#### Topic 1 - Tools of Geometry

Postulate 1-1:	Postulate 1-2:
Through any two points, there is exactly one line.	If two distinct lines intersect, then they intersect in exactly one
	point.
Postulate 1-3:	Postulate 1-4:
If two distinct planes intersect, they intersect in exactly one	Through any three noncollinear points there is exactly one
line.	plane.
Ruler Postulate:	Segment Addition Postulate:
Every point on a line can be paired with a real number. This	If three points A, B and C are collinear and B is between A and
makes a one-to-one correspondence between the points on	C, then $AB + BC = AC$ .
the line and the real numbers.	
Protractor Postulate:	Angle Addition Postulate:
Consider $\overrightarrow{OB}$ and a point on A on one side of $\overrightarrow{OB}$ . Every ray	If point B is in the interior of $\angle AOC$ , then
	$m\angle AOB + m\angle BOC = m\angle AOC$ .
of the form $\mathit{OA}$ can be paired one to one with a real number	
from 0 to 180.	
Linear Pair Postulate:	⊥ lines → right angles
If two angles form a linear pair, then they are supplementary.	

# Topic 2 – Reasoning and Proof

Law of Detachment:	Law of Syllogism:
If the hypothesis of a true conditional is true, then the	If $p \rightarrow q$ is true and $q \rightarrow r$ is true, then $p \rightarrow r$ is true.
conclusion is true. In symbolic form:	
If p→q is true and p is true, then q is true.	
Symmetric Property:	Transitive Property:
If $\overline{AB} \cong \overline{CD}$ , then $\overline{CD} \cong \overline{AB}$ .	If $\overline{AB}\cong \overline{CD}$ , and $\overline{CD}\cong \overline{EF}$ , then $\overline{AB}\cong \overline{EF}$ .
If $\angle A \cong \angle B$ , then $\angle B \cong \angle A$ .	If $\angle A \cong \angle B$ , and $\angle B \cong \angle C$ , then $\angle A \cong \angle C$ .
Reflexive Property:	If $\angle B \cong \angle A$ , and $\angle B \cong \angle C$ , then $\angle A \cong \angle C$ .
$\overline{AB} \cong \overline{AB}$ and $\angle A \cong \angle A$ .	
Vertical Angles Theorem:	Congruent Supplements Theorem:
Vertical Angles are congruent.	If two angles are supplements of the same angle (or congruent
	angles), then the two angles are congruent.
Congruent Complements Theorem:	All right angles are congruent.
If two angles are complements of the same angle (or congruent	
angles), then the two angles are congruent.	If two angles are congruent and supplementary, then each is a
	right angle.

#### Topic 3 – Parallel and Perpendicular Lines

Same-Side Interior Angles Postulate:	Alternate Interior Angles Theorem:
If a transversal intersects two parallel lines, then the same-side	If a transversal intersects two parallel lines, then alternate
interior angles are supplementary.	interior angles are congruent.
Corresponding Angles Theorem:	Alternate Exterior Angles Theorem:
If a transversal intersects two parallel lines, the corresponding	If a transversal intersects two parallel lines, then alternate
angles are congruent.	exterior angles are congruent.
Converse of the Corresponding Angles Theorem:	Converse of the Alternate Interior Angles Theorem:
If two lines and a transversal form corresponding angles that	If two lines and a transversal form alternate interior angles that
are congruent, then the lines are parallel.	are congruent, then the two lines are parallel.
Converse of the Same-Side Interior Angles Postulate:	Converse of the Alternate Exterior Angles Theorem:
If two lines and a transversal form same-side interior angles	If two lines and a transversal form alternate exterior angles
that are supplementary, then the two lines are parallel.	that are congruent, then the two lines are parallel.

