



# Exponent Rules

## Zero Exponent

- When anything, except 0, is raised to the zero power it is 1.

$$a^0 = 1 \quad (\text{if } a \neq 0)$$

- For example

$$x^0 = 1 \quad (\text{if } x \neq 0)$$

$$25^0 = 1$$

$$(-1)^0 = 1$$

$$(-a)^0 = 1$$

$$-1^0 = -1$$

$$-a^0 = -1$$

## Zero Exponent

$$a^0 = 1 \quad (\text{if } a \neq 0)$$

- Try it on your own

11.  $h^0 =$  1 (if  $h \neq 0$ )

12.  $1000^0 =$  1

13.  $0^0 =$  0

## Negative Exponents

- If  $b \neq 0$ , then

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

- For example

$$\frac{1}{x^2}$$

$$\frac{x^{-2}}{1} = \frac{1}{x^2}$$

$$\frac{3^{-2}}{1} = \frac{1}{3^2} = \frac{1}{9}$$

## Negative Exponents

- If  $b \neq 0$ , then  $b^{-n} = \frac{1}{b^n}$
- Try it on your own:

$$14. h^{-3} = \frac{1}{h^3}$$

$$15. 2^{-3} = \frac{1}{2^3} = \frac{1}{8}$$

## Negative Exponents

- The negative exponent basically flips the part with the negative exponent to the other half of the fraction.

$$\left( \frac{1}{b^{-2}} \right) = \left( \frac{b^2}{1} \right) = b^2$$

$$\left( \frac{2}{x^{-2}} \right) = \left( \frac{2x^2}{1} \right) = 2x^2$$

$\frac{2}{1} \times \frac{1}{x^{-2}}$   
 $2x^2$

## Math Manners

- For a problem to be completely simplified there should not be any negative exponents



Try these:

$$1. (2a^2b)^0 =$$

$$2. y^2 \times y^{-4} =$$

$$3. (a^5)^{-1} =$$

$$4. s^{-2} \times 4s^7 =$$

$$5. (3x^{-2}y^3)^{-4} =$$

$$6. (s^2t^4)^0 =$$

$$7. \left(\frac{2^2}{x}\right)^{-1} =$$

$$8. \left(\frac{3^9}{3^5}\right)^{-2} =$$

$$9. \left(\frac{s^2t^2}{s^4t^4}\right)^{-2} =$$

$$10. \left(\frac{36a^5}{4a^4b^5}\right)^{-2} =$$

**SOLUTIONS**

1.  $(2a^2b)^0 = 1$

2.  $y^2 \times y^{-4} = y^{-2} = \frac{1}{y^2}$

3.  $(a^5)^{-1} = \frac{1}{a^5}$

4.  $s^{-2} \times 4s^7 = 4s^5$

5.  $(3x^{-2}y^3)^{-4} = (3^{-4}x^8y^{-12}) = \frac{x^8}{81y^{12}}$

6.  $(s^2t^4)^0 = 1$

$$\begin{aligned} & 3^{-4} x^8 y^{-12} \\ & \frac{3^4 x^8}{y^{12}} = \frac{x^8}{81 y^{12}} \end{aligned}$$

**SOLUTIONS**

$$7. \left( \frac{2^2}{x} \right)^{-1} \left( \frac{4}{x} \right)^{-1} = \frac{x}{4}$$

$$8. \left( \frac{3^9}{3^5} \right)^{-2} = (3^4)^{-2} = 3^{-8} = \frac{1}{3^8}$$

$$9. \left( \frac{s^2 t^2}{s^4 t^4} \right)^{-2} = (s^{-2} t^{-2})^{-2} = s^4 t^4$$

$$10. \left( \frac{36a^5}{4a^4 b^5} \right)^{-2} = 9^{-2} a^{-2} b^{10} = \frac{b^{10}}{81a^2}$$

$$\left( \frac{9a}{b^5} \right)^{-2}$$

$$\frac{9^{-2} a^{-2}}{b^{-10}}$$

$$\frac{b^{10}}{9^2 a^2} = \frac{b^{10}}{81a^2}$$

$$a) 2^{-4} = \frac{1}{2^4} = \frac{1}{16}$$

$$b) 4^{-2} = \frac{1}{4^2} = \frac{1}{16}$$

$$c) x^{-6} = \frac{1}{x^6}$$

$$d) 3z^{-2} = \frac{3}{z^2}$$

$$e) \frac{1}{3^{-2}} = 3^2 = 9$$

$$f) 5^0 = 1$$

$$7. 2^{-5} \cdot 2^3 = 2^{-2} = \frac{1}{2^2} = \frac{1}{4}$$

$$8. x^3 \cdot x^{-7} = x^{-4} = \frac{1}{x^4}$$

$$9. \frac{3^3}{3^5} = 3^{-2} = \frac{1}{3^2} = \frac{1}{9}$$

$$10. \frac{x^4}{x^{-6}} = x^{10}$$

$$4 - -6$$

$$4 + 6 = 10$$

$$11. x^0 = 1$$

$$12. 1001^{-1} = \frac{1}{1001}$$