**CHAPTER 2**

converse

the statement formed by switching the hypothesis and conclusion of a conditional statement



negation

The negative of a statement.



inverse

the statement formed when you negate the hypothesis and conclusion of a conditional statement



contrapositive

a statement that negates the hypothesis and the conclusion and switches their orders of the original statement



equivalent statements

When two statements are both true or both false



perpendicular lines

Two lines that intersect to form right angles



line perpendicular to a plane

a line that intersects the plane in a point and is perpendicular to every line in the plane that intersects it



biconditional statement

a statement that contains the phrase "if and only if"



logical argument

an argument based on deductive reasoning, which uses facts, definitions, and accepted properties in a logical order



law of detachment

if p -> q is a true conditional statement and p is true, than q is true



law of syllogism

If p ->q and q->r are ture conditional statements, then p->r is true



theorem

a true statement that follows as a result of other true statements



two-column proof

has numbered statements and reasons that show the logical order of an argument



paragraph proof

a type of proof written in paragraph form



conditional statement

p -> q



converse statement

q -> p



contrapositive statement

~q -> ~p



inverse statement

~p -> ~q



addition property

if a=b, then a+c=b+c



subtraction property

if a=b, then a-c=b-c



multiplication property

if a=b, then ac=bc



division property

if a=b and c n='t 0, then a/c=b/c



reflexive property

for any real number a, a=a



symmetric property

if a=b, then b=a



transitive property

if a=b and b=c, then a=c

substitution property

if a=b, then a can be substituted for b in any equation or expression



reflexive (property of segment congruence)

for any segment AB, line AB ~= line AB



symmetric (property of segment congruence)

if line AB ~= line CD, then line CD ~= line AB



transitive (property of segment congruence)

if line AB ~= line CD, and line CD ~= line EF, then line AB ~= line EF



reflexive (property of angle congruence)

for any angle A, angle A ~= angle A



symmetric (property of angle congruence)

if angle A ~= angle B, then angle B ~= angle A



transitive (property of angle congruence)

if angle A ~= angle B and angle B ~= angle C, then angle A ~= angle C

**THEOREMS:**

If two angles are right angles, then they are congruent.

If two angles are straight angles, then they are congruent.

If angles are supplementary to the same angle or to congruent angles, then they are congruent. (**Congruent Supplement Theorem**)

If angles are complementary to the same angle or to congruent angles, then they are congruent. (**Congruent Complement Theorem**)

**CHAPTER 3**

alternate exterior anglesTwo nonadjacent exterior angles that lie on opposite sides of a transversal.



alternate interior angles

Two nonadjacent interior angles that lie on opposite sides of a transversal.



axis of symmetry

A line that divides a planar figure into two congruent reflected halves.



center of a regular polygon

The point that is equidistant from all vertices of a polygon.



central angle of a regular polygon

An angle formed by two rays originating from the center of a circle.



concave polygon

A polygon that is not convex.



convex polygon

A polygon in which any line segment connecting two points of the polygon has no part outside the polygon.



corresponding angles

Two nonadjacent angles, one interior and one exterior, that lie on the same side of a transversal.



equiangular polygon

A polygon in which all angles are congruent.



equilateral polygon

A polygon in which all sides are congruent.



midsegment of a trapezoid

A line connecting the midpoints of the two nonparallel segments of a trapezoid.



midsegment of a triangle

A segment whose endpoints are the midpoints of two sides.



polygon

A closed plane figure formed from three or more segments such that each segment intersects exactly two other segments, one at each endpoint and no two segments with a common endpoint are collinear.



parallelogram

A quadrilateral with two pairs of parallel sides.



quadrilateral

A polygon with four sides



rectangle

A quadrilateral with four right angles.



reflectional symmetry

A plane figure has reflectional symmetry if its reflection image across a line coincides with the preimage, the original figure.



regular polygon

A polygon that is both equilateral and equiangular.



remote interior angle

An interior angle of a triangle that is not adjacent to a given exterior angles.



rhombus

A quadrilateral with four congruent sides.



rotational symmetry

A figure has rotational symmetry if and only if it has at least one rotation image, not counting rotation images of 0˚ or multiples of 360˚, that coincides with the original figure.



same-side interior angles

Interior angles that lie on the same-side of a transversal.



slope

The ratio of rise to run for a segment; the slope of a nonvertical line that contains the points (x1, y1) is the ratio (y2-y1/x2-x1)

square

A quadrilateral with four congruent sides and four right angles.



transversal

A line, ray, or segment that intersects two or more coplanar lines, rays, or segments, each at a different point.



trapezoid

A quadrilateral with one and only one pair of parallel sides.



