Geometry EOC Formulas to Memorize

Coordinate Geometry

Partitioning a Line Segment
Ratio $m:n$

$$B\left(\frac{n\cdot x_1+m\cdot x_2}{m+n}, \frac{n\cdot y_1+m\cdot y_2}{m+n}\right)$$

If just a number line (x −axis)

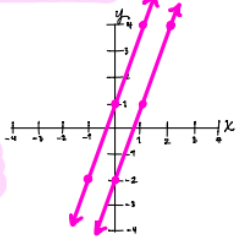
Weighted Averages
A has weight w_1; B has weight w_2

$$P\left(\frac{w_1\cdot x_1+w_2\cdot x_2}{w_1+w_2}, \frac{w_1\cdot y_1+w_2\cdot y_2}{w_1+w_2}\right)$$

If just a number line (x −axis)

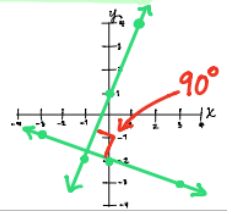
Parallel Lines SAME SLOPE

$y = 3x + 1$
$y = 3x - 2$
$m = 3$
$m = 3$
Same!



Perpendicular Lines
OPPOSITE SIGN, RECIPROCAL

$y = 3x + 1$
$y = -\frac{1}{3}x - 2$
$m = 3$
$m = -\frac{1}{3}$



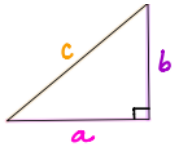
Segment Addition Postulate

$\overline{AB} + \overline{BC} = \overline{AC}$

Right Triangles

Pythagorean Theorem

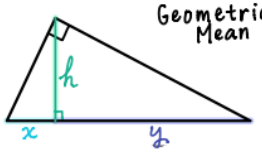
$a^2 + b^2 = c^2$



Altitude on Hypoteneuse

$\frac{x}{h} = \frac{h}{y}$

Geometric Mean



Right Triangle Trigonometry

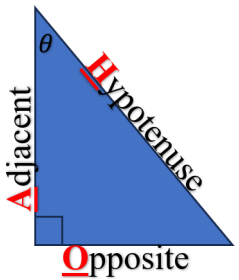
- Use $S\frac{O}{H}C\frac{A}{H}T\frac{O}{A}$ to find unknown **side lengths** in a right triangle

- Use sin^{-1}, cos^{-1}, tan^{-1} to find unknown **angle measures** in a right triangle

$\sin 32° = \frac{x}{10}$
To Find x On Calc: $10 \cdot \sin 32°$

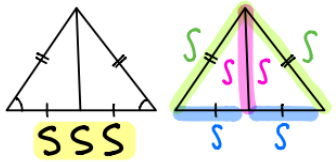
$\cos 56° = \frac{7}{x}$
To Find x on Calc: $\frac{7}{\cos 56°}$

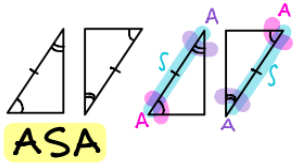
$\tan x° = \frac{5}{8}$
To Find x on Calc: $\tan^{-1}\left(\frac{5}{8}\right)$

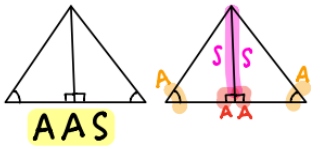


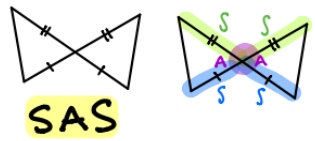
Congruent Triangles

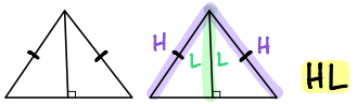
Triangle Congruency





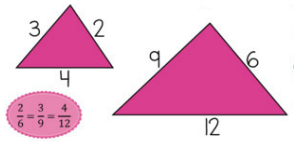




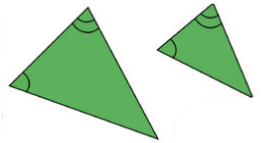


Similar Triangles

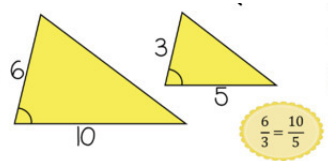
Side-Side-Side (SSS~)



