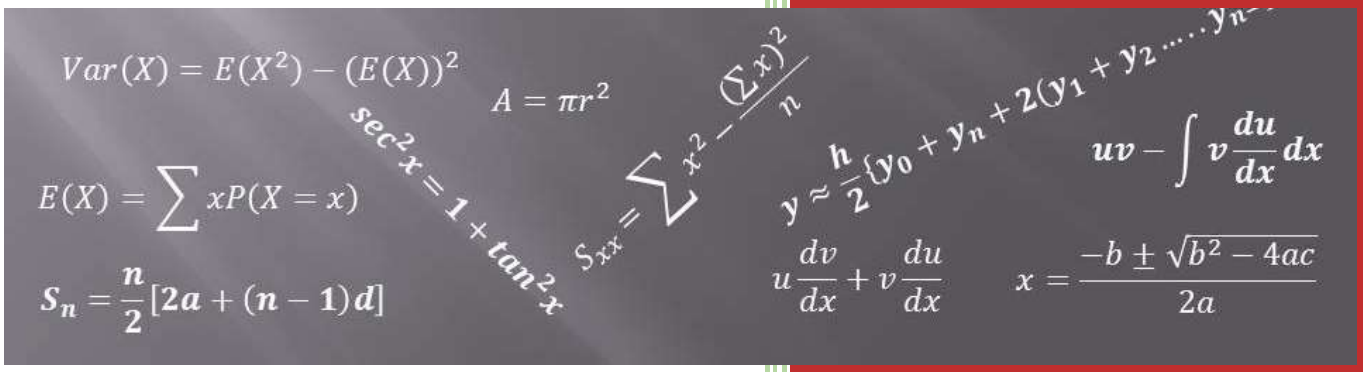
MathsGeeks

‘Everything You Need to Know’
A Level – Edexcel – C2



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Remainder Theorem: If $(x+2)$ has a remainder of -14 put $f(-2)$ into the equation and it will equal -14. e.g. $f(x) = 2x^2 + x^2 + 3x + 4 = 2(-2)^3 + (-2)^2 + 3(-2) + 4 = -14$.

Factor Theorem: If $(x+1)$ has remainder 0 then it is a **factor** and you can carry out long division e.g.

$$(x+1)\overline{)x^3 + 2x^2 + 3x + 2}\quad x^2 + x + 2$$

Binomial Expansion: Make sure it starts with a 1 e.g. for $(2+x)^5 = 2^5(1+\frac{x}{2})^5$ then use

$(1+x)^n = 1 + \frac{nx}{1!} + \frac{n(n-1)x^2}{2!} + \frac{n(n-1)(n-2)x^3}{3!}$ (in formula book) e.g.

$$2^5\left(1+\frac{x}{2}\right)^5 = 2^5(1 + 5\left(\frac{x}{2}\right) + \frac{5(4)}{2!}(\frac{x}{2})^2 + \frac{5(4)(3)}{3!}\left(\frac{x}{2}\right)^3 \ldots) = 32 + 80x + 80x^2 + 40x^3 \ldots..$$

If you are given for example $2^5(1.005)^5$ then this is simply $2^5(1 + 0.005)^5$ which means that in this case $\frac{x}{2} = 0.005$ and $x = 0.01$. Then just substitute this into the expansion.

Trapezium Rule: Simply fill in the formula. e.g. If you are given or have to calculate the following:

x	0	0.5	1	1.5	2	2.5	3
$y = \sqrt{(2^X + 1)}$	1.414	1.554	1.732	1.957	2.236	2.580	3

Then $h = 0.5 - 0$ or $1.5 - 1$ so 0.5. and the y values given here so $y \approx \frac{h}{2}\{y_0 + y_n + 2(y_1 + y_2 \ldots.. y_{n-1})\}$ becomes $y \approx \frac{0.5}{2}\{1.414 + 3 + 2(1.554 + 1.732 + 1.957 + 2.236 + 2.580)\}$ etc.

Logarithms: Remember and use the following

1) $log_a b + log_a c = log_a bc$

2) $log_a b - log_a c = log_a \frac{b}{c}$

3) If $log_b c = a \;\; then\; c = b^a$

4) $log_a b^c = c log_a b$

5) $log_a b = \frac{\log b}{\log a}$

Solving Equations: for example if $7^{2x} - 4(7^x) + 3 = 0$ then let $u = 7^x$ to get $7u^2 - 4u + 3 = 0$. Then solve the quadratic and sub back in and solve for x.

Geometric Series: Same as arithmetic sequence (C1) in terms of setting up equations (where a is the first term and r is the multiple difference between one term and the next. Note the addition of $S_\infty = \frac{a}{1-r}$ (also in formula book).

Trigonometry: Learn $sin^2x + cos^2x = 1$ and $\frac{\sin x}{\cos x} = \tan x$

e.g. $3sin^2x + 7sinx = cos^2x - 4$ becomes $3sin^2x + 7sinx = (1 - sin^2x) - 4$ then rearrange.

Plot graphs to find ALL values of x. For example if sin x = $\frac{1}{2}$ then $x_1 = sin^{-1}(\frac{1}{2})$ and x_2 = 180 - x_1 for the region 0 to 360°.

Triangles: Triangles in C2 are general not right angled and so you need to use the formulas in the book. If you have mostly angles use $\frac{sin\ A}{a} = \frac{sinB}{b} = \frac{sin\ C}{c}$. If you have mostly lengths then use $a^2 = b^2 + c^2 - 2bc\cos A$. You may also be asked for the area of the triangle (also in the formula book) = $\frac{1}{2}\ ab\sin C$.

Arcs/Sectors/Segments of Circles: Use the formulas in the book. The length of arc = $r\theta$. And the area of a sector is Area = $\frac{1}{2}r^2\theta$. You often then have to subtract a triangle to find the final area of the segment.

Circles: The equation of a circle is $(x - a)^2 + (y - b)^2 = r^2$ where (a, b) is the centre of the circle and r is the radius of the circle. If you are given for example $x^2 + 4x + y^2 - 2y + 9 = 0$ then complete the square for both $(x + 2)^2 + (y - 1)^2 = r^2$ and then compare to find r^2.

To find a tangent to the circle find the gradient of the line from the point on the edge of the circle to the centre (effectively the radius) and do $-1/m$ to find gradient of tangent. Then fill in $y = mx + c$ and find *c* using the point on the tangent.

Differentiation: These questions usual give you information to get rid of one variable e.g. given a box which is right prism of height *h* which has a cross section which is a sector of a circle, radius r cm and angle 1 radian. The volume of the box if $300\ cm^3$. Show the surface area is $S = r^2 + \frac{1800}{r}$. Use the volume to get rid of *h*. Vol = Area of base x height, so $300 = \frac{1}{2}r^2 \times 1 \times h$ and $h = \frac{600}{r^2}$. Sub this into surface area $S = 2 \times \frac{1}{2}r^2 \times 1 + 2rh + r\vartheta h = r^2 + 2rh + rh = r^2 + \frac{1800}{r}$.
Then remember $\frac{d}{dx}(x^n) = nx^{n-1}$. And that at a minimum and maximum $\frac{d\ (anything)}{dx}$= 0. For a minimum point $\frac{d^2(anthing)}{dx^2} > 0$ and is < 0 for maximum point.

Integration: Remember $\int x^n\ dx = \frac{1}{n+1}(x^{n+1})$
The area under a curve i.e. between the curve and the x-axis is given by $\int_{x_1}^{x_2} y\ dx$ between limits of x_2 and x_1 for example.
Often you have to subtract or add a triangle using $\frac{1}{2}(base\ x\ height)$.