Quadratic equations:

$ax^2 + bx + c = 0$ has roots $\dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Arithmetic series:

$u_n = a + (n-1)d$

$S_n = \dfrac{1}{2}n(a + l) = \dfrac{1}{2}n[2a + (n-1)d]$

Geometric series:

$u_n = ar^{n-1}$

$S_n = \dfrac{a(1-r^n)}{1-r}$

$S_\infty = \dfrac{a}{1-r}$ for $|r| < 1$

Differentiation:

function	derivative
x^p	px^{p-1}
$f(x) + g(x)$	$f'(x) + g'(x)$

Integration:

function	integral
x^p	$\dfrac{1}{p+1}x^{p+1} + c,\ p \neq -1$
$f'(x) + g'(x)$	$f(x) + g(x) + c$

Trigonometry:

In the triangle ABC

$\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

$a^2 = b^2 + c^2 - 2bc \cos A$

area $= \dfrac{1}{2}ab \sin C$

$\cos^2 A + \sin^2 A \equiv 1$

Area:

area under a curve $= \int_a^b y\,dx$

Laws of logarithms:

$\log_a(xy) \equiv \log_a x + \log_a y$

$\log_a\left(\frac{x}{y}\right) \equiv \log_a x - \log_a y$

$\log_a(x^k) \equiv k \log_a x$

Trigonometry:

$\sec^2 A \equiv 1 + \tan^2 A$
$\operatorname{cosec}^2 A \equiv 1 + \cot^2 A$

$\sin 2A \equiv 2 \sin A \cos A$

$\cos 2A \equiv \cos^2 A - \sin^2 A$

$\tan 2A \equiv \frac{2\tan A}{1-\tan^2 A}$

Differentiation:

function	derivative
e^x	e^x
$\ln px \ (p > 0)$	$\frac{1}{x}$

Integration:

function	integral
e^x	$e^x + c$
$\frac{1}{x}$	$\ln \lvert x \rvert + c, x \neq 0$

Differentiation:

function	derivative
e^{kx}	ke^{kx}
$\sin kx$	$k\cos kx$
$\cos kx$	$-k\sin kx$
$\tan kx$	$k\sec^2 kx$
$f(x)g(x)$	$f'(x)g(x)+f(x)g'(x)$
$\frac{f(x)}{g(x)}$	$\frac{f'(x)g(x)-f(x)g'(x)}{(g(x))^2}$
$f(g(x))$	$f'(g(x))g'(x)$

Integration:

function	integral
e^{kx}	$\frac{1}{k}e^{kx}+c$
$\cos kx$	$\frac{1}{k}\sin kx+c$
$\sin kx$	$-\frac{1}{k}\cos kx+c$
$\sec^2 kx$	$\frac{1}{k}\tan kx+c$
$f'(g(x))g'(x)$	$f(g(x))+c$

Vectors:

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} . \begin{pmatrix} a \\ b \\ c \end{pmatrix} = xa + yb + zc$$

Mean $= \bar{x} = \dfrac{\Sigma x}{n}$ or $\dfrac{\Sigma fx}{\Sigma f}$

Standard deviation $= \sqrt{\text{Variance}}$

Interquartile range $= \text{IQR} = Q_3 - Q_1$

$\text{P}(A') = 1 - \text{P}(A)$

For independent events, $\text{P}(B \mid A) = \text{P}(B)$, $\text{P}(A \mid B) = \text{P}(A)$, $\text{P}(A \cap B) = \text{P}(A)\,\text{P}(B)$

$\text{E}(aX + b) = a\text{E}(X) + b$

$\text{Var}\,(aX + b) = a^2\,\text{Var}\,(X)$

Cumulative distribution function for a discrete random variable:

$$\text{F}(x_0) = \text{P}(X \leq x_0) = \sum_{x \leq x_0} \text{p}(x)$$

Standardised Normal Random Variable $Z = \dfrac{X - \mu}{\sigma}$ where $X \sim \text{N}(\mu, \sigma^2)$

For the continuous random variable X having probability density function $f(x)$,

$$P(a < X \leq b) = \int_a^b f(x)\,dx .$$

$$f(x) = \frac{dF(x)}{dx} .$$

$aX \pm bY \sim \mathrm{N}(a\mu_x \pm \mathrm{b}\mu_y, a^2\sigma_x^2 + b^2\sigma_y^2)$ where X and Y are independent and $X \sim \mathrm{N}(\mu_x, \sigma_x^2)$ and $Y \sim \mathrm{N}(\mu_y, \sigma_y^2)$.

The tension in an elastic string $= \dfrac{\lambda x}{l}$

The energy stored in an elastic string $= \dfrac{\lambda x^2}{2l}$

For SHM:

$\ddot{x} = -\omega^2 x,$

$x = a\cos \omega t$ or $x = a \sin \omega t$,

$v^2 = \omega^2(a^2 - x^2),$

$T = \dfrac{2\pi}{\omega}$