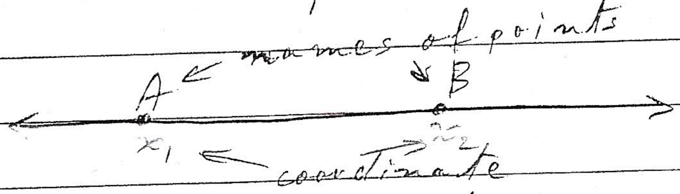
Postulate or Axiom: A rule that is accepted without proof

Theorem: A rule can be proved.

Postulate 1: Ruler Postulate

The points on a line can be matched one to one with the real numbers. The real number that corresponds to a point is the coordinate of the point.




The distance between points A and B, written AB, is the difference of the coordinates of A & B

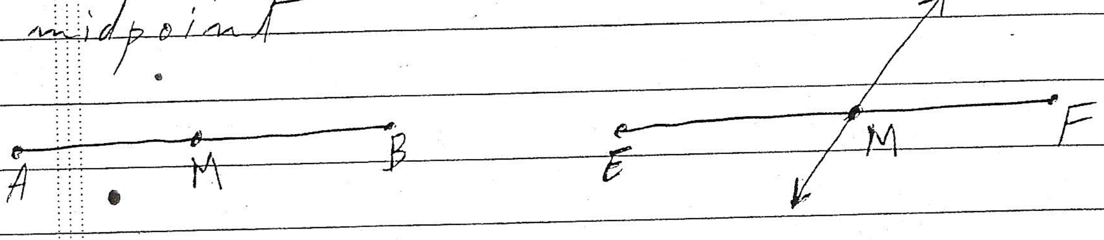
$$AB = |x_2 - x_1|$$

Congruent segments: are line segments that have same length.

Notation: $\overline{AB} \cong \overline{EF}$

Definitions: The midpoint of a segment is the point that divides the segment into 2 congruent segments.

A segment bisector is a point, ray, line, line segment, or plane that intersects the segment at its midpoint

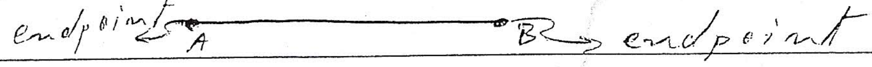


Geometry Grade 7 P1

Definition: Undefined terms are words do not have formal definitions, but there is agreemen bout they mean.
example: point, line, plane.

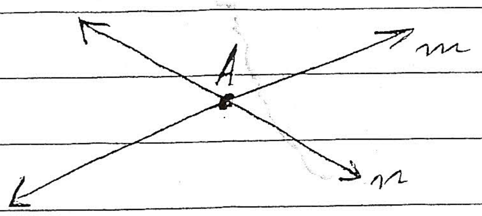
Definition: Defined terms can be described using known words such as point or line.

Segment: The line segment AB (written as $\overline{AB}$) consists of the endpoints A and B and all points on $\overleftrightarrow{AB}$ that are between A and B. Note that $\overline{AB}$ can also be named $\overline{BA}$.




Ray: The ray AB (written as $\overrightarrow{AB}$) consists of the endpoint A all points on $\overleftrightarrow{AB}$ that lie on the same side of A as B.

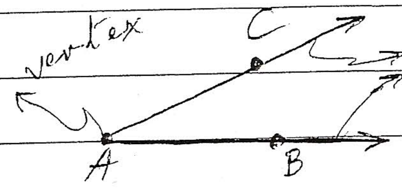

Intersection: The intersection of the figures is the set of points the figures hav in common.



**Distance formula:** $A(x_1, y_1)$  $B(x_2, y_2)$

$$(AB)^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$

**Definitions:** An angle consists of 2 different rays with the same endpoint. The rays are the sides of the angle. The endpoint is the vertex of the angle.

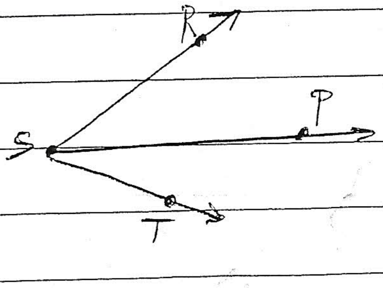



$\angle CAB$

**Postulate 4:** Angle addition Postulate

If P is in the interior of $\angle RST$, then the measure of $\angle RST$ is equal to the sum of the measures of $\angle RSP$ and $\angle PST$.

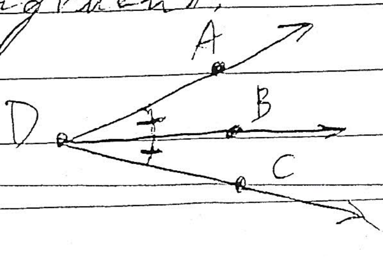
$$m\angle RST = m\angle RSP + m\angle PST$$




**Definitions:** two angles are congruent angles if they have the same measure.

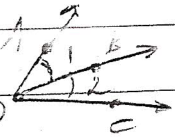
$$m\angle A = m\angle B, \quad \angle A \cong \angle B$$

An angle bisector is a ray divides an angle in angles that are congruent.



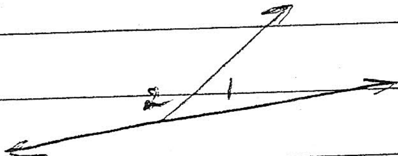

$\overrightarrow{DB}$ is an angle bisector

efinitions: Two angles are complementary angles if the sum of their measures is 90°. each angle is the complement of the other.
Two angles are supplementary angles if the sum f their measures is 180°. Each angle is the upplement of the other.
Adjacent angles are 2 angles that share a common vertex and side, but have no common interior poin

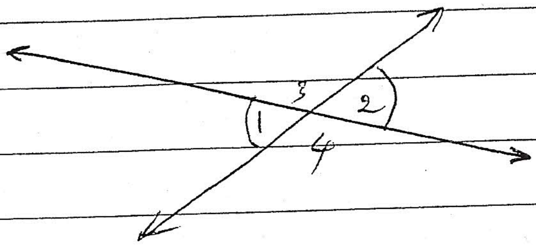



∠1 & ∠2 are adjacent

Two adjacent angles are a linear