

NOTATION

Set notation			
Notation	Meaning	Comment	Papers
\in	is an element of		2, 3
\notin	is not an element of		2, 3
\subseteq	is a subset of		2, 3
\subset	is a proper subset of		2, 3
$\{x_1, x_2, \dots, x_n\}$	the set with elements x_1, x_2, \dots, x_n		2, 3
\emptyset	the empty set	only used with explanation	2, 3
A'	the complement set of the set A	only used with explanation	2, 3
\mathbb{N}	the set of natural numbers $\{1, 2, 3, \dots\}$		2, 3
\mathbb{Z}	the set of integers $\{\dots, -2, -1, 0, 1, 2, \dots\}$		2, 3
\mathbb{Q}	the set of rational numbers $\{\frac{p}{q} : p \in \mathbb{Z}, q \in \mathbb{N}\}$		2, 3
\mathbb{R}	the set of real numbers		2, 3
\mathbb{C}	the set of complex numbers		2, 3
\cup	union of sets		2, 3
\cap	intersection of sets		2, 3
(x, y)	the ordered pair x, y	for example, coordinates	2, 3

Miscellaneous symbols			
Notation	Meaning	Comment	Papers
$=$	is equal to		2, 3
\neq	is not equal to		2, 3
\equiv	is identical to, or is equivalent to, or is congruent to		2, 3
\approx	is approximately equal to		2, 3
∞	infinity		2, 3
\propto	is proportional to		2, 3
$<$	is less than		2, 3
\leq	is less than or equal to		2, 3
$>$	is greater than		2, 3
\geq	is greater than or equal to		2, 3
\therefore	therefore		2, 3
$p \Rightarrow q$	p implies q (if p then q)		2, 3
$p \Leftarrow q$	p is implied by q (if q then p)		2, 3
$p \Leftrightarrow q$	p is equivalent to q (p if and only if q)		2, 3
S_n	the sum to n terms of a progression		2, 3
S_∞	the sum to infinity of a progression		2, 3
$x \rightarrow \infty$	x tends to ∞		2, 3
$x_n \rightarrow a$	x_n tends to a	for sequences when $n \rightarrow \infty$	2, 3

Operations			
Notation	Meaning	Comment	Papers
$a \pm b$	a plus or minus b		2, 3 •
$a \mp b$	a minus or plus b		2, 3 •
$a \times b, ab, a.b$	a multiplied by b	$a.b$ not usually used	2, 3
$a \div b, \frac{a}{b}, a/b$	a divided by b	a/b is not given in the A level notation list; $a \div b$ not usually used	2, 3 •
$\sum_{i=m}^n a_i$	$a_m + a_{m+1} + \dots + a_n$	only the case $m = 1$ is given in the A level notation list	2, 3 •
$\prod_{i=m}^n a_i$	$a_m a_{m+1} \dots a_n$	only the case $m = 1$ is given in the A level notation list	2, 3 •
\sqrt{a}	the positive square root of a	$a \in \mathbb{R}, a \geq 0$	2, 3
$ a $	the modulus of a	$a \in \mathbb{R}$	2, 3
$n!$	n factorial, $n \in \mathbb{N}$	$0! = 1$, by definition	2, 3
$\binom{n}{r}$ or ${}^n C_r$	the binomial coefficient $\frac{n!}{r!(n-r)!}$		2, 3

Functions			
Notation	Meaning	Comment	Papers
$\lim_{x \rightarrow a} f(x)$	the limit of $f(x)$ as x tends to a		2, 3
$\frac{dy}{dx}$	the first derivative of y with respect to x		2, 3
$\frac{d^n y}{dx^n}$	the n th derivative of y with respect to x		2, 3
\dot{x} and \ddot{x}	the first and second derivatives of x with respect to t	where t is time, unless otherwise specified	2, 3
$f'(x)$	the first derivative of f evaluated at x		2, 3
$f''(x)$	the second derivative of f evaluated at x		2, 3
$f^{(n)}(x)$	the n th derivative of f evaluated at x		2, 3
$\int f(x) dx$	the indefinite integral of $f(x)$ with respect to x		2, 3
$\int_a^b f(x) dx$	the definite integral of $f(x)$ with respect to x between the limits of $x = a$ and $x = b$		2, 3
e	base of natural logarithms		2, 3
$e^x, \exp x$	exponential function of x		2, 3
$\log_a x$	logarithm to base a of x		2, 3
$\ln x, \log_e x$	natural logarithm of x		2, 3
$\sin, \cos, \tan, \operatorname{cosec}, \sec, \cot$	the trigonometric functions		2, 3
\sin^{-1}, etc	the inverse trigonometric functions	arcsin, etc, will not be used	2, 3
$\sinh, \cosh, \tanh, \operatorname{cosech}, \operatorname{sech}, \coth$	the hyperbolic functions		3
\sinh^{-1}, etc	the inverse hyperbolic functions	arsinh, etc, will not be used	3