Topic 3 – Parallel and Perpendicular Lines

Alternate Interior Angles Postulate: If a transversal intersects two parallel lines, then the same-side interior angles are supplementary.   Corresponding Angles Theorem: If a transversal intersects two parallel lines, the corresponding angles are congruent.   Corverse of the Corresponding Angles Theorem: If two lines and a transversal form corresponding angles that are congruent, then the lines are parallel.   Converse of the Corresponding Angles Theorem: If two lines and a transversal form corresponding angles that are congruent, then the lines are parallel.   Converse of the Same-Side Interior Angles Postulate: If two lines and a transversal form same-side interior angles that are supplementary, then the two lines are parallel.   Converse of the Same-Side Interior Angles Postulate: If two lines and a transversal form same-side interior angles that are congruent, then the two lines are parallel.   Converse of the Alternate Interior Angles Theorem: If two lines and a transversal form alternate interior angles that are congruent, then the two lines are parallel.   Converse of the Alternate Interior Angles Theorem: If two lines and a transversal form alternate interior angles that are congruent, then the two lines are parallel.   Converse of the Alternate Interior Angles Theorem: If two lines and a transversal form alternate interior angles that are congruent, then the two lines are parallel.   Converse of the Alternate Interior Angles Theorem: If two lines and a transversal form alternate interior angles that are congruent, then the two lines are parallel.   Converse of the Alternate Interior Angles Theorem: If two lines and a transversal form alternate interior angles that are congruent, then the two lines are parallel.   If a plane, if a line is perpendicular to the same line, then they are parallel to the given line.   Parallel Postulate	<u></u>	
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If two non-vertical lines are parallel, then their slopes are equal.  If the slopes of two distinct non-vertical lines are equal, then the lines are parallel.  Any two vertical lines or horizontal lines are parallel.  Spherical Geometry Parallel Postulate (In spherical geometry) Through a point not on a line, there is  If two non-vertical lines are perpendicular, then the product of their slopes is -1.  If the slopes of two lines have a product of -1, then the lines are perpendicular.  Any horizontal line and vertical line are perpendicular.  Spherical Geometry Triangle Angle Sum Theorem  In spherical geometry, the sum of the measures of the angles of	of the measures of its two remote interior angles.	the measure of each of its remote interior angles.
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the lines are parallel.  Any two vertical lines or horizontal lines are parallel.  Spherical Geometry Parallel Postulate (In spherical geometry) Through a point not on a line, there is  perpendicular.  Any horizontal line and vertical line are perpendicular.  Spherical Geometry Triangle Angle Sum Theorem In spherical geometry, the sum of the measures of the angles of	equal.	their slopes is -1.
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Spherical Geometry Parallel Postulate (In spherical geometry) Through a point not on a line, there is In spherical geometry, the sum of the measures of the angles of	the lines are parallel.	perpendicular.
(In spherical geometry) Through a point not on a line, there is In spherical geometry, the sum of the measures of the angles of	Any two vertical lines or horizontal lines are parallel.	Any horizontal line and vertical line are perpendicular.
	Spherical Geometry Parallel Postulate	Spherical Geometry Triangle Angle Sum Theorem
no parallel to the given line. a triangle is always greater than 180.	(In spherical geometry) Through a point not on a line, there is	In spherical geometry, the sum of the measures of the angles of
	no parallel to the given line.	a triangle is always greater than 180.

# Definitions

Definition of Midpoint	Definition of Right Angle	Definition of Congruent Angles
A midpoint of a segment is the point that	A right angle is an angle whose measure	Congruent angles are angles that have
divides the segment into two congruent	if 90.	the same measure.
segments.		
Definition of Segment Bisector	Definition of Angle Bisector	Definition of Congruent Segments
A segment bisector is a line, segment, ray	An angle bisector is a ray that divides an	Congruent segments are segments that
or plane that intersects a segment at its	angle into two congruent angles.	have the same length.
midpoint.		
Definition of Complementary Angles	Definition of Supplementary Angles	Definition of Isosceles Triangle
Two angles are complementary if the	Two angles are supplementary if the sum	An isosceles triangle has at least two
sum of their measures is 90.	of their measures is 180.	congruent sides.

#### Other

Overlapping Segment Theorem	Overlapping Angle Theorem
If two collinear segments adjacent to a common segment are	If two angles adjacent to a common angle are congruent, then
congruent, then the overlapping segments formed are	the overlapping angles formed are congruent.
congruent.	

