2.1 Introduction to Exponents

Math 9 **Introduction to Exponents**

Is there a simplified way to write each expression?

$3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 =$ 3×10

$(-5) + (-5) + (-5) + (-5) + (-5) + (-5) + (-5) =$ $(-5) \times 7$

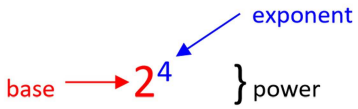
Multiplication is a simplified way to write repeated addition.

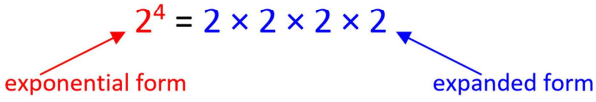
Is it possible to write repeated multiplication in a simpler way?

$3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 =$ 3^{10}

$(-5) \times (-5) \times (-5) \times (-5) \times (-5) \times (-5) \times (-5) =$ $(-5)^7$

Using exponents repeated multiplication can be written in a simpler way.





Examples:

Write each expression in exponential form. Then evaluate the power.

$2 \times 2 \times 2 \times 2 \times 2 =$ $2^5 = 32$ $4 \times 4 \times 4 =$ $4^3 = 64$

$(-3) \times (-3) \times (-3) =$ $(-3)^3 = -27$ $(-3) \times (-3) \times (-3) \times (-3) =$ $(-3)^4 = 81$

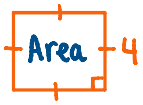
→ When evaluating a power with a negative base and an even exponent, the result is positive.

→ When evaluating a power with a negative base and an odd exponent, the result is negative.

Evaluate each power.

"squared"

$4^2 = 16$



"cubed"

$2^3 = 8$

$3^5 = 243$

$3^4 = 81$

Write each expression in expanded form. Then evaluate.

$(-2)^4 = (-2)\times(-2)\times(-2)\times(-2) = 16$

$-2^4 = -2\times2\times2\times2 = -16$

$(-4)^3 = (-4)\times(-4)\times(-4) = -64$

$-(-5)^6 = -(-5)\times(-5)\times(-5)\times(-5)\times(-5)\times(-5)$

$= -15625$

The exponent is applied to the base. If the negative value is in brackets, the base is a negative number. If there are no brackets, the base is positive.

How are $(-5)^2$ and -5^2 different?

The bases are different.

$(-5)^2 = (-5)\times(-5) = 25$

$-5^2 = -5\times5 = -25$

Practise: p.97 #5, 7, 11, 13, 14, 17, 21