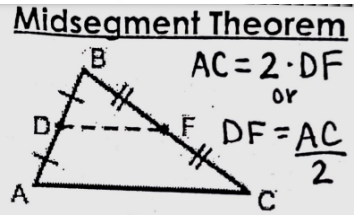
Angle-Angle (AA~)



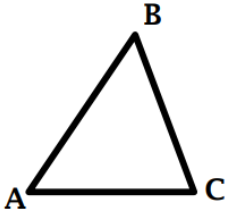
Side-Angle-Side (SAS~)



Midsegment Theorem

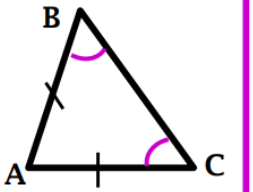


Triangle Sum
The three angles of any triangle will always add to 180°.



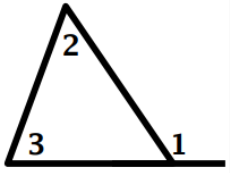
$\angle A + \angle B + \angle C = 180°$

Isosceles Triangle
If two sides of a triangle are congruent, then the angles opposite are also congruent (and vice versus).



If $\overline{AB} \cong \overline{AC}$, then $\angle B \cong \angle C$.
If $\angle B \cong \angle C$, then $\overline{AB} \cong \overline{AC}$.

Exterior Angle
The measure of an exterior angle of a triangle is equal to the sum of the two remote interior.



If $\angle 1$ is an exterior angle, then $m\angle 1 = m\angle 2 + m\angle 3$.

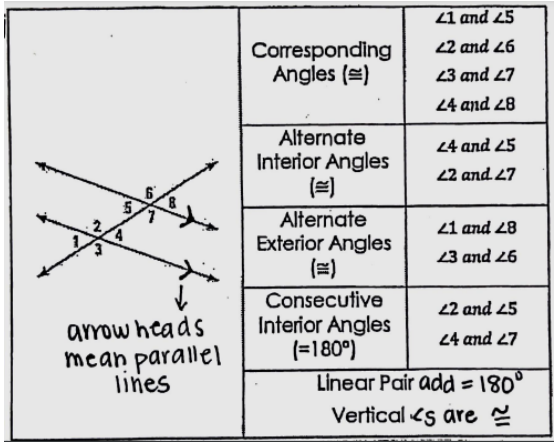
Transformation Rules

Translation	$(x,y) \rightarrow (x+h, y+k)$ h = horiz. shift, k = vertical shift.
Reflection (x-axis)	$(x,y) \rightarrow (x,-y)$
Reflection (y-axis)	$(x,y) \rightarrow (-x,y)$
Reflection ($y = x$)	$(x,y) \rightarrow (y,x)$
Reflection ($y = -x$)	$(x,y) \rightarrow (-y,-x)$
Rotation (90 CCW)	$(x,y) \rightarrow (-y,x)$
Rotation (180 CCW)	$(x,y) \rightarrow (-x,-y)$
Rotation (270 CCW)	$(x,y) \rightarrow (y,-x)$
Dilation (k = sc. fac.)	$(x,y) \rightarrow (kx,ky)$

Density

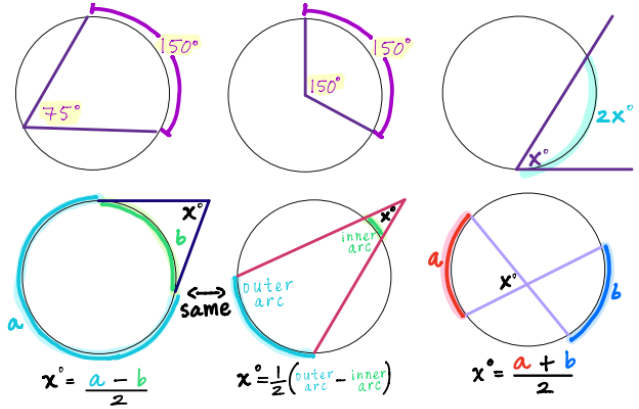
$Density = \frac{mass}{volume}$ or $Density = \frac{population}{total\ area\ of\ land}$

