

# Math 4 CST

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MATH MEMORY AID

**1: System of equations**  
 a system of equations is 2 equations or more  
 POI (point of intersection)

**4 types of Word problems**

Type 1: Both equations are  $(y=ax+b)$   
 Type 2: Both equations are  $(ax+by=C)$   
 Type 3: equations are  $(ax+by=C)$  and  $(y=ax+b)$   
 Type 4: Two coordinates are given  $(x,y)$  and  $(x,y)$  → solve by finding the equation of a line.

there are 4 methods  
 1: **Graphing method**  
 2: **Comparison method** → make equations  $(=)$  to each other  
 3: **Substitutional method** → replace the functional form equation into the other one  
 4: **Elimination method** → use format  $ax+by=C$   
 $ax+by=C$

**Special types of lines**

coincident $\parallel$	$y=ax+b$ $y=ax+b$	- have same slope & y intercept	# of solutions $\infty$ by many
parallel $\nparallel$	$y=ax+b$ $y=ax+c$	- have same slope only	0
perpendicular $\perp$	$y=2x+3$ $y=-1/2x-4$	- negative reciprocal - switch - flip fraction	1
secant $\times$	$y=2x+5$ $y=-3x+6$	- Do not have same slope	1

**Independent vs Dependent**  
 The "thing" that can stand alone. If we ↑ or ↓ this factor, it will impact the dependent variable.  
 usually: Time (# of min, hours, # of students, adults, etc...)  
 usually: cost \$, price \$  
 relies on and feels the effect of the independent variable. It changes depending on how much the other variable you have.

Ex:  $y=2x+8$   
 perpendicular =  $y=-1/2x+2$   
**lit Problems:**

- Functional form
- parallel lines
- perpendicular lines
- x-intercept
- y-intercept
- Comparison method

$y=1x+50 (=x)$   
 $1x+50 = -1x+130$   
 $1x+x = 130-50$   
 $2x = 80$   
 $x = 40$   
 $y = -(40)+130$   
 $y = -40+130$   
 $y = 90$

**2: Geometry (analytic)**  
 → Distance →  $\sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$  result (length)  
 → midpoint →  $(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2})$  result (coordinate)  
 → Division point →  $(\frac{ax_2+bx_1}{a+b}, \frac{ay_2+by_1}{a+b})$  \*when there is a fraction\* result (coordinate)

**3: Types of functions**

**Quadratic function**  
 equation  $(ax^2)$   
 ex:  $y=ax^2$   
 $2250 = a(15)^2$   
 $2250 = \frac{225a}{25}$   
 $a=10$   
 $y=10x^2$

**Exponential function**  
 equation  $(y=a \cdot (C)^x)$  # of initial price  
 ↑ 30% →  $\frac{30}{100} = 0.3$   
 ↓ 30% →  $\frac{30}{100} = 0.3$   
 $1+0.3 = 1.3$   
 $1-0.3 = 0.7$

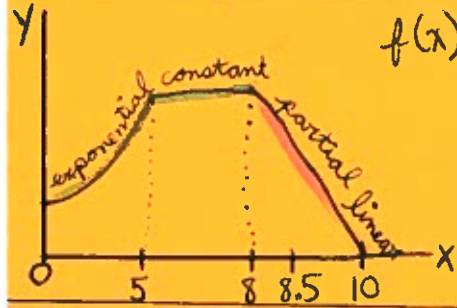
**periodic function**

cycle: 1 repetition  
 period: count the units for the cycle  $p=6$   
 frequency:  $\frac{1}{\text{period}} f = \frac{1}{6}$

**step function**  
 includes value  
 excludes value  
 Double means 2  
 Triple = 3  
 Quadruple = 4

make a TOV  
 $f(x)=a$   
 mostly #

**Piecewise function**



$$f(x) = \begin{cases} 2(1.20)^x & ; 0 \leq x \leq 5 \\ 5 & ; 5 \leq x \leq 8 \\ -2x + 21 & ; 8 \leq x \leq 10.5 \end{cases}$$

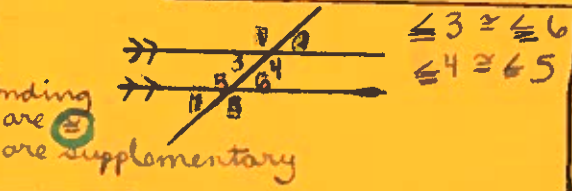
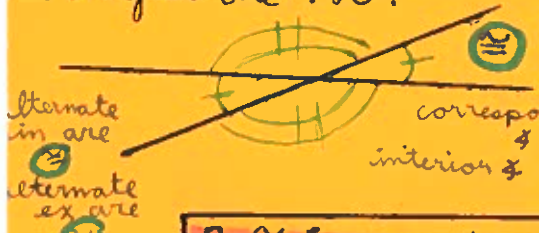
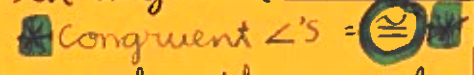
**4: Properties of a function**

