

Topic 1 – Tools of Geometry

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

Topic 2 – Reasoning and Proof

Law of Detachment: If the hypothesis of a true conditional is true, then the conclusion is true. In symbolic form: If $p \rightarrow q$ is true and p is true, then q is true.	Law of Syllogism: If $p \rightarrow q$ is true and $q \rightarrow r$ is true, then $p \rightarrow r$ is true.
Symmetric Property: If $\overline{AB} \cong \overline{CD}$, then $\overline{CD} \cong \overline{AB}$. If $\angle A \cong \angle B$, then $\angle B \cong \angle A$.	Transitive Property: If $\overline{AB} \cong \overline{CD}$, and $\overline{CD} \cong \overline{EF}$, then $\overline{AB} \cong \overline{EF}$. If $\angle A \cong \angle B$, and $\angle B \cong \angle C$, then $\angle A \cong \angle C$. If $\angle B \cong \angle A$, and $\angle B \cong \angle C$, then $\angle A \cong \angle C$.
Reflexive Property: $\overline{AB} \cong \overline{AB}$ and $\angle A \cong \angle A$.	
Vertical Angles Theorem: Vertical Angles are congruent.	Congruent Supplements Theorem: If two angles are supplements of the same angle (or congruent angles), then the two angles are congruent.
Congruent Complements Theorem: If two angles are complements of the same angle (or congruent angles), then the two angles are congruent.	All right 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: If a transversal intersects two parallel lines, then the same-side interior angles are supplementary.	Alternate Interior Angles Theorem: If a transversal intersects two parallel lines, then alternate interior angles are congruent.
Corresponding Angles Theorem: If a transversal intersects two parallel lines, the corresponding angles are congruent.	Alternate Exterior Angles Theorem: If a transversal intersects two parallel lines, then alternate exterior angles are congruent.
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 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 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 Alternate Exterior Angles Theorem: If two lines and a transversal form alternate exterior angles that are congruent, then the two lines are parallel.

If two lines are parallel to the same line, then they are parallel to each other.	In a plane, if two lines are perpendicular to the same line, then they are parallel to each other.
Perpendicular Transversal Theorem In a plane, if a line is perpendicular to one of two parallel lines, then it is perpendicular to the other.	Parallel Postulate Through a point not on a line, there is one and only one line parallel to the given line.
Triangle Angle-Sum Theorem The sum of the measures of the angles of a triangle is 180.	Perpendicular Postulate Through a point not on a line, there is one and only one line perpendicular to the given line.
Triangle Exterior Angle Theorem The measure of each exterior angle of a triangle equals the sum of the measures of its two remote interior angles.	Triangle Exterior Angle Theorem – Corollary The measure of an exterior angle of a triangle is greater than the measure of each of its remote interior angles.
Slopes of Parallel Lines 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.	Slopes of Perpendicular Lines 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 Parallel Postulate (In spherical geometry) Through a point not on a line, there is no parallel to the given line.	Spherical Geometry Triangle Angle Sum Theorem In spherical geometry, the sum of the measures of the angles of a triangle is always greater than 180.

Definitions

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

Other

Overlapping Segment Theorem If two collinear segments adjacent to a common segment are congruent, then the overlapping segments formed are congruent.	Overlapping Angle Theorem If two angles adjacent to a common angle are congruent, then the overlapping angles formed are congruent.
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Topic 4 – Congruent Triangles

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

Topic 6 – Polygons and Quadrilaterals

<p>Polygon Angle-Sum Theorem The sum of the measures of an n-gon is $(n - 2)180$ Corollary The measure of each angle of a regular n-gon is $\frac{(n - 2)180}{n}$</p>	<p>Polygon Exterior Angle-Sum Theorem The sum of the measures of the exterior angles of a polygon, one at each vertex, is 360.</p>
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Topic 6 cont'd – Properties of Parallelograms

<p>Parallelogram \rightarrow Opp sides \cong If a quadrilateral is a parallelogram, then its opposite sides are congruent.</p>	<p>Opp sides $\cong \rightarrow$ Parallelogram If both pairs of opposite sides of a quadrilateral are congruent, then it is a parallelogram</p>
<p>Parallelogram \rightarrow Consec. Angles are Supp. If a quadrilateral is a parallelogram, then its consecutive angles are supplementary.</p>	<p>Consec. Angles are Supp \rightarrow Parallelogram If all pairs of consecutive angles in a quadrilateral are supplementary, then it is a parallelogram.</p>
<p>Parallelogram \rightarrow Opp. Angles are \cong If a quadrilateral is a parallelogram, then its opposite angles are congruent.</p>	<p>Opp. Angles $\cong \rightarrow$ Parallelogram If both pairs of opposite angles of a quadrilateral are congruent, then it is a parallelogram.</p>
<p>Parallelogram \rightarrow Diags. bisect each other If a quadrilateral is a parallelogram, then its diagonals bisect each other.</p>	<p>Diags. Bisect each other \rightarrow Parallelogram If both diagonals of a quadrilateral bisect each other, then it is a parallelogram.</p>
<p>Angle supp. to both consec angles \rightarrow Parallelogram If an angle of a quadrilateral is supplementary to both of its consecutive angles, then the quadrilateral is a parallelogram.</p>	<p>One pair opp sides \cong and $\parallel \rightarrow$ Parallelogram If one pair of opposite sides of a quadrilateral is both congruent and parallel, then it is a parallelogram.</p>
<p>Rhombus $\rightarrow \perp$ diagonals If a parallelogram is a rhombus, then its diagonals are perpendicular.</p>	<p>\perp diagonals \rightarrow Rhombus If a quadrilateral is a parallelogram with perpendicular diagonals, then it is a rhombus.</p>

<p>Rhombus \rightarrow Diags bisect opp. Angles If a parallelogram is a rhombus, then each diagonal bisects a pair of opposite angles.</p>	<p>Diags. Bisect opp. Angles \rightarrow Rhombus If a quadrilateral is a parallelogram with a diagonal that bisects a pair of opposite angles, then it is a rhombus.</p>
<p>Rectangle \rightarrow Diags. \cong If a parallelogram is a rectangle, then its diagonals are congruent.</p>	<p>Diags. $\cong \rightarrow$ Rectangle If a quadrilateral is a parallelogram with congruent diagonals, then it is a rectangle.</p>
<p>Parallelogram w/ $\perp \cong$ Diags. \rightarrow Square If a quadrilateral is a parallelogram with perpendicular, congruent diagonals, then it is a square.</p>	<p>Kite $\rightarrow \perp$ Diags. If a quadrilateral is a kite, then its diagonals are perpendicular.</p>
<p>Isosceles trapezoid $\rightarrow \cong$ Base Angles If a quadrilateral is an isosceles trapezoid, then each pair of base angles is congruent.</p>	<p>Isosceles trapezoid $\rightarrow \cong$ Diags. If a quadrilateral is an isosceles trapezoid, then its diagonals are congruent.</p>
<p>Trapezoid Midsegment Theorem If a quadrilateral is a trapezoid, then</p> <ol style="list-style-type: none"> 1. The midsegment is parallel to the bases 2. The length of the midsegment is half the sum of the lengths of the bases. 	

Topic 5 – Relationships Within Triangles

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