

# Mathematics mind map

## Common content

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## Analysis and approaches AHL

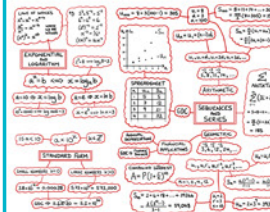
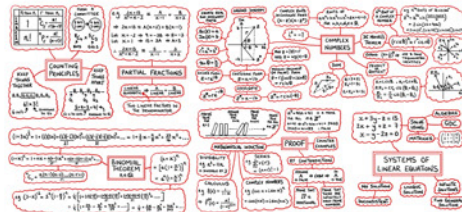
## Analysis and approaches SL

## Common content

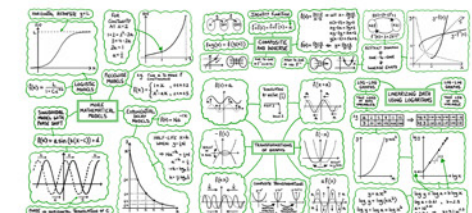
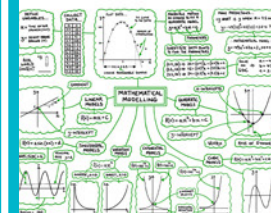
## Applications and interpretation SL

## Applications and interpretation AHL

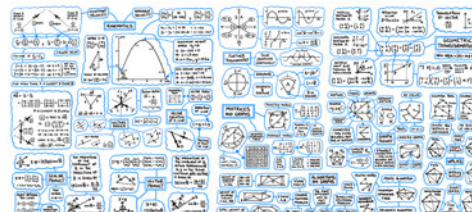
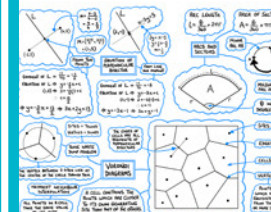
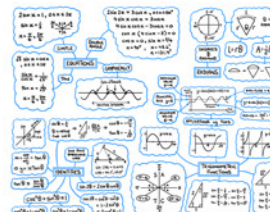
### Number and algebra



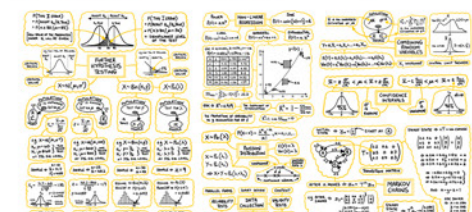
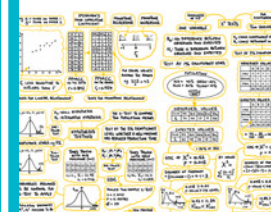
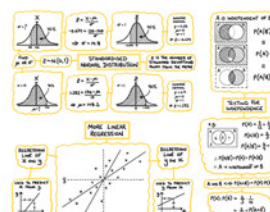
### Functions



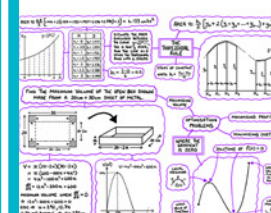
### Geometry and trigonometry



### Statistics and probability



### Calculus



**LAWS OF INDICES**

$x^a \times x^b = x^{a+b}$   
 $\frac{x^a}{x^b} = x^{a-b}$   
 $(x^a)^b = x^{ab}$

WHERE a, b ARE INTEGERS

eg.  $5^3 \times 5^{-6} = 5^{-3}$   
 $6^4 \div 6^3 = 6$   
 $(2^3)^{-4} = 2^{-12}$   
 $x^{-3} = \frac{1}{x^3}$   
 $(2x)^4 = 16x^4$

**EXPONENTIAL AND LOGARITHM**

$2^3 = 8 \Leftrightarrow \log_2 8 = 3$

$a^x = b \Leftrightarrow x = \log_a b$

$a = 10 \Rightarrow x = \log b$   
 $a = e \Rightarrow x = \ln b$

$10^3 = 1000 \Leftrightarrow \log 1000 = 3$   
 $x = e^3 \Leftrightarrow \ln x = 3$

$1 \leq a < 10$     $a \times 10^k$     $k \in \mathbb{Z}$

**STANDARD FORM**

SMALL NUMBERS  $k < 0$    LARGE NUMBERS  $k > 0$

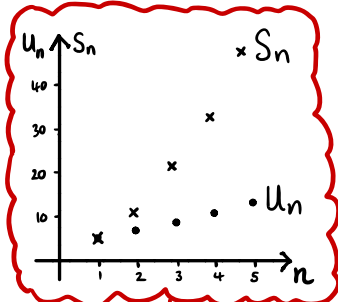
$3.8 \times 10^{-4} = 0.00038$     $5.73 \times 10^5 = 573,000$

