Negative Exponents Worksheet

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Part 1: Foundational Knowledge

What is the result of \(2^{-3} \)?

Hint: Think about the definition of negative exponents.

- ◯ 8
- ◯ \(\frac{1}{8}\)
- ◯ -8
- ◯ \(\frac{1}{2}\)

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Which of the following expressions are equivalent to \(x^{-4} \)? (Select all that apply)

Hint: Consider how negative exponents can be rewritten.

- ☐ \(\frac{1}{x^4}\)

- [ ] x^4
- [ ] \(\frac{1}{x^{-4}}\)
- [ ] \(\frac{1}{x^3}\)

Which of the following expressions are equivalent to \(x^{-4} \)? (Select all that apply)

Hint: Think about how to express negative exponents positively.

- [ ] \(\frac{1}{x^4} \)
- [ ] x^4
- [ ] \(\frac{1}{x^{-4}} \)
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Explain in your own words what a negative exponent represents in a mathematical expression.

Hint: Think about how negative exponents relate to division.

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Hint: Consider how negative exponents affect the base.

Explain in your own words what a negative exponent represents in a mathematical expression.

Hint: Consider how negative exponents relate to division.

Convert the following expressions with negative exponents to positive exponents:

Hint: Remember that \(a^{-n} = \frac{1}{a^n} \).

1. a) \(7^{-2} \)

2. b) \(m^{-5} \)

Convert the following expressions with negative exponents to positive exponents:

Hint: Use the rule that \(a^{-n} = \frac{1}{a^n} \).

1. a) 7^{-2}

2. b) m^{-5}

Convert the following expressions with negative exponents to positive exponents:

Hint: Remember to apply the rule of negative exponents.

1. a) 7^{-2}

2. b) m^{-5}

Which rule is applied when simplifying \(a^{-m} \times a^n \)?

Hint: Think about how exponents combine when multiplying like bases.

- ◯ Add the exponents
- ◯ Subtract the exponents
- ◯ Multiply the exponents
- ◯ Divide the exponents

Which rule is applied when simplifying \(a^{-m} \times a^n \)?

Hint: Think about how exponents are combined.

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Part 2: Understanding Concepts

If \(3^{-x} = \frac{1}{27} \), what is the value of \(x \)?

Hint: Consider the relationship between exponents and bases.

- ◯ 3
- ◯ -3
- ◯ 9
- ◯ -9

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Which of the following statements are true about the expression \(\frac{1}{a^{-n}} \)? (Select all that apply)

Hint: Think about how negative exponents affect fractions.

- ☐ It is equivalent to \(a^n \)
- ☐ It simplifies to \(a^{-n} \)
- ☐ It represents a reciprocal
- ☐ It is equivalent to \(\frac{1}{a^n} \)

Which of the following statements are true about the expression \(\frac{1}{a^{-n}} \)? (Select all that apply)

Hint: Think about how to simplify the expression.

- ☐ It is equivalent to \(a^n \)
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- [ ] It represents a reciprocal
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- [ ] It simplifies to \(a^{-n} \)
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Describe how the zero exponent rule applies to the expression \(b^0 \).

Hint: Consider what any non-zero number raised to the power of zero equals.

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Hint: Consider what any number raised to the zero power equals.

Part 3: Applying Knowledge

Simplify the expression \(\frac{2^{-3} \times 3^2}{6^{-1}} \).

Hint: Apply the rules of exponents to simplify the expression.

- ◯ \(\frac{1}{36} \)
- ◯ 36
- ◯ \(\frac{1}{4} \)
- ◯ 4

Simplify the expression \(\frac{2^{-3} \times 3^2}{6^{-1}} \).

Hint: Use the rules of exponents to simplify the expression step by step.

- ◯ \(\frac{1}{36}\)
- ◯ 36
- ◯ \(\frac{1}{4}\)
- ◯ 4

Simplify the expression \(\frac{2^{-3} \times 3^2}{6^{-1}} \).

Hint: Use the rules of exponents to simplify.

- ◯ \(\frac{1}{36} \)
- ◯ 36
- ◯ \(\frac{1}{4} \)
- ◯ 4

Which of the following expressions simplify to 1? (Select all that apply)

Hint: Think about how exponents can cancel each other out.

- ☐ (5^{-1} \times 5)

- [ ] 10^0
- [ ] \(\frac{4^{-2}}{4^{-2}} \)
- [ ] 2^{-3} \times 2^3

Which of the following expressions simplify to 1? (Select all that apply)

Hint: Think about the properties of exponents and how they relate to 1.

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- [ ] 10^0
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Solve for \(x \) in the equation \(4^{-x} = \frac{1}{16} \).

Hint: Consider how to express both sides with the same base.

Solve for \(x \) in the equation \(4^{-x} = \frac{1}{16} \).

Hint: Consider how to express 16 as a power of 4.

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Part 4: Analyzing Relationships

Analyze the expression \(\frac{x^{-3} \times y^2}{z^{-1}} \) and choose the correct simplified form.

Hint: Apply the rules of exponents to simplify the expression.

- ◯ \(\frac{y^2}{x^3 \times z} \)
- ◯ x^3 \times y^2 \times z
- ◯ \(\frac{z \times y^2}{x^3} \)
- ◯ x^{-3} \times y^2 \times z^{-1}

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Consider the expression \(a^{-2} \times b^0 \times c^3 \). Which of the following are true? (Select all that apply)

Hint: Think about the properties of exponents.

- ☐ The expression simplifies to \(\frac{c^3}{a^2} \)
- ☐ \(b^0 \) equals 1
- ☐ The expression can be rewritten as \(a^2 \times c^3 \)
- ☐ \(a^{-2} \) is equivalent to \(\frac{1}{a^2} \)

Consider the expression \(a^{-2} \times b^0 \times c^3 \). Which of the following are true? (Select all that apply)

Hint: Think about the properties of exponents and how they apply to this expression.

- ☐ The expression simplifies to \(\frac{c^3}{a^2} \)
- ☐ \(b^0 \) equals 1
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- ☐ \(a^{-2} \) is equivalent to \(\frac{1}{a^2} \)

Break down the steps to simplify the expression \(\frac{m^{-1} \times n^2}{ p^{-3}} \).

Hint: Consider how to handle negative exponents in both the numerator and denominator.

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Break down the steps to simplify the expression \(\frac{m^{-1} \times n^2}{ p^{-3}} \).

Hint: Consider how to apply the rules of exponents.

Part 5: Synthesis and Reflection

Create an expression using negative exponents that simplifies to \(\frac{1}{8} \). Which of the following could be your expression? (Select all that apply)

Hint: Think about how negative exponents can represent fractions.

- [ ] 2^{-3}
- [ ] 4^{-1.5}
- [ ] 8^{-1}

- [ ] 16^{-0.75}

Reflect on the use of negative exponents in scientific notation. How do they help in representing very small numbers? Provide an example.

Hint: Consider how negative exponents are used in scientific contexts.

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