Corresponding Angles Postulate

If two lines cut by a transversal are parallel, then corresponding angles are congruent.



Alternate Interior Angles Theorem

If two lines cut by a transversal are parallel, then alternate interior angles are congruent.



Alternate Exterior Angles Theorem

If two lines cut by a transversal are parallel, then same-side interior angles are supplementary.



Converse of the Corresponding Angles Postulate

If two lines are cut by a transversal in such a way that corresponding angles are congruent, then the two lines are parallel.



Converse of the Same-Side Interior Angles Theorem

If two lines are cut by a transversal in such a way that same-side interior angles are supplementary, then two lines are parallel.



Converse of the Alternate Interior Angles Theorem

If two lines are cut by a transversal in such a way that alternate interior angles are congruent, then the two lines are parallel.



Theorem

If two coplanar lines are perpendicular to the same line, then two lines are parallel.



Theorem

If two lines are parallel to the same line, then the two lines are parallel.



The Parallel Postulate

Given a line and a point not on the line, there is one and only on line that contains the given point and is parallel to the given line.



Triangle Sum Theorem

The sum of the measures of the angles of a triangle is 180˚.



Exterior Angle Theorem

The measure of an exterior angle of a triangle is equal to the sum of the measures of the remote interior angles.



Sum of the Interior Angles of a Polygon

The sum,s, of the measures of the interior angles of a polygon with n sides is given by s = (n-2)180˚.



The Measure of an Interior Angle of a Regular Polygon

The measure, m, of an interior angle of a regular polygon with n sides is m=180˚-360/n.



Sum of the Exterior Angles of a Polygon

The sum of the measures of the exterior angles of a polygon is 360˚.



Parallel Lines Theorem

In a coordinate plane, two nonvertical lines are parllel if and only if they have the same slope.



Perpendicular Lines Theorem

In a coordinate plane, two nonvertical lines are perpendicular if and only if the product of their slopes is -1.



Converse of the Alternate Exterior Angles Theorem

If 2 lines are cut by a transversal in such a way that alternate exterior angles are congruent.

**CHAPTER 4**

### acute triangle

triangle with three acute angles



### equiangular triangle

triangle with three congruent angles



### right triangle

triangle with one right angle



### obtuse angle

triangle with one obtuse angle



### equilateral triangle

triangle with three congruent sides



### isosceles triangle

triangle with at least two congruent sides



### scalene triangle

triangle with no congruent sides



### auxiliary line

a line that is added to a figure to aid in a proof



### corollary

a theorem whose proof follows directly form another theorem



### interior

set of all points inside the figure



### exterior

set of all points outside the figure



### interior angle

an angle formed by two sides of a triangle



### exterior angle

an angle formed by one side of the triangle and the extension of an adjacent side



### remote interior angle

an interior angle that is not adjacent to the exterior angle



### Triangle Sum Theorem

The sum of the angle measures of a triangle is 180°



### Corollary 4-2-2

the acute angles of a right angle are complementary



### Corollary 4-2-3

the measure of each angle in an equiangular triangle is 60°



### Exterior Angle Theorem

the measures of an exterior angle of a triangle is equal to the sum of the measures of its remote interior angles



### Third Angles Theorem

If two angles of one triangle are congruent to two angles of another triangle, then the third pair of angles are congruent



### corresponding angles

angles in the same position in polygons with an equal amount of sides



### corresponding sides

sides in the same position in polygons with an equal amount of sides



### corresponding polygons

two polygons are congruent if and only if the corresponding angles and sides are congruent



### triangle rigidity

property that gives you a shortcut for proving two triangles congruent



### included angle

an angle formed by two adjacent sides of a polygon



### Side-Side-Side (SSS) Congruence Postulate

If three sides of one triangle are congruent to three sides of another triangle, then the triangles are congruent



### Side-Angle-Side (SAS) Congruence Postulate

If two sides and an included angle of a triangle are congruent to two sides and an included angle of another triangle, then the triangles are congruent



### included side

the common side of two consecutive angles in a polygon



### Angle-Side-Angle (ASA) Congruence Postulate

If two angles and the included side of one triangle are congruent to two sides and the included side of another triangle, then the triangles are congruent



### Angle-Angle-Side (AAS) Congruence Theorem

If two angles and a nonincluded side of a triangle are congruent to the corresponding angles and nonincluded side of another triangle, then the triangles are congruent



### Hypotenuse-Leg (HL) Congruence Theorem

If the hypotenuse and leg of a right angle are congruent to the hypotenuse and leg of another right triangle, then the triangles are congruent.



