PHYSICS PHOR PHUN
PASO ROBLES, CA

Exponents and Logarithms

MATH AND SCIENCE TUTORING
805-610-1725

Properties of Exponents

Null property	$a^0 = 1$
Identity	$a^1 = a$
Product property	$a^m \cdot a^n = a^{m+n}$
Quotient property	$\dfrac{a^m}{a^n} = a^{m-n}$
Power property	$(a^m)^n = a^{mn}$
Distributive properties	$(ab)^m = a^m b^m$
	$\left(\dfrac{a}{b}\right)^m = \dfrac{a^m}{b^m}$
Inverse property	$a^{-m} = \dfrac{1}{a^m}$
Root properties	$a^{\frac{1}{m}} = \sqrt[m]{a}$
	$a^{\frac{m}{n}} = \sqrt[n]{a^m}$

Properties of Logarithms

Definition	Iff $x = b^y$ then $\log_b x = y$
Null property	$\log_b 1 = 0$
Identity	$\log_b b = 1$
Product property	$\log_b mn = \log_b m + \log_b n$
Quotient property	$\log_b \dfrac{m}{n} = \log_b m - \log_b n$
Power properties	$\log_b m^p = p \log_b m$
	$b^{\log_b x} = x$
Change of base	$\log_a x = \dfrac{\log_b x}{\log_b a}$
Common log	$\log x = \log_{10} x$
Natural log	$\ln x = \log_e x$
Domain limit	$\log_b -m$ is NOT real

Properties of Radicals

Identity	$\sqrt[m]{a^m} = a$	**Power property**	$\sqrt[m]{ab} = \sqrt[m]{a} \cdot \sqrt[m]{b}$
Domain limit $\sqrt[n]{-a}$	is NOT real iff n is even	**Quotient property**	$\sqrt[m]{\dfrac{a}{b}} = \dfrac{\sqrt[m]{a}}{\sqrt[m]{b}}$

Growth and Decay

compound interest

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

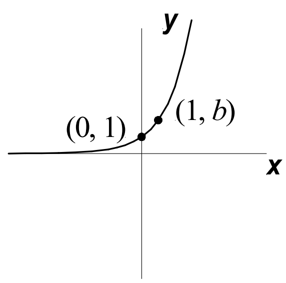
continuous growth/decay

$$A = Pe^{rt}$$

Parent Functions

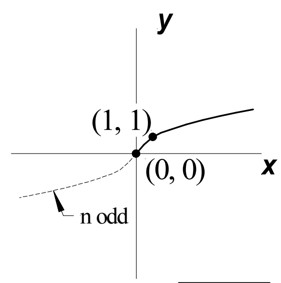
in standard position

Exponential



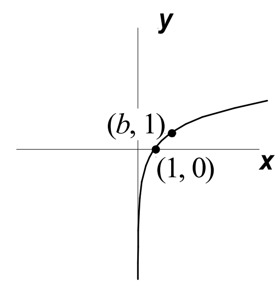
$$y - k = \pm ab^{\pm c(x-h)}$$

Radical



$$y - k = \pm a\sqrt[n]{(x-h)}$$

Logarithmic



$$y - k = \pm a \log_b (x-h)$$