

MATHEMATICS
UNITS 3A AND 3B
FORMULA SHEET
2014



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Western Australian Certificate of Education

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Numbers and algebra

Index laws:

For $a, b > 0$ and m, n real,

$$a^m b^n = (a b)^m$$

$$a^m a^n = a^{m+n}$$

$$(a^m)^n = a^{mn}$$

$$\frac{1}{a^m} = a^{-m}$$

$$\frac{a^m}{a^n} = a^{m-n}$$

$$a^0 = 1$$

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 $y = f(x)g(x)$

or

If $y = uv$

then $y' = f'(x)g(x) + f(x)g'(x)$

then $\frac{dy}{dx} = \frac{du}{dx}v + u\frac{dv}{dx}$

See next page

Space and measurement

In any triangle ABC :

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

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

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

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

Circle:

$C = 2\pi r = \pi D$, where C is the circumference, r is the radius and D is the diameter

$$A = \pi r^2$$

Triangle:

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

Parallelogram:

$$A = bh$$

Trapezium:

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

Prism:

$V = Ah$, where V is the volume and A is the area of the base

Pyramid:

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

Cylinder:

$$S = 2\pi rh + 2\pi r^2, \text{ where } S \text{ is the total surface area}$$

$$V = \pi r^2 h$$

Cone:

$$S = \pi rs + \pi r^2, \text{ where } s \text{ is the slant height}$$

$$V = \frac{1}{3}\pi r^2 h$$

Sphere:

$$S = 4\pi r^2$$

$$V = \frac{4}{3}\pi r^3$$

Chance and data

Probability:

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

In a normal distribution approximately:

68% of values lie within one standard deviation of the mean
95% of values lie within two standard deviations of the mean
99.7% of values lie within three 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.