Circles

$$Arc\ Length = \frac{\theta}{2\pi} \times 2\pi r$$

$$Arc\ Length = \theta r$$

$$Sector\ Area = \frac{\theta}{2\pi} \times \pi r^2$$

$$Sector\ Area = \frac{1}{2}\theta r^2$$

$$(x-a)^2 + (y-b)^2 = r^2$$

$$Centre: (a\ ,\ b)$$

$$Radius = r$$

Sequences and Series

$$U_n = ar^{(n-1)}$$

$$S_n = \frac{a\left(1-r^n\right)}{1-r}$$

$$S_\infty = \frac{a}{1-r}$$

$$a = the\ first\ number$$

$$r = the\ common\ ratio$$

The Binomial Expansion

Use Pascal's triangle or the nCr button

$$(a+b)^4$$

$$1a^4+4a^3b+6a^2b^2+4ab^3+1b^4$$

Factors and Remainders

If $(x+3)$ is a factor then f(-3)=0

If f(-3)=5 the remainder when you divide by $(x+3)$ is 5.

Divide $x^3+4x^2+9x+18$ by $x+3$

$$
\begin{array}{r|l}
 & x^2+x+6 \\
\hline
x+3 & x^3+4x^2+9x+18 \\
 & \underline{x^3+3x^2} \\
 & \quad x^2+9x \\
 & \quad \underline{x^2+3x} \\
 & \quad\quad 6x+18 \\
 & \quad\quad \underline{6x+18} \\
 & \quad\quad\quad 0
\end{array}
$$

Triangles

The Sine Rule

For Lengths: $\frac{a}{\sin(A)} = \frac{b}{\sin(B)}$

For Angles: $\frac{\sin(A)}{a} = \frac{\sin(B)}{b}$

The Cosine Rule

For Lengths: $a^2 = b^2 + c^2 - 2bc\cos(A)$

For Angles: $\cos(A) = \frac{b^2 + c^2 - a^2}{2bc}$

$$Area = \frac{1}{2}ab\sin(C)$$

And for right angled triangles:
SOHCAHTOA and Pythagoras

The Trapezium Rule

The gap between the x values is 2

x	2	4	6	8
y	3.2	3.7	3.9	4.0

Half the first and last, add them all up and multiply by the gap

$$2\left(\frac{3.2}{2}+3.7+3.9+\frac{4.0}{2}\right)$$

Differentiation

Turning Point

Stationary Point

Maximum

Minimum

All mean that $\frac{dy}{dx} = 0$

$$If \ \frac{d^2y}{dx^2} > 0 \ minimum$$

$$If \ \frac{d^2y}{dx^2} < 0 \ maximum$$

Integration

Area under curve between a and b = $\int_a^b y \, dx$

Logs

$$2^3 = 8$$

$$\log_2 8 = 3$$

$$\log_a x + \log_a y = \log_a xy$$

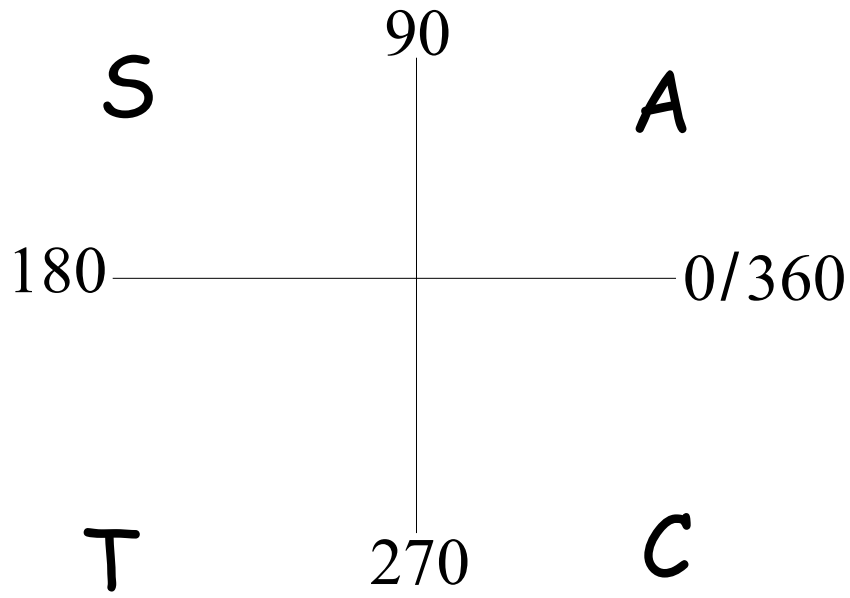
$$\log_a x - \log_a y = \log_a (x/y)$$

$$\log_a x^y = y \log_a (x)$$

Trigonometry

$$\cos^2\theta + \sin^2\theta = 1$$

$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$



$$\sin(\theta) = \sin(180-\theta)$$

$$\cos(\theta) = \sin(360-\theta)$$

$$\tan(\theta) = \tan(\theta+180)$$