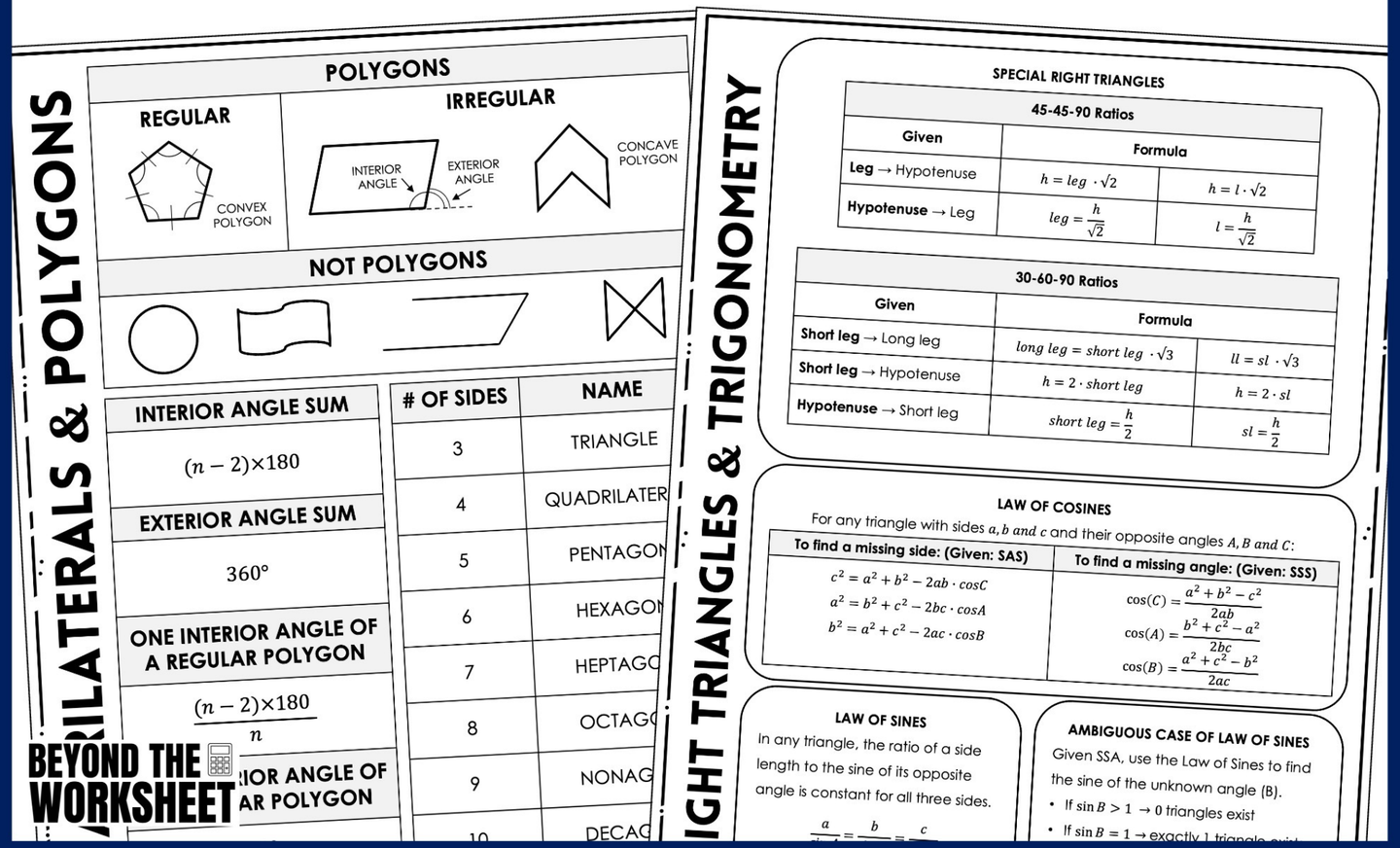
HIGH SCHOOL GEOMETRY

QUICK REFERENCE SHEETS



31 PRINTABLE REFERENCE SHEETS

These 31 pages give high school students a clear, organized reference for every geometry unit. Each page includes key definitions, formulas, theorems, and diagrams. Students can use them during class, on homework, and when studying for tests.

...S & CONICS

TANGENT LINES

- **Tangent-Radius Theorem:** If a line is tangent to a circle, then it is perpendicular to the radius drawn to the point of tangency.
- **Converse of Tangent-Radius Theorem:** If a line is perpendicular to a radius at a point on a circle, then the line is tangent to the circle.
- **Two-Tangent Theorem:** If two tangent segments are drawn to a circle from the same external point, then the two tangent segments are congruent.

PROPERTIES OF CHORDS

- **Congruent chords** intercept congruent arcs.
- **Congruent arcs** correspond to congruent chords.
- Chords that are the same distance from the center are congruent.

