Tools for Math Review Sheet

y = (slope)x + (y-intercept)

Area of square = $(\text{length of side})^2$

Circumference of circle of radius r = $2\pi r$

Area circle of radius r = πr^2

Area triangle = ½(base × height)

Surface area cube = $6(\text{length side})^2$

Volume cube = $(\text{length side})^3$

volume sphere = $\frac{4}{3}\pi r^3$

$a^x \bullet a^y = a^{x+y}$

$a^x \div a^y = a^{x-y}$

$(a^x)^y = a^{x \bullet y}$

$a^{-b} = \frac{1}{a^b}$

The logarithm of a number is the exponent by which a fixed number, the base, has to be raised to produce that number. The log base *a* of a number *y* is the power of *a* that yields *y*.

$\log_a y = \log_a a^x = x$ e.g $\log_{10} 1000 = \log_{10} 10^3 = 3$

$\log_{10}$ is commonly described as just log.

Log_e is commonly described as ln.

e = 2.71828182845904523536028747135266249775724709369995...

$\log_a a = 1$ e.g. $\log 10 = \log 10^1 = 1$ or $\ln e = \ln e^1 = 1$

$\log_a (b \bullet c) = \log_a b + \log_a c$

$\log_a (b \div c) = \log_a b - \log_a c$

$\log_a b^c = c \log_a b$ e.g. $\ln 2^{-3} = -3 \ln 2$

Population at time t = $P(t)$
Population at time 0 = P_0
r = rate

Rate has units of 1/time, e.g. a rate of change of 12% per year corresponds to 0.12/yr

t = time

$$\mathbf{P(t) = P_0\, e^{rt}}$$

for doubling $P(t) = 2P_0$

so $2P_0 = P_0\, e^{rt}$

$2 = e^{rt}$

$\ln 2 = \ln (e^{rt})$

$\ln 2 = rt \ln e$

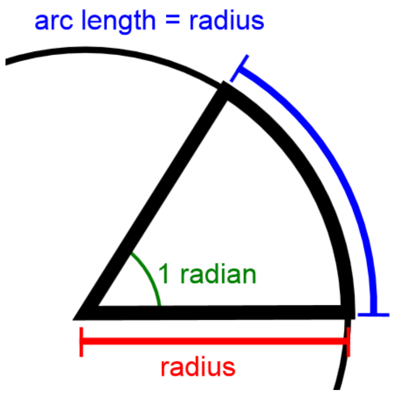
$\ln 2 = rt$

$$\frac{\ln 2}{r} = t$$

$$\frac{0.69}{r} = t$$

$$\mathbf{t = \frac{0.69}{r}}$$

A radian is the ratio between the length of an arc and its radius. It is normally described in terms of pi (π) and as a unitless quantity.

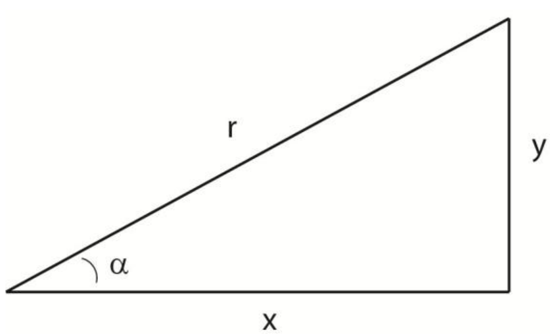


A complete circle has an arc length of $2\pi r$ (its circumference), so a complete circle is 2π radians.

$$\text{Radian} = \frac{\text{length of arc}}{\text{radius}} = \frac{2\Pi r}{r} = 2\Pi$$

A complete circle is 360°, 360° is 2π radians, leading to the following conversion factor.

$$\frac{360^{o}}{2\Pi} = \frac{180^{o}}{\Pi}$$



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$$\sin \alpha = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{y}{r}$$

$$\cos \alpha = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{x}{r}$$

$$\tan \alpha = \frac{\text{opposite}}{\text{adjacent}} = \frac{y}{x}$$