Parallel & Transversals



Corresponding Angles (≅)	∠1 and ∠5 ∠2 and ∠6 ∠3 and ∠7 ∠4 and ∠8
Alternate Interior Angles (≅)	∠4 and ∠5 ∠2 and ∠7
Alternate Exterior Angles (≅)	∠1 and ∠8 ∠3 and ∠6
Consecutive Interior Angles (=180°)	∠2 and ∠5 ∠4 and ∠7
Linear Pair add = 180° Vertical ∠s are ≅	

Circle Angle Formulas



Polygons (2D):

Interior Degrees of Shapes

Sum of interior angles = 180(n - 2)

Triangle (3-sides)	180°
Quadrilateral (4-sides)	360°
Pentagon (5-sides)	540°
Hexagon (6-sides)	720°

Polygon Angle Measures

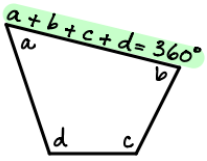
Sum of interior angles = **180(n - 2)**

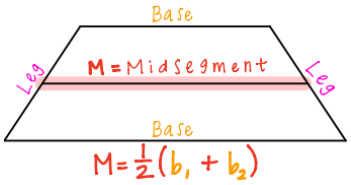
n = # of sides of polygon

Interior Angle Measure = $\frac{180(n-2)}{n}$

Exterior Angle Measure = $360 \div n$

Sum of Ext Angles = **360° ALWAYS**





Vocabulary

- **Adjacent:** Next to/touching
- **Vertical angles:** Across & congruent
- **Supplementary:** Add up to 180°
- **Complementary:** Add up to 90°
- **Bisector:** Divides an angle or side into two congruent pieces

Proof Properties

Properties of Equality	
Addition Property of Equality	If $a = b$, then $a + c = b + c$.
Subtraction Property of Equality	If $a = b$, then $a - c = b - c$.
Multiplication Property of Equality	If $a = b$, then $ac = bc$.
Division Property of Equality	If $a = b$ and $c \neq 0$, then $\frac{a}{c} = \frac{b}{c}$.
Reflexive Property of Equality	$a = a$
Symmetric Property of Equality	If $a = b$, then $b = a$.
Transitive Property of Equality	If $a = b$ and $b = c$, then $a = c$.
Substitution Property of Equality	If $a = b$, then b can be substituted for a in any expression.

Conditional Statements

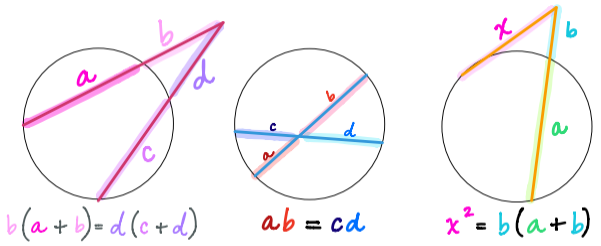
Conditional: If p, then q

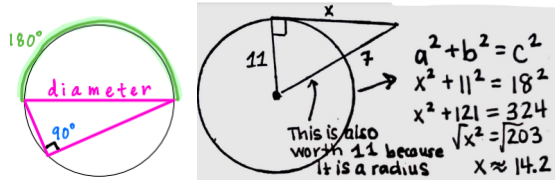
Converse: If q, then p (trade places)

Inverse: If not p, then not q (negate)

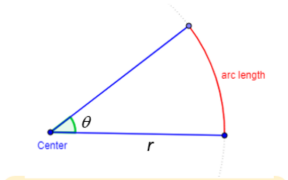
Contrapositive: If not q, then not p (negate & trade places)

Circle Segment Formulas





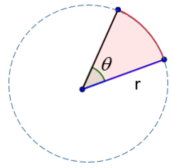
Arc Length



If θ is measured in degrees then

arc length $= \frac{\theta}{360°} \times 2\pi r$

Sector Area



If θ is measured in degrees then

area of sector $= \frac{\theta}{360°} \times \pi r^2$