



MATHEMATICS

UNITS 3C AND 3D

2015 **FORMULA SHEET**

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This document is valid for teaching and examining until 31 December 2015.

Mathematics 3C and 3D Formula Sheet updated January 2015

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Chance and data

For any event A and its complement A, and event BProbability:

 $(g|V)_d(g)_d = (V|g)_d(V)_d = (g \cup V)_d$ $(A \cap A) - (A) + (A) + (A) = (A \cup A) - (A \cap A)$

In a binomial distribution:

 $\frac{u \wedge}{Q} z + \underline{x} \geq n \geq \frac{u \wedge}{Q} z - \underline{x}$

where μ is the population mean,

'ueəm əldmes ətt si \underline{x}

bns exis eldmes ent si n

to the confidence level.

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 $I = (\underline{V})d + (V)d$

Mean: $\sigma = \eta du = 0$ and standard deviation: $\sigma = \eta du = 0$

A confidence interval for the mean of a population is:

 σ is the population standard deviation,

z is the cut-off value on the standard normal distribution corresponding

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

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Number and algebra

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

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

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

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

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

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

$$a^0 = 1$$

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

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

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

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

Product rule: If y = f(x) g(x)

If
$$y = uv$$

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

then
$$y' = f'(x) g(x) + f(x) g'(x)$$
 or then $\frac{dy}{dx} = \frac{du}{dx}v + u\frac{dv}{dx}$

Quotient rule:

If
$$y = \frac{f(x)}{g(x)}$$

then
$$y' = \frac{f'(x) g(x) - f(x) g'(x)}{(g(x))^2}$$

$$\begin{aligned} &\text{If } y = \frac{f(x)}{g(x)} \\ &\text{then } y' = \frac{f'(x) \ g(x) - f(x) \ g'(x)}{(g(x))^2} \end{aligned} \qquad \text{or} \\ &\text{then } \frac{dy}{dx} = \frac{\frac{du}{dx} \ v - u \frac{dv}{dx}}{v^2} \end{aligned}$$

Chain rule:

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

If
$$y = f(u)$$
 and $u = g(u)$

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

or
$$fy = f(u) \text{ and } u = g(x)$$
 then
$$\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

Integration:

Powers:

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

Exponentials:

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

Fundamental Theorem of Calculus:

$$\frac{d}{dx} \left(\int_a^x f(t) dt \right) = f(x) \qquad \text{and} \qquad \int_a^b f'(x) dx = f(b) - f(a)$$

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

$$\delta y \simeq \frac{dy}{dx} \, \delta x$$

Exponential growth and decay:

If
$$\frac{dy}{dt} = ky$$
, then $y = Ae^{kt}$

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Space and measurement

 $C = 2\pi r = \pi D$, where *C* is the circumference, Circle:

 \emph{r} is the radius and \emph{D} is the diameter

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 $A = \pi r^2$, where A is the area

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

Parallelogram: A = bh

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

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

 $V = \frac{1}{2} Ah$ Pyramid:

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

 $S = \pi r s + \pi r^2$, where s is the slant height Cone:

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

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

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

Volume of solids of revolution:

 $V = \int \pi y^2 dx$ rotated about the x-axis

 $V = \int \pi x^2 dy$ rotated about the *y*-axis