Government of **Western Australia**
Curriculum Council

WACE
Western Australian Certificate of Education

Mathematics: Units 3C and 3D
Formula sheet

Number and algebra: Calculus

Differentiation

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

If $f(x) = x^n$, then $f'(x) = n x^{n-1}$

If $f(x) = e^x$, then $f'(x) = e^x$

	Function notation		Leibniz Notation	
	y	y'	y	y'
Product rule	$f(x)\, g(x)$	$f'(x)\, g(x) + f(x)\, g'(x)$	uv	$\frac{du}{dx} v + u \frac{dv}{dx}$
Quotient rule	$\frac{f(x)}{g(x)}$	$\frac{f'(x)\, g(x) - f(x)\, g'(x)}{(g(x))^2}$	$\frac{u}{v}$	$\frac{\frac{du}{dx} v - u \frac{dv}{dx}}{v^2}$
Chain rule	$f(g(x))$	$f'(g(x))\, g'(x)$	$y = f(u)$ and $u = g(x)$	$\frac{dy}{du} \times \frac{du}{dx}$

Integration

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

$$\int e^x dx = e^x + c$$

Fundamental Theorem of Calculus: $\frac{d}{dx} \int_a^x f(t)\, dt = f(x)$ and $\int_a^b f'(x)\, dx = f(b) - f(a)$

Incremental formula: $\delta y \approx \frac{dy}{dx}\, \delta x$

Space and measurement: Measurement

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

Prism: Volume = Area of base $\times$ height

Cylinder: Total surface area = $2\pi r h + 2\pi r^2$ Volume = $\pi r^2 \times h$

Pyramid: Volume = $\frac{1}{3} \times$ area of base $\times$ height

Cone: Total surface area = $\pi r s + \pi r^2$, s is the slant height Volume = $\frac{1}{3} \times \pi r^2 \times h$

Sphere: Total surface area = $4\pi r^2$ Volume = $\frac{4}{3}\pi r^3$

Volume of solids of revolution about the axes: $\int \pi y^2\, dx$ and $\int \pi x^2\, dy$

Space and measurement: Rate

If $y' = ky$, then $y = Ae^{kx}$

Chance and data: Quantify chance

Probability Laws

$P(A) + P(\bar{A}) = 1$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$P(A \cap B) = P(A)P(B/A) = P(B)P(A/B)$

Binomial distributions: Mean: $\mu = np$ and standard deviation: $\sigma = \sqrt{np(1-p)}$

Chance and data: Represent data

Central Limit Theorem:

Mean of the sample means, $\bar{X}$, equals the population mean, μ

Standard deviation of the sample means equals $\frac{\sigma}{\sqrt{n}}$

where σ is the population standard deviation.

Chance and data: Interpret data

Infer the mean of a population from a sample using $\bar{x} - z\frac{\sigma}{\sqrt{n}} \leq \mu \leq \bar{x} + z\frac{\sigma}{\sqrt{n}}$

where z is the standard score for a confidence interval.

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