### CPCTC

Corresponding Parts of Congruent Triangles are Congruent



### coordinate proof

a style of proof that uses coordinate geometry and algebra



### legs

the congruent sides of an isosceles triangle



### vertex angle

the angle formed by the legs of an isosceles triangle



### base

the side opposite of the vertex angle



### base angles

the two angles that have the base as a side



### Isosceles Triangle Theorem

If two sides of a triangle are congruent, then the angles opposite the sides are congruent



### Converse of Isosceles Triangle Theorem

If two angles of a triangle are congruent, then the sides opposite those angles are congruent



### Equilateral Triangle Corollary

If a triangle is equilateral, then it is equiangular



### Equiangular Triangle Corollary

If a triangle is equiangular, then it is equilateral

**CHAPTER 5**

### equidistant

the same distance from two or more objects



### locus

a set of points that satisfies a given condition



### Perpendicular Bisector Theorem

If the point is on the perpendicular bisector of a segment, then it is equidistant from the endpoints of the segment



### 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



### Angle Bisector Theorem

If a point is on the angle bisector of an angle, then it is equidistant from the sides of the angle



### Converse of the Angle Bisector Theorem

If a point in the interior of an angle is equidistant from the sides of the angle, then it is on the angle bisector of the angle



### concurrent

a point where three or more lines intersect at one point



### point of concurrency

point where three or more lines coincide



### circumcenter of a triangle

the point of concurrency of the three perpendicular bisectors of a triangle



### circumscribed circle

every vertex of the polygon lies on the circle



### incenter of a triangle

the point of concurrency of the three angle bisectors of a triangle



### inscribed circle

a circle in which every side of the polygon is tangent to the circle



### Circumcenter Theorem

The circumcenter of the triangle is equidistant from the vertices of the triangle



### Incenter Theorem

The incenter of a triangle is equidistant from the sides of the triangle



### median of a triangle

a segment whose endpoints are a vertex of a triangle and the midpoint of the opposite side



### centroid of the triangle

the point of concurrency of the three medians of a triangle



### altitude of a triangle

a perpendicular segment from a vertex to the line containing the opposite side



### orthocenter of a triangle

the point of concurrency of the three altitudes of a triangle



### Centroid Theorem

The centroid of a triangle is located ²/₃ of the distance from each vertex to the midpoint of the opposite side



### midsegment of a triangle

a segment that joins the midpoints of two sides of the triangle

### Triangle Midsegment Theorem

The midsegment of a triangle is parallel to a side of the triangle, and its length is half of the length of that side



### indirect proof

a proof in which the statement to be proved is assumed to be false and a contradiction is shown



### Theorem 5-5-1

If two sides of a triangle are not congruent, then the larger angle is opposite the larger side



### Theorem 5-5-2

If two angles of a triangle are not congruent, then the larger side is opposite the larger angle



### Triangle Inequality Theorem

The sum of any two side lengths of a triangle is greater than the third side length



### Hinge 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 across from the larger included side



### Converse of the Hinge Theorem

If two sides of a triangle are congruent to two sides of another triangle and the third sides are not congruent, then the larger included angle is across from the longer third side



### Pythagorean triple

a set of three nonzero whole numbers a, b, and c such that a²+b²=c²



### Converse of the Pythagorean Theorem

If the sum of the squares of the lengths of two sides of a triangle is equal to the square of the length of the third side, then the triangle is a right triangle



### Pythagorean Inequalities Theorem

In ∆ABC, c is the length of the longest side. If c²>a²+b², then ∆ABC is an obtuse triangle. If c²<a²+b², then ∆ABC is an acute triangle



### 45°-45°-90° Triangle Theorem

In a 45°-45°-90° triangle, both legs are congruent and the length of the hypotenuse is the length of the legs times √2



### 30°-60°-90° Triangle Theorem

In a 30°-60°-90° triangle, the length of the hypotenuse is 2 times the length of the shorter leg, and the length of the longer leg is the length of the shorter leg times√3