Complex numbers			
Notation	Meaning	Comment	Papers
i	square root of -1	j will not be used	2, 3
$x + iy$	complex number with real part x and imaginary part y		2, 3
$r(\cos \theta + i \sin \theta)$	complex number with modulus r and argument θ	$r \geq 0$; the range of θ will be given if required	2, 3
$\text{Re}(z)$	the real part of z	$\text{Re}(z) = x$ if $z = x + iy$	2, 3
$\text{Im}(z)$	the imaginary part of z	$\text{Im}(z) = y$ if $z = x + iy$	2, 3
$\arg(z)$	the argument of z	$\arg(z) = \theta$ if $z = r(\cos \theta + i \sin \theta)$; the range of $\arg(z)$ will be given if required	2, 3
$ z $	the modulus of z	$ z = r$ if $z = r(\cos \theta + i \sin \theta)$	2, 3
z^*	the complex conjugate of z	$z^* = x - iy$ if $z = x + iy$	2, 3

Matrices			
Notation	Meaning	Comment	Papers
M	the matrix M		2, 3
M_{ij}	the entry in the i th row and j th column of the matrix M	only used with explanation	2, 3 •
0	matrix with all entries 0		2, 3
I	identity matrix		2, 3
\mathbf{M}^{-1}	the inverse of the (square) matrix M		2, 3
\mathbf{M}^T	the transpose of the matrix M		2, 3
$\det \mathbf{M}$	determinant of the (square) matrix M		2, 3
Mr	image of the column vector r under the transformation associated with the matrix M		2, 3

Vectors			
Notation	Meaning	Comment	Papers
a	the vector a		2, 3
\overrightarrow{AB}	the vector represented by the directed line segment AB		2, 3
$\hat{\mathbf{a}}$	the unit vector in the direction of a	only used with explanation	2, 3
i, j, k	unit vectors in the directions of the Cartesian axes		2, 3
$ \mathbf{a} $	the magnitude of a		2, 3
$ \overrightarrow{AB} $	the magnitude of \overrightarrow{AB}		2, 3
r	position vector		2, 3
s	displacement vector		2, 3
a.b or a · b	the scalar product of vectors a and b		2, 3
a × b	the vector product of vectors a and b		3 •

Probability/Statistics			
Notation	Meaning	Comment	Papers
$A, B, C, \text{ etc}$	events		2, 3
$A \cup B$	union of events A and B		2, 3
$A \cap B$	intersection of events A and B		2, 3
$P(A)$	probability of the event A		2, 3
A'	complement of event A	only used with explanation	2, 3
$P(A B)$	probability of the event A conditional on (i.e. given) the event B		2, 3
$x, y, r, \text{ etc}$	values of the random variables $X, Y, R, \text{ etc}$		2, 3
$P(X = x)$	probability function of a discrete random variable X		2, 3
$f(x)$	probability density function (p.d.f.) of a continuous random variable		2, 3
$F(x)$	cumulative distribution function (c.d.f.) of a continuous random variable		2, 3
$E(X)$	expectation of the random variable X		2, 3
$\text{Var}(X)$	variance of the random variable X		2, 3
\sim	has the distribution		2, 3
$B(n, p)$	Binomial distribution with parameters n and p , where n is the number of trials and p is the probability of success in any trial	$q = 1 - p$	2, 3
$N(\mu, \sigma^2)$	Normal distribution with mean μ and variance σ^2		2, 3
$N(0, 1)$	the standard Normal distribution		2, 3
ϕ, Φ	probability density function and cumulative distribution function of a random variable with standard Normal distribution	knowledge of formulae is not required; only used with explanation	2, 3

Mechanics			
Notation	Meaning	Comment	Papers
kg	kilogram		2, 3
m	metre		2, 3
km	kilometre		2, 3
m s^{-1}	metres per second		2, 3
m s^{-2}	metres per second per second	acceleration	2, 3
N	newton		2, 3
N m	newton metre	moment of a force, for example	2, 3
J	joule		2, 3
t	time		2, 3
s	displacement		2, 3
u	initial speed		2, 3
v	speed or final speed		2, 3
a	acceleration		2, 3
g	acceleration due to gravity		2, 3
μ	coefficient of friction		2, 3
e	coefficient of restitution		2, 3
k	stiffness		2, 3
λ	modulus of elasticity		2, 3
ω	angular speed		3