THIRD SPACE LEARNING

Negative Exponents Worksheet

Algebra

Grades 8

Skill Questions

Name: .....

Date: .....

1 Simplify:

$$2x^{-3}$$

Answer

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2 Evaluate:

$$(-3)^{-2}$$

Answer

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3 Simplify:

$$\frac{5}{x^{-2}}$$

Answer

---

4 Evaluate:

$$4^3 \times 4^{-7}$$

Answer

---

5 Simplify:

$$3a^{-1}b^{-2}$$

Answer

---

6 Evaluate: $(-4)^{-1}$

Answer

7 Simplify:

$$(12a^3)^{-1} \times (2a^5)$$

Answer

8 Evaluate:

$$25^{-\frac{1}{2}}$$

Answer

9 Simplify:

$$4x^{-7} \times 5x^{-8}$$

Answer

10 Evaluate:

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

Answer

Applied Questions

11 Ms. Marcrie gave her class the following problem to simplify.

$(5x)^{-2}\,(10x^{3})$

Sara simplifies the answer to be: $50x$

Jorge simplifies the answer to be: $\frac{2x}{5}$

Ilah simplifies the answer to be: x

Who is correct and why?

Answer

12 Complete the chart of value for, $y = 2^{-x}$

x	y
-1	
	1
2	
	$\frac{1}{8}$

Answer

13 Explain why 3^{-2} is not a negative number.

Answer

14 The formula for radioactive decay is $A(t) = A_0 e^{-kt}$ where $A(t)$ is the amount of material left after time, A_0 is the amount of material present at $t = 0$, and k is the constant that can be determined based on the half-life of the material. Gold-198 is a type of gold sometimes used in medical application. How much of the 65 gram sample will be left after 6 days if k = 0.26 and e = 2.72? Round your answer to the nearest tenth.

Answer

15 Using your knowledge of negative exponents and exponent rules, what do you think the value of x is in the equation below?

$$2^{-3} \times 2^{x} = 2^{-7}$$

Answer

Answers

Question number	Question	Answers	Standard
1	Simplify: $2x^{-3}$	$\frac{2}{x^3}$	8.EE.A.1
2	Evaluate: $(-3)^{-2}$	$\frac{1}{9}$	8.EE.A.1
3	Simplify: $\frac{5}{x^{-2}}$	$5x^2$	8.EE.A.1
4	Evaluate: $4^3 \times 4^{-7}$	$\frac{1}{4^4} = \frac{1}{256}$	8.EE.A.1
5	Simplify: $3a^{-1}b^{-2}$	$\frac{3}{ab^2}$	8.EE.A.1
6	Evaluate: $(-4)^{-1}$	$-\frac{1}{4}$	8.EE.A.1
7	Simplify: $(12a^3)^{-1} \times (2a^5)$	$\frac{a^2}{6}$	8.EE.A.1
8	Evaluate: $25^{-\frac{1}{2}}$	$\frac{1}{\sqrt{25}} = \frac{1}{5}$	8.EE.A.1
9	Simplify: $4x^{-7} \times 5x^{-8}$	$20x^{-15} = \frac{20}{x^{15}}$	8.EE.A.1
10	Evaluate: $(\frac{2}{7})^{-3}$	$(\frac{7}{2})^3 = \frac{343}{8}$	8.EE.A.1

<table>
<tr><th>Question number</th><th>Question</th><th>Answers</th><th>Standard</th></tr>
<tr><td>11</td><td>Ms. Marcrie gave her class the following problem to simplify.

$(5x)^{-2}(10\ x^3)$

Sara simplifies the answer to be: $50\ x$

Jorge simplifies the answer to be: $\frac{2x}{5}$

Ilah simplifies the answer to be: x

Who is correct and why?</td><td>Jorge is correct with the answer of: $\frac{2x}{5}$

Simplifying the problem:
$(5x)^{-2}\ (10x^3)$
$\frac{1}{5x^2} = \frac{1}{25x^2}$

$\frac{1}{25x^2} \times \frac{10x^3}{1} = \frac{10x^3}{25x^2} = \frac{2x}{5}$</td><td>8.EE.A.1</td></tr>
<tr><td>12</td><td>Complete the chart of value for,

$y = 2^{-x}$

<table><tr><th>x</th><th>y</th></tr><tr><td>-1</td><td></td></tr><tr><td></td><td>1</td></tr><tr><td>2</td><td></td></tr><tr><td></td><td>$\frac{1}{8}$</td></tr></table></td><td><table><tr><th>x</th><th>y</th></tr><tr><td>-1</td><td>2</td></tr><tr><td>0</td><td>1</td></tr><tr><td>2</td><td>$\frac{1}{4}$</td></tr><tr><td>3</td><td>$\frac{1}{8}$</td></tr></table></td><td>8.EE.A.1</td></tr>
<tr><td>13</td><td>Explain why 3^{-2} is not a negative number.</td><td>3^{-2} is not a negative number because it can be rewritten with positive exponent. 3^{-2} means to take the reciprocal of the base and raise it to the positive power. In this case, 3^{-2} can be rewritten as $\frac{1^2}{3} = \frac{1}{9}$ (which is not a negative number).</td><td>8.EE.A.1</td></tr>
</table>

Question number	Question	Answers	Standard
14	The formula for radioactive decay is $A(t) = A_0 e^{-kt}$ where $A(t)$ is the amount of material left after time, A_0 is the amount of material present at $t = 0$, and k is the constant that can be determined based on the half-life of the material. Gold-198 is a type of gold sometimes used in medical application. How much of the 65 gram sample will be left after 6 days if k=0.26 and e=2.72? Round your answer to the nearest tenth.	A_0 = 65 e = 2.72 k = 0.26 t = 6 $A(t) = A_0 e^{-kt}$ $A(t) = 65 \times 2.72^{-0.26 \times 6}$ $A(t) = 65 \times 0.21$ $A(t) = 13.6$ There is approximately 13.6 grams of Gold-198 left after 6 days.	8.EE.A.1
15	Using your knowledge of negative exponents and exponent rules, what do you think the value of x is in the equation below? $2^{-3} \times 2^{x} = 2^{-7}$	x = - 4 $2^{-3} \times 2^{-4} = 2^{-7}$ Using exponent rules, when multiplying, you add exponents so -3 + (- 4) = - 7	8.EE.A.1

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