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.

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: $\mathrm{I} = Prt$, 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.