Positive Exponents and Order of Operations MathPrint View

Objectives:

- Review the order of operations
- Calculate expressions with exponents, using extra parentheses if needed

Review the order of operations

When a calculation involves several operations, the rules are called the **order of operations**.
Graphing calculators know and use the order of operations.

1) Grouping symbols, including Parentheses ( ), brackets [ ], braces { }, the top or bottom of a large fraction bar, and insides of absolute values | | and insides of radicals. If nested, work inside out.
2) Exponents, including radicals
3) Multiplication and Division are equal priority, from left to right
4) Addition and Subtraction are equal priority, from left to right

Some students remember the order of operations by the acronym PEMDAS.

CAUTION: Multiplication does not always come before division! It's left to right.
CAUTION: Addition does not always come before subtraction! It's left to right.

Calculate expressions with exponents, using extra parentheses if needed

Because exponents are before add, subtract, multiply, or divide, if we want these before an exponent we must put parentheses around add, subtract, multiply, or divide.

Example 1: Calculate 2^3+4

Exponent before add is correct, so we do not insert parentheses.

Press these buttons: 

to get 12.

Example 2: Calculate $2^{3+4}=2^{(3+4)}$

Parentheses are implied because 3+4 is the exponent.

Press these buttons: 

to get 128.

CAUTION: The next two examples illustrate a common error!

Example 3: Calculate $(-9)^2$

Make base negative before evaluating exponent.

Press these buttons: 

to get $(-9)(-9)=81$

Example 4: Calculate -9^2

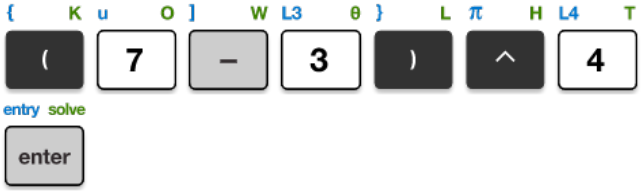
Multiply by negative (after evaluating exponent) requires no parentheses.

Press these buttons: 

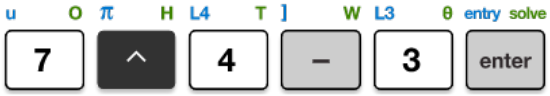
to get $-9 \cdot 9 = -81$

Try it!

1) $(7-3)^4$



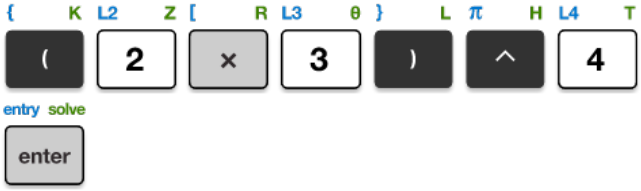
2) 7^{4-3}



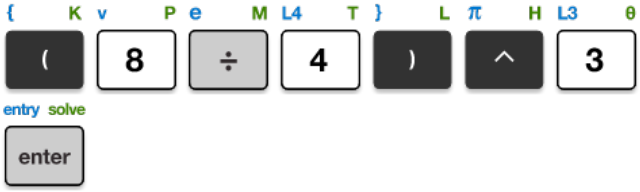
3) -7^{4-3}

4) $2 \cdot 3^4$

5) $(2 \cdot 3)^4$



6) $\left(\frac{8}{4}\right)^3$

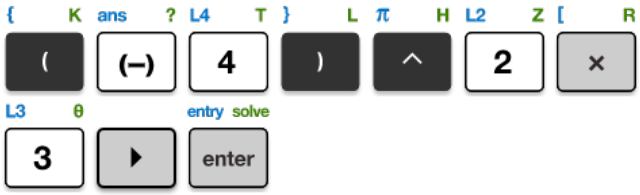


7) $\frac{8^3}{4}$

8) $3^{8/4}$

9) $4^{2 \cdot 3}$

10) $(-4)^{2 \cdot 3}$



Answers

1) 256
2) 7
3) -7
4) 162
5) 1296
6) 8
7) 128
8) 9
9) 4096
10) 4096