Government of **Western Australia**
School Curriculum and Standards Authority

WACE
Western Australian Certificate of Education

MATHEMATICS:

UNITS 3A AND 3B

FORMULA SHEET
2012

This document is valid for teaching and examining until 31 December 2012.

Mathematics 3A and 3B Formula Sheet updated July 2012

Numbers and algebra

Index laws: For $a, b > 0$ and m, n real,

$a^m b^m = (a\,b)^m$ $\quad a^m a^n = a^{m+n}$ $\quad (a^m)^n = a^{mn}$

$\frac{1}{a^m} = a^{-m}$ $\quad \frac{a^m}{a^n} = a^{m-n}$ $\quad a^0 = 1$

For $a > 0$ and m an integer and n a positive integer,
$a^{\frac{m}{n}} = \sqrt[n]{a^m} = \left(\sqrt[n]{a}\right)^m$

Simple interest: $I = Prt$, where P is the principal, r is the rate per year and t is the time in years

Compound interest: $A = P(1 + r)^t$ compounded annually

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

Differentiation: If $f(x) = y$ then $f'(x) = \frac{dy}{dx}$

Powers: If $f(x) = x^n$ then $f'(x) = nx^{n-1}$ or If $y = x^n$ then $\frac{dy}{dx} = nx^{n-1}$

Product rule: If $y = f(x)\,g(x)$ then $y' = f'(x)\,g(x) + f(x)\,g'(x)$ or If $y = uv$ then $\frac{dy}{dx} = \frac{du}{dx}v + u\frac{dv}{dx}$

Integration: $\int x^n\,dx = \frac{x^{n+1}}{n+1} + c,\ n \neq -1$

Antiderivative: Given $\frac{dy}{dx} = x^n$ then $y = \frac{x^{n+1}}{n+1} + c,\ n \neq -1$

See next page

Space and measurement

In any triangle ABC:

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

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

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

$A = \frac{1}{2}ab\sin C$, where A is the area

Circle: $C = 2\pi r = \pi D$, where C is the circumference, r is the radius and D is the diameter
$A = \pi r^2$, where A is the area

Triangle: $A = \frac{1}{2}bh$, where b is the base and h is the perpendicular height

Parallelogram: $A = bh$

Trapezium: $A = \frac{1}{2}(a + b)h$, where a and b are the lengths of the parallel sides and h is the perpendicular height

Prism: $V = Ah$, where V is the volume, A is the area of the base and h is the perpendicular height

Pyramid: $V = \frac{1}{3}Ah$

Cylinder: $S = 2\pi rh + 2\pi r^2$, where S is the total surface area
$V = \pi r^2 h$

Cone: $S = \pi rs + \pi r^2$, where s is the slant height
$V = \frac{1}{3}\pi r^2 h$

Sphere: $S = 4\pi r^2$
$V = \frac{4}{3}\pi r^3$

Chance and data

Probability: For any event A and its complement $\overline{A}$
$P(A) + P(\overline{A}) = 1$

In a normal distribution approximately:
68% of values lie within one (1) standard deviation of the mean
95% of values lie within two (2) standard deviations of the mean
99.7% of values lie within three (3) standard deviations of the mean.

Note: Any additional formulas identified by the examination panel as necessary will be included in the body of the particular question.