# Topic 4 – Congruent Triangles

Third Angles Theorem	Side-Side (SSS) Postulate
If the two angles of one triangle are congruent to two angles of	If three sides of one triangle are congruent to three sides of
another triangle, then the third angles are congruent.	another triangle, then the two triangles are congruent.
Side-Angle-Side (SAS) Postulate	Angle-Side-Angle (ASA) Postulate
If two sides and the included angle of one triangle are	If two angles and the included side of one triangle are
congruent to two sides and the included angle of another	congruent to two angles and the included side of another
triangle, then the two triangles are congruent.	triangle, then the two triangles are congruent.
Angle-Angle-Side (AAS) Theorem	Isosceles Triangle Theorem
If two angles and a non-included side of one triangle are	If wo sides of a triangle are congruent, then the angles opposite
congruent to two angles and a non-included side of another	those sides are congruent.
triangle, then the two triangles are congruent.	Corollary
	If a triangle is equilateral, then the triangle is also
	equiangular.
Theorem 4-5	Hypotenuse-Leg (HL) Theorem
If a line bisects the vertex angle of an isosceles triangle, then	If the hypotenuse and a leg of one right triangle are congruent
the line is also the perpendicular bisector of the base.	to the hypotenuse and a leg of another right triangle, then the
	triangles are congruent.

# Topic 6 cont'd – Properties of Parallelograms

Rhombus → Diags bisect opp. Angles	Diags. Bisect opp. Angles → Rhombus
If a parallelogram is a rhombus, then each diagonal bisects a	If a quadrilateral is a parallelogram with a diagonal that bisects
pair of opposite angles.	a pair of opposite angles, then it is a rhombus.
Rectangle → Diags. ≅	Diags. ≅ → Rectangle
If a parallelogram is a rectangle, then its diagonals are	If a quadrilateral is a parallelogram with congruent diagonals,
congruent.	then it is a rectangle.
Parallelogram w/ $\perp$ $\cong$ Diags. $\rightarrow$ Square	Kite $ ightarrow ot$ Diags.
If a quadrilateral is a parallelogram with perpendicular,	If a quadrilateral is a kite, then its diagonals are perpendicular.
congruent diagonals, then it is a square.	
Isosceles trapezoid → ≅ Base Angles	Isosceles trapezoid $\rightarrow$ $\cong$ Diags.
If a quadrilateral is an isosceles trapezoid, then each pair of	If a quadrilateral is an isosceles trapezoid, then its diagonals are
base angles is congruent.	congruent.
Trapezoid Midsegment Theorem	
If a quadrilateral is a trapezoid, then	
<ol> <li>The midsegment is parallel to the bases</li> </ol>	
2. The length of the midsegment is half the sum of the	
lengths of the bases.	

Topic 5 – Relationships Within Triangles

Triangle Midsegment Theorem	Perpendicular Bisector Theorem
If a segment joins the midpoints of two sides of a triangle, then	If a point is on the perpendicular bisector of a segment, then it
the segment is parallel to the third side and half as long.	is equidistant from the endpoints of the segment.
Converse of the Perpendicular Bisector Theorem	Angle Bisector Theorem
If a point is equidistant from the endpoints of a segment, then	If a point is on the bisector of an angle, then the point is
it is on the perpendicular bisector of the segment.	equidistant from the sides of the angle.
Converse of the Angle Bisector Theorem	Concurrency of Perpendicular Bisectors Theorem
If a point is in the interior of an angle and is equidistant from	The perpendicular bisectors of the sides of a triangle are
the sides of the angle, then the point is on the angle bisector.	concurrent at a point equidistant from the vertices.
Concurrency of Angle Bisectors Theorem	Concurrency of Medians Theorem
The bisectors of the angles of a triangle are concurrent at a	The medians of a triangle are concurrent at a point that is two-
point equidistant from the sides of the triangle.	thirds the distance from each vertex to the midpoint of the
	opposite side.
Concurrency of Altitudes Theorem	Triangle Inequality Theorem
The lines that contain the altitudes of a triangle are concurrent.	The sum of the lengths of any two sides of a triangle is greater
	than the length of the third side.
Two angles of $\Delta$ are not $\cong$ $\rightarrow$ Larger side is opposite larger	Two sides of $\Delta$ are not $\cong$ $\rightarrow$ Larger angle is opposite larger
angle	side
The Hinge Theorem (SAS Inequality Theorem)	Converse of the Hinge Theorem (SSS Inequality)
If two sides of one triangle are congruent to two sides of	If two sides of one triangle are congruent to two sides of
another triangle and the included angles are not congruent,	another triangle and the third sides are not congruent, then the
then the longer third side is opposite the larger included angle.	larger included angle is opposite the larger third side.