ANGLE MEASURES IN CIRCLES

- When the **vertex** of the angle is not at the center of the circle, the relationship between the angle and the intercepted arc **will depend** on where the vertex is.

CHORD THEOREMS

...LES & TRIGONOMETRY

SPECIAL RIGHT TRIANGLES

45-45-90 Ratios		
Given	**Formula**	
Leg → Hypotenuse	$h = leg \cdot \sqrt{2}$	$h = l \cdot \sqrt{2}$
Hypotenuse → Leg	$leg = \frac{h}{\sqrt{2}}$	$l = \frac{h}{\sqrt{2}}$

30-60-90 Ratios		
Given	**Formula**	
Short leg → Long leg	$long\ leg = short\ leg \cdot \sqrt{3}$	$ll = sl \cdot \sqrt{3}$
Short leg → Hypotenuse	$h = 2 \cdot short\ leg$	$h = 2 \cdot sl$
Hypotenuse → Short leg	$short\ leg = \frac{h}{2}$	$sl = \frac{h}{2}$

LAW OF COSINES

For any triangle with sides $a, b\ and\ c$ and their opposite angles $A, B\ and\ C$:

To find a missing side: (Given: SAS)	To find a missing angle: (Given: SSS)

...AREA & VOLUME

Surface Area Formulas

Shape	Surface Area Formula
Rectangular / General Prism	$SA = 2B + Ph$
Cylinder	$SA = 2\pi r^2 + 2\pi rh$
Cylinder (lateral surface only)	$SA = 2\pi rh$
Pyramid	$SA = B + \frac{1}{2}P\ell$
Cone	$SA = \pi r^2 + \pi r\ell$
Sphere	$SA = 4\pi r^2$
Hemisphere - Total surface area	$SA = 3\pi r^2$
Hemisphere – Curved surface only	$SA = 2\pi r^2$

...FORMATIONS

RIGID VS. NON-RIGID TRANSFORMATIONS

- Rigid transformations are operations that change the **position** of a figure in a plane **without** changing its **size** or **shape**.
  - Translations, Rotations, and Reflections are rigid transformations.
- Non-rigid transformations change the **size** of the figure, but the image is still similar to the pre-image.
  - Dilations are non-rigid transformations.

- **Preimage**: original figure or shape before a transformation is applied
- **Image**: new figure or shape that results from applying a transformation

TRANSLATIONS

A translation is moving a figure from one location to another without rotating or flipping it. All points in the figure move the same distance in the same direction.

- Vector $\langle a, b \rangle$ shows the horizontal shift (a) and the vertical shift (b) to apply to the preimage.
- For any point (x, y), the new coordinates after translation will be:

$$(x', y') = (x + a, y + b)$$

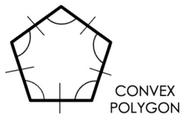
REFLECTIONS

figure over a line, called the line of

...ERALS & POLYGONS

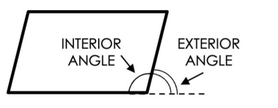
POLYGONS

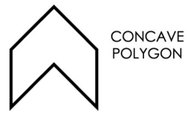
REGULAR



CONVEX POLYGON

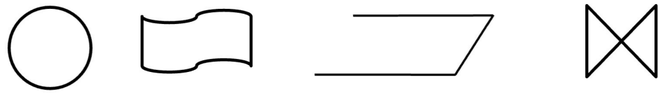
IRREGULAR





CONCAVE POLYGON

NOT POLYGONS



INTERIOR ANGLE SUM
$(n-2)\times 180$
EXTERIOR ANGLE SUM
360°

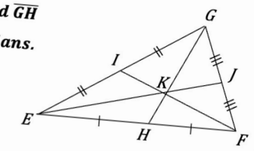
# OF SIDES	NAME
3	TRIANGLE
4	QUADRILATERAL
5	PENTAGON

...IANGLE RELATIONSHIPS

Medians

- Divide the opposite side of a triangle into two equal halves.
- Medians in triangles intersect at a point called the **centroid**.
- The centroid divides each median into two segments in the **ratio 2:1**, with the longer segment closer to the vertex.
- The longer segment is 2/3 of the whole; the shorter segment is 1/3 of the whole.

K is the centroid.
$\overline{IF}$, $\overline{EJ}$, and $\overline{GH}$ are medians.



Indirect Proofs

1. **Assume the Opposite:** Start by assuming the statement you want to prove is false.
2. **Logical Steps:** Use logical steps and given information to deduce consequences from this assumption.
3. **Reach a Contradiction:** Identify a contradiction to the assumption. For example, it can contradict a known fact, theorem, or definition.
4. **Conclude:** Since the assumption leads to a contradiction, it must be false. Therefore, the original statement is true.

Altitudes in Triangles

- Forms a 90° angle with the side it is drawn to.
- The three altitudes of a triangle intersect at a point called the **orthocenter.**
- The altitude (h) of a triangle can be found