

Algebra 8-6: Negative Exponents

Warm-Up

1. Jack put \$56 into a savings account with an annual yield of 2.5%. How much money is in the account after 120 days?

Growth \swarrow $100\% + 2.5\%$
 $102.5\% \cdot 1.025$
 $y = bq^x$ $y = 56(1.025)^{\frac{120}{365}}$
 $= 56.46$

2. Simplify. $(x^3)^5$

x^{15}

3. Simplify. $r^3 \cdot s^2 \cdot t^5 (r \cdot s^4 \cdot t^0)$

$r^3 \cdot r^1 \cdot s^2 \cdot s^4 \cdot t^5$
 $= r^4 s^6 t^5$

4. Solve. $(x^3)^z = x^{27}$

$3z = 27$
 $z = 9$

5. Solve. $2^y \cdot 2^8 = 2^{11}$

$y + 8 = 11$
 $2 = 2$
 $y + 8 = 11$
 $-8 \quad -8$
 $y = 3$

PropertyDefinitionExampleNegative
Exponent

$$b^{-n} = \frac{1}{b^n}$$

$$\frac{1}{b^{-n}} = b^n$$

$$x^{-4} = \frac{1}{x^4}$$

$$a^{-3} = \frac{1}{a^3}$$

Remember...

When in doubt, write it out!

Examples

Write without negative exponents.

1. $(g^4)^{-8}$ $\frac{1}{g^8}$

2. $(x^5)^{-6}$ $\frac{1}{x^{30}}$

3. $(s^6)s^{-5}$ (s)

$s^6 \cdot s^{-5} = s^{6+(-5)} = s^1 = s$

4. $(t^{-8})t^2$ $\frac{1}{t^{10}}$

5. $(x^3)y^{-5}$ $\frac{x^3}{y^5}$

6. $(x^5y^2)x^{-3}y^{-4}$ $\frac{x^2}{y^2}$

$t^{-8+2} = t^{-10}$

$\frac{x^3}{1} \cdot \frac{1}{y^5}$

$x^5 \cdot x^{-3} \cdot y^2 \cdot y^{-4}$
 $x^2 \cdot y^{-2}$
 $\frac{x^2}{y^2}$

Solve. 3^{+7}

7. $4^3 \cdot 4^{-7} = 4^z$

$4^{-4} = 4^z$
 $4 = 4$
 $-4 = z$

8. $8^{-5} \cdot 8^x = 8^{-8}$

$8^{-5+x} = 8^{-8}$
 $-5+x = -8$
 $+3+x = -5$
 $x = -8$

9. $2^y \cdot 2^8 = 2^{-4}$

$2^{y+8} = 2^{-4}$
 $y+8 = -4$
 $y = -12$

10. 4 years ago they put money in an account with an annual yield of 5.6%. If there is \$460 in the account today, what was it worth then?

$x = -4$
 $y = bg^x$
 $y = 460(1.056)^{-4}$
 $y = \$369.92$

$100\% + 5.6\%$
 105.6%
 1.056