M9

2.7 Exponent Laws
2.8

For any real number "a" and any integers "m" and "n" the following is true:

!It is very important that the base is the same for each power, the rules do not work otherwise!

Law	Formula	Example
Product Law	$a^m \times a^n = a^{m+n}$	$5^2 \times 5^4 =$ Proof:
Quotient Law	$a^m \div a^n = a^{m-n}$ $\frac{a^m}{a^n} = a^{m-n}$	$6^8 \div 6^3 =$ Proof:
Power Law	$(a^m)^n = a^{m \times n}$	$(7^2)^3 =$ Proof:

For any real numbers "a" and "b" and any integers "m" and "n" the following is true:

Law	Formula	Example
Power of a Product	$(a \times b)^m = a^m \times b^m$	$(2x)^3 =$
Power of a Quotient	$\boldsymbol{b \neq 0}$ $(a \div b)^m = a^m \div b^m$ $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$	$\left(\frac{3}{x}\right)^2 =$
Exponent of zero	$\boldsymbol{a \neq 0}$ $a^0 = 1$	$15^0 =$
Base of positive one	$1^a = 1$	$1^{500} =$
Base of negative one	$(-1)^a = 1$ if and only if a is even $(-1)^a = -1$ if and only if a is odd	$(-1)^{20} =$ $(-1)^{31} =$

Rule	Formula	Example
A base with a negative exponent	$a^{-m} = \frac{1}{a^m}$	$(5x)^{-1} =$ $4^{-2} =$ $7x^{-3} =$
A fraction with bases with one or more negative exponents	$\boldsymbol{b \neq 0 \text{ and } a \neq 0}$ $\frac{a^{-m}}{b^{-n}} = \frac{b^n}{a^n}$ $\left(\frac{a}{b}\right)^{-m} = \left(\frac{b}{a}\right)^{m}$	$\frac{x^{-3}}{y^{-9}} =$ $\frac{a^{-2}}{b^3} =$ $\frac{a^7}{b^{-9}} =$