- 1: Domain: (x values, left to right)
- 2: range: (y values, bottom to top)
- 3: Y-intercept
- 4: Zero (x-intercept)
- 5: maximum: (y values highest) if answer is  $\infty$ , (none)
- 6: minimum: (y values lowest) if answer is  $-\infty$ , (none)
- 7: increasing: (x values, left to right)
- 8: decreasing: (x values, left to right)
- 9: Positive: (x values above the x-axis greater than 0)
- 10: negative: (x values less than 0 below x-axis)

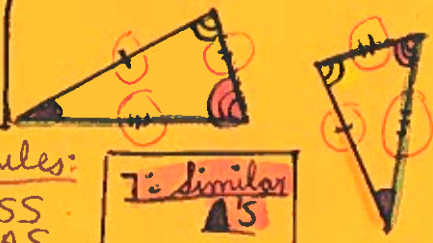
**Geometry**

**Complementary:** when the sum of the angles are  $90^\circ$

**Supplementary:** when the sum of the angles are  $180^\circ$

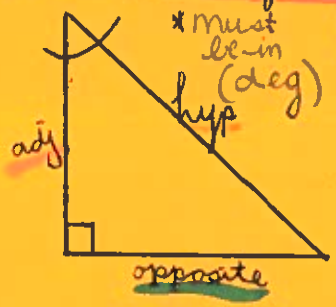


**6: Congruent triangles**

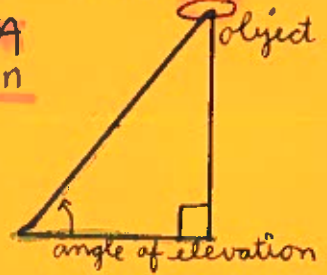


**8: Trigonometry**

$\theta = \text{Theta}$



**SOH CAHTOA**  
 sin cos tan



**5 rules:**

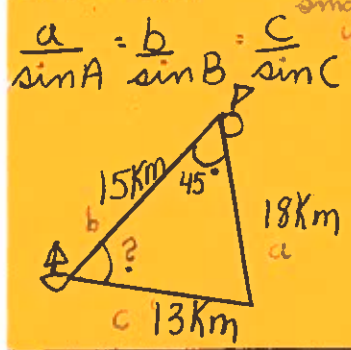
- SSS
- SAS
- ASA
- AAS
- HL

**7: Similar triangles**



**3 conditions** (same ratios)  
 SSS  
 SAS  
 AA

**line law**



\* when you get a small angle and you looking

$$\frac{18}{\sin A} = \frac{13}{\sin 45}$$

$$\theta = 78.3^\circ$$

for obtuse subtract 180 and the # you got x

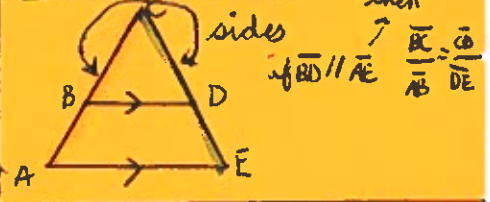
**area of triangles**

- 1: Common  $A = \frac{B \times h}{2}$
- 2: sandwich!  $A = \frac{a \times b \times \sin C}{2}$

**heron's law:**  
 $P = \frac{a+b+c}{2}$

$$A = \sqrt{P(P-a)(P-b)(P-c)}$$

**Thales Theorem**



$$a^2 = m \cdot c$$

$$b^2 = n \cdot c$$

$$h^2 = m \cdot n$$

$$h \cdot c = a \cdot b$$

$$a^2 + b^2 = c^2$$

$$c = m + n$$



**correlation coefficient**  
 $r \approx \pm (1 - \frac{\text{short side}}{\text{long side}})$

**9: Statistics:**

**scatterplot:**

**mean deviation**

- 1: find the mean
- 2: find the difference of each score from the mean.
- 3: make it positive
- 4: find the mean of all positive differences

**percentile rank**  
 $P(x) = \frac{(\# \text{ of values} < x) + 0.5}{\# \text{ of values} = x} \times 100$   
 $P(x) = \frac{\text{Total position} + 1}{\# \text{ of values}} \times 100$