GDC  $\Rightarrow 5.2 \cancel{E} 30 = 5.2 \times 10^{30}$

$u_{100} = 8 + 3(100-1) = 305$

$u_1 = 8$   
 $d = 3$   
 $n = 100$

$S_{100} = 8 + 11 + 14 + \dots + 305$   
 $= \frac{100}{2}(8 + 305) = 15,650$



$u_n = u_1 + (n-1)d$

$S_n = \frac{n}{2}(u_1 + u_n)$   
 $= \frac{n}{2}[2u_1 + (n-1)d]$

$u_1, u_1 + d, u_1 + 2d, u_1 + 3d, \dots$

**SPREADSHEET**

n	u <sub>n</sub>	S <sub>n</sub>
1	5	5
2	7	12
3	9	21
4	11	32

$5, 8, 11, 14, \dots$

+3   +3   +3

**ARITHMETIC**

**SEQUENCES AND SERIES**

**Σ NOTATION**

$\sum_{i=1}^{10} (3i+2)$

$= 5 + 8 + 11 + \dots + 32$

$= \frac{10}{2}(5 + 32)$

$= 185$

**FINANCIAL APPLICATIONS**

ANNUAL DEPRECIATION

GDC  $\Rightarrow$  FINANCE SOLVER

**GEOMETRIC**

$3, 6, 12, 24, \dots$

$u_n = u_1 r^{n-1}$

$u_1, u_1 r, u_1 r^2, u_1 r^3, \dots$

$S_n = \frac{u_1(r^n - 1)}{r - 1} = \frac{u_1(1 - r^n)}{1 - r}$

$n = 1, 2, 4, 12$

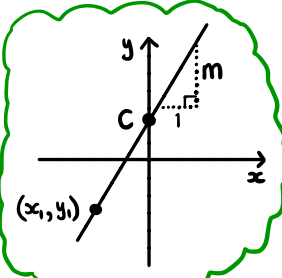
**COMPOUND INTEREST**

$A = P(1 + \frac{r}{n})^{nt}$

$S_{10} = 2 + 6 + 18 + \dots + 39366$   
 $= \frac{2(3^{10} - 1)}{3 - 1} = 59,048$

$u_1 = 2$   
 $r = 3$   
 $n = 10$

$u_{10} = 2 \times 3^9 = 39366$

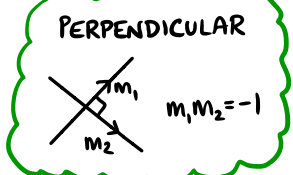
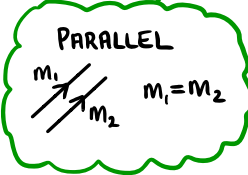


$ax + by = d$

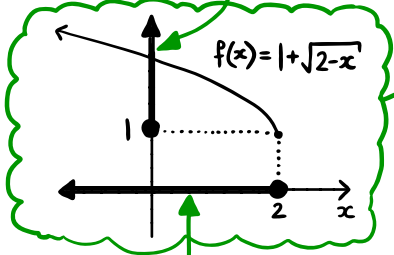
$y = mx + c$

$y - y_1 = m(x - x_1)$

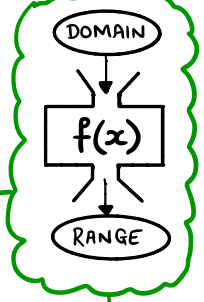
**STRAIGHT LINES**



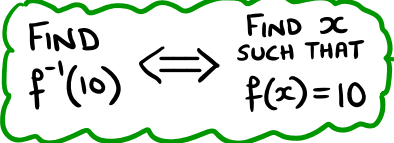
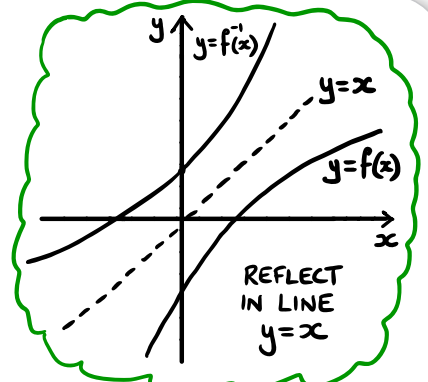
RANGE  $\{y \in \mathbb{R} : y \geq 1\}$



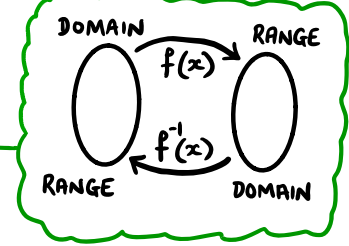
DOMAIN  $\{x \in \mathbb{R} : x \leq 2\}$



**FUNCTION NOTATION**

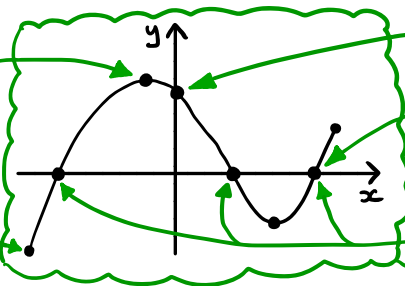


**INVERSE  $f^{-1}(x)$**



MAXIMUM VALUE

MINIMUM VALUE



y-INTERCEPT

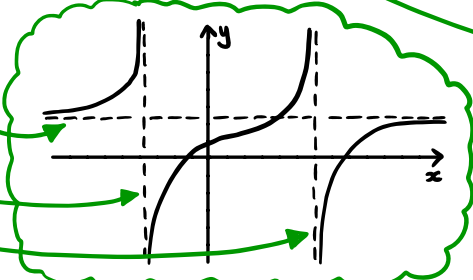
x-INTERCEPT

ZEROS OR ROOTS

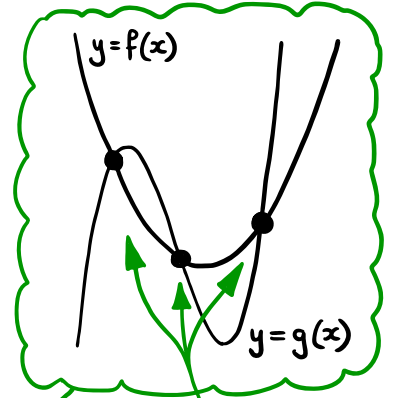
**GRAPHING ON THE GDC**

HORIZONTAL ASYMPTOTES

VERTICAL ASYMPTOTES



PLOT GRAPHS AND LABEL THE KEY FEATURES



SOLVE  $f(x) = g(x)$

FIND POINTS OF INTERSECTION

