Core 2 Revision

Algebra and Functions

- If $f(p) = 0$ then $f(x - p)$ is a factor of $f(x)$.
- Long division with algebra…

Sine and Cosine

- $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
- $c^2 = a^2 + b^2 - 2ab\cos C$
- $area = \frac{1}{2}ab\sin C$

Exponentials and Logarithms

- $\log_a n = x \rightarrow a^x = n$
- $\log_a 1 = 0$
- $\log_a a = 1$
- $\log xy = \log x + \log y$
- $\log\left(\frac{x}{y}\right) = \log x - \log y$
- $\log(x)^k = k\log x$
- $\log_a x = \frac{\log_b x}{\log_b a}$

Co-ordinate Geometry

- Mid point of a line = $(\bar{x}, \bar{y})$
- Length of a line = $\sqrt{\Delta x^2 + \Delta y^2}$
- A circle of centre (a, b) has formula $r^2 = (x-a)^2 + (y-b)^2$

Binomial Expansion

$$(a+b)^n = a^n + \binom{n}{1}a^{n-1}b + \binom{n}{2}a^{n-2}b^2 + \ldots + \binom{n}{r}a^{n-r}b^r + b^n$$

where $n \in \mathrm{N}$

$$\binom{n}{r} = {}^nC_r = \frac{n!}{r!(n-r)!}$$

$$(1+x)^n = 1 + nx + \frac{n(n-1)}{1\times 2}x^2 + \ldots + \frac{n(n-1)\ldots(n-r+1)}{1\times 2\times\ldots\times r}x^r$$

where $|x| < 1, n \in R$

Radian Measure

- $1 radian = {}^{180}/_{\pi}$
- $360^o = 2\pi^c$
- $arclength = \theta r$
- $area\,\mathrm{sec}tor = \frac{1}{2}r^2\theta$
- $areasegment = \frac{1}{2}r^2(\theta - \sin\theta)$

Geometric Sequences

- $u_n = ar^{n-1}$
- $S_n = \frac{a(1-r^n)}{1-r}$
- $S_\infty = \frac{a}{1-r}$ where $|r| < 1$

Trigonometric Functions & Identities

- Working anti-clockwise from 0 t 360^o **A**ll **S**tudents **T**ake **C**annabis shows where functions are positive.
- $\sin(180-\theta) = \sin\theta$
- $\cos(180-\theta) = -\cos\theta$
- $\tan 45 = 1, \sin 30 = 0.5, \cos 60 = 0.5$ *etc*

Graphs: sin starts at the origin, cos starts at the max, range is -1 to 1, period is 360. For tan period is 180 and range is ∞

- $\tan\theta = \frac{\sin\theta}{\cos\theta}$
- $\sin^2\theta + \cos^2\theta = 1$
- With sin; θ = θ + *n*360; (180 – θ) + *n*360
- With cos; θ = θ + *n*360; (360 – θ) + *n*360
- With tan; θ = θ + *n*180

Differentiation

- Stationary points are where the gradient of the curve is 0.
- d*y* / d*x* will give stationary points. (solve $f'(x) = 0$ then sub. in $f(x)$.
- *if* $f''(x) > 0$ then min point; if < 0 then max point; if = 0 then either or inflexion.

Integration

- Definite integration has limits, solve then sub limits in and subtract. Integrating a range gives the area below it.
- Trapezium rule allows estimation of areas under curves.