U2:L3 – Special Cases

Any base to the power of 1, is the base.

5^1	5
49^1	49
12345^1	12345
0.99^1	0.99

Any base to the power of 0 is 1.

5^0	1
49^0	1
$(-100)^0$	1
0.13^0	1

A negative base with an even exponent is positive.

$(-2)^2$	$(-2)\times(-2) = +4$
$(-3)^2$	$(-3)\times(-3) = +9$
$(-2)^4$	$(-2)\times(-2)\times(-2)\times(-2) =$
$(-3)^4$	$(+4)\times(-2)\times(-2)$

$(-3)\times(-3)\times(-3)\times(-3)$
$(9)\times(-3)\times(-3)$
$(-27)\times(-3) = 81$

$(-8)\times(-2)$
$+16$

A negative base with an odd exponent is negative.

$(-2)^3$	-8
$(-3)^3$	-27
$(-2)^5$	-32
$(-3)^5$	-243

$(-2)\times(-2)\times(-2)\times(-2)\times(-2)$

$(-3)\times(-3)\times(-3)\times(-3)\times(-3)$
$9\times(-3)\times(-3)\times(-3)$
$(-27)\times(-3)\times(-3)$

Fractions with exponents require the exponent to be applied to **both** the numerator and denominator.

$\left(\frac{2}{3}\right)^3 = \frac{2^3}{3^3}$	$= \frac{8}{27} = \frac{2\times2\times2}{3\times3\times3}$
$\left(\frac{3}{5}\right)^2 = \frac{3^2}{5^2}$	$= \frac{3\times3}{5\times5} = \frac{9}{25}$
$\left(\frac{5}{9}\right)^2 = \frac{5^2}{9^2}$	$= \frac{5\times5}{9\times9} = \frac{25}{81}$
$\left(\frac{11}{13}\right)^2 = \frac{11^2}{13^2}$	$= \frac{11\times11}{13\times13} = \frac{121}{169}$

Variables (letters) can also be used with exponents. Fill in the table below:

	BASE	EXPONENT	REPEATED MULTIPLICATION
y^2	y	2	$y \times y$
$(ab)^3$	(ab)	3	$(ab)\times(ab)\times(ab)$
$(gh)^4$	(gh)	4	$(gh)\times(gh)\times(gh)\times(gh)$
xy^3	y	3	$(x)\times(y)\times(y)\times(y)$
$3w^4$	w	4	$(3)\times(w)\times(w)\times(w)\times(w)$
$(4l)^3$	$4l$	3	$(4l)\times(4l)\times(4l)$

$4^3 l^3$

$64l^3$

$4\times l\times 4\times l\times 4\times l$

$4\times4\times4\times l\times l\times l$

$64l^3$

Negative Bases

$(-2)^3$

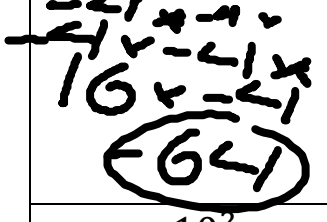
BASE	(-2)
EXPONENT	3
REPEATED MULTIPLICATION	$(-2)\times(-2)\times(-2)$
EVALUATE	-8

-2^3

BASE	2
EXPONENT	3
REPEATED MULTIPLICATION	$-(2)\times(2)\times(2)$
EVALUATE	-8

TRY IT OUT!

Write out the **repeated multiplication**, and then **evaluate.**

$(-4)^3$ 	-3^3 -27	-5^4 -625	$(-10)^1$ -10
-10^2 -100	$(-10)^2$ 100	-7^6 $-823{,}543$	$-\frac{1^3}{2}$ $-\frac{1}{2}$