5}$$
$$= \boldsymbol{(3)^5}$$
$$= \boldsymbol{243 \; months}$$

Conclusion: With the new technology, the customer will need to replace a light bulb every 243 months.