Negative Exponents Worksheet Questions and Answers PDF

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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
- ◯ \(\frac{1}{2}\)

> The result of \(2^{-3} \) is \(\frac{1}{8} \).

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

Hint: Recall the definition of negative exponents.

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- ◯ **\(\frac{1}{8} \) ✓**
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> The result is \(\frac{1}{8} \).

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Hint: Recall the definition of negative exponents.

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

The result is \(\frac{1}{8} \).

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

Hint: Consider how negative exponents can be rewritten.

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

The equivalent expressions are \(\frac{1}{x^4} \) and \(\frac{1}{x^{-4}} \).

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

Hint: Think about how to express negative exponents positively.

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

The correct answers are \(\frac{1}{x^4} \) and \(\frac{1}{x^{-4}} \).

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

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

The correct answers are \(\frac{1}{x^4} \) and \(\frac{1}{x^{-4}} \).

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

Hint: Think about how negative exponents relate to division.

A negative exponent indicates the reciprocal of the base raised to the positive exponent.

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

Hint: Consider how negative exponents affect the base.

A negative exponent indicates the reciprocal of the base raised to the positive exponent.

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

Hint: Consider how negative exponents relate to division.

A negative exponent indicates the reciprocal of the base raised to the positive exponent.

Convert the following expressions with negative exponents to positive exponents:

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

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

\(\frac{1}{49} \)

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

\(\frac{1}{m^5} \)

The conversions are \(7^{-2} = \frac{1}{49} \) and \(m^{-5} = \frac{1}{m^5} \).

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}

\(\frac{1}{7^2} \)

2. b) m^{-5}

\(\frac{1}{m^5} \)

The expressions should be converted to \(\frac{1}{7^2} \) and \(\frac{1}{m^5} \).

Convert the following expressions with negative exponents to positive exponents:

Hint: Remember to apply the rule of negative exponents.

1. a) 7^{-2}

> \(\frac{1}{7^2} \)

---

2. b) m^{-5}

> \(\frac{1}{m^5} \)

> The expressions should be rewritten as \(\frac{1}{7^2} \) and \(\frac{1}{m^5} \).

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

> The rule applied is to subtract the exponents.

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

Hint: Think about how exponents are combined.

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

> The correct rule is to subtract the exponents.

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

The correct rule is to subtract the exponents.

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

The value of \(x \) is 3.

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

Hint: Consider the relationship between exponents and bases.

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Hint: Consider the relationship between exponents and bases.

- ◯ **3 ✓**
- ◯ -3
- ◯ 9
- ◯ -9

The value of \(x \) is 3.

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.

- [x] **It is equivalent to \(a^n \) ✓**
- [ ] It simplifies to \(a^{-n} \)
- [x] **It represents a reciprocal ✓**
- [x] **It is equivalent to \(\frac{1}{a^n} \) ✓**

> The true statements are that it is equivalent to \(a^n \) and represents a reciprocal.

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.

- [x] **It is equivalent to \(a^n \) ✓**
- [ ] It simplifies to \(a^{-n} \)
- [x] **It represents a reciprocal ✓**
- [x] **It is equivalent to \(\frac{1}{a^n} \) ✓**

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- [x] **It represents a reciprocal ✓**
- [x] **It is equivalent to \(\frac{1}{a^n} \) ✓**

> The true statements are that it is equivalent to \(a^n \) and represents a reciprocal.

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.

The zero exponent rule states that any non-zero number raised to the power of zero equals 1.

Describe how the zero exponent rule applies to the expression \(b^0 \).

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

The zero exponent rule states that any non-zero number raised to the power of zero equals one.

Describe how the zero exponent rule applies to the expression \(b^0 \).

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

The zero exponent rule states that any non-zero number raised to the power of zero equals one.

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 ✓**

The simplified expression is 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 ✓**

The simplified expression is 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 ✓**

The simplified expression is 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 ✓**

The correct answers are \((5^{-1} \times 5) \), \(10^0 \), and \(2^{-3} \times 2^3 \).

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.

- ☐ **(5^{-1} \times 5) ✓**
- ☐ **10^0 ✓**
- ☐ **\(\frac{4^{-2}}{4^{-2}}\) ✓**

- [ ] 2^{-3} \times 2^3

> The expressions that simplify to 1 are \((5^{-1} \times 5) \), \(10^0 \), and \(\frac{4^{-2}}{4^{-2}} \).

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

Hint: Think about the properties of exponents.

- [ ] **(5^{-1} \times 5) ✓**
- [ ] **10^0 ✓**
- [ ] **\(\frac{4^{-2}}{4^{-2}} \) ✓**
- [ ] **2^{-3} \times 2^3 ✓**

> The expressions that simplify to 1 are \((5^{-1} \times 5) \), \(10^0 \), and \(2^{-3} \times 2^3 \).

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

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

> **The solution for \(x \) is 2.**

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

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

> **The solution for \(x \) is 2.**

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

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

The solution for \(x \) is 2.

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}

The correct simplified form is \(\frac{y^2}{x^3 \times z} \).

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

Hint: Use 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}

The correct simplified form is \(\frac{y^2}{x^3 \times z} \).

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

Hint: Use 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}

> The correct simplified form is \(\frac{y^2}{x^3 \times z} \).

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 \(\frac{1}{a^2} \) ✓**

> The true statements are that the expression simplifies to \(\frac{c^3}{a^2} \) and \(b^0 \) equals 1.

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

> The true statements are that the expression simplifies to \(\frac{c^3}{a^2} \), \(b^0 \) equals 1, and \(a^{-2} \) is equivalent to \(\frac{1}{a^2} \).

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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 \(\frac{1}{a^2} \) ✓**

The true statements are that the expression simplifies to $\frac{c^3}{a^2}$, b^0 equals 1, and 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.

To simplify, convert negative exponents to positive and then simplify the fraction.

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

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

The steps involve converting negative exponents to positive and simplifying the expression.

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.

The steps involve converting negative exponents to positive and simplifying the fraction.

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}

The expressions that simplify to \(\frac{1}{8} \) are \(2^{-3} \), \(4^{-1.5} \), and \(8^{-1} \).

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.

Negative exponents in scientific notation represent very small numbers by indicating the reciprocal of a power of ten.

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 notation.

Negative exponents in scientific notation represent very small numbers by indicating the reciprocal of the base raised to a positive exponent.