unctional form
$= ax + b \rightarrow a = \frac{y_2 - y_1}{x_2 - x_1}$

eneral Form
$)x + by = C$
) convert move
ll variables over
xcept 'y' and
ivide by 'y'

Parallel Equations: Same slope but different y-int.

Perpendicular Equations: negative reciprocal slopes and different y-intercepts
ex: $1/2 \rightarrow -2/1$ $5/4 \rightarrow -4/5$

Like terms: x^2yz & xy^2z aren't the same
x^2y & yx^2 are the same

Positive Slope | Negative Slope | Slope Zero | Slope Error

Vocabulary
(a) → Slope / rate of change
(b) → y-intercept / initial value
x-int = 3 → (3, 0)
y-int = 7 → (0, 7)

Distance: $D(A,B) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Midpoint: $M(x,y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

omparison method
$= ax + b$
$y = ax + b$
$x + b = ax + b$

Substitution method
$ax + by = C$
$y = ax + b$
$ax + b(ax + b) = C$

Elimination method
$ax + by = C$
$cx + by = C$
cancel x or y variable

Division Point:
$P(x,y) = \left(\frac{ax_2 + bx_1}{a + b}, \frac{ay_2 + by_1}{a + b}\right)$
↳ (x_1, y_1) are the coordinates at the BEGINING of the division point. $2/3 \rightarrow 3 - 2 = 1 \rightarrow 2 : 1 = a : b$

Area of a Triangle
$(b \cdot h) \div 2$
$(a)(c)(\sin B) \div 2$
$(a)(b)(\sin C) \div 2$
$(b)(c)(\sin A) \div 2$
$9 = \text{Perimeter} - 2$
$= \sqrt{9(9-a)(9-b)(9-c)}$

Metric Relations
*Don't confuse the letters

1.) $(m\overline{AB})^2 = (m\overline{BH})(m\overline{BC})$
2.) $(m\overline{AC})^2 = (m\overline{CH})(m\overline{BC})$
3.) $(m\overline{AH})^2 = (m\overline{BH})(m\overline{CH})$
4.) $(m\overline{AB})(m\overline{AC}) = (m\overline{AH})(m\overline{BC})$

Thales Theorem

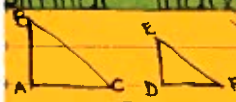
If $\overline{BD} \parallel \overline{AE}$, then $\frac{\overline{BC}}{\overline{AB}} = \frac{\overline{CD}}{\overline{DE}}$

Sine Law
$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

SOH CAH TOA

$\sin\theta = 20/30 \rightarrow \sin^{-1}(20 \div 30)$
$\cos 30° = x/80 \rightarrow 80 \times \cos 30°$
$\cos 30° = 80/x \rightarrow 80 \div \cos 30°$

Similar Triangles



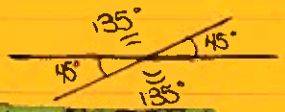
$\frac{AC}{DF} = \frac{AB}{DE}$ or $\frac{AB}{AC} = \frac{DE}{DF}$

Types of Triangles
1.) Scalene — no equal sides
2.) Isosceles — 2 equal sides and angles
3.) Equilateral — 3 equal sides and angles
4.) Right Angle — sum of angles $1 + 2 = 90°$

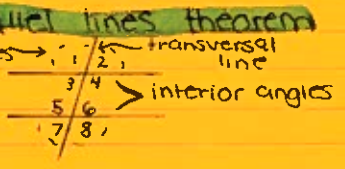
Isometric Triangles
1.) side side side (SSS)
2.) Side angle side (SAS)
3.) Angle side Angle (ASA)
4.) Angle Angle Side (AAS)
5.) Hypotenuse - Leg (HL)

Pythagorean Theorem
$a^2 + b^2 = c^2$ *only ∠ triangles

Types of Angles
) Acute → less than 90° ∠
) Right → equal to 90° ∟
) Obtuse → between 90°-110°
) Straight → equal to 180°
) Reflex → greater than 90°
) Complementary → 2 ∠ = 90°
) Supplementary → 2 ∠ = 180°
) Adjacent → 2 ∠ side by side that share a common side + vertex
) Congruent → 2 ∠ with the same measure; symbol: ≅
) V → vertically
O → Opposite
A → Angles



Parallel lines theorem



1) alternate interior angles are congruent
$\angle 3 \cong \angle 6$
$\angle 4 \cong \angle 5$

2.) alternate exterior angles
$\angle 1 \cong \angle 8$
$\angle 2 \cong \angle 7$

3.) interior angles are supplementary
$\angle 3 + \angle 5 = 180°$
$\angle 4 + \angle 6 = 180°$

4.) corresponding angles are congruent
$\angle 1 = \angle 5$ $\angle 3 = \angle 7$
$\angle 2 = \angle 6$ $\angle 4 = \angle 8$

Domain
• Set of x-values from left to right

Range
• Set of y-values from the bottom to the top

Increasing
• Part of the function going up from left to right

Decreasing
• Part of the function going down from left to right

Positive
• All the cordinates above the x-axis

Negative
• All the cordinates below the x-axis

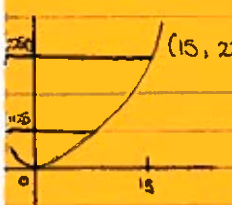
Intercepts
• the cordinates that pass through the x or y axis

Maximum
• highest y-value of the line or curve

Minimum
• lowest y-value of the line or curve

Quadratic Functions:
$y = ax^2$ → Word Problems

Below is the graph of a rocket before launching
Define the variables and Find the rule



A) x: time (sec)
y: distance (m)
$2250 = a(15)^2$
$2250 = 225a$
$10 = a$

* Note: 'a' is not a slope and always passes through the origin

B) Distance after 20sec?
$y = 10(20)^2$
$y = 4000m$
Time at 9000m?
$9000 = 10x^2$
$30 = x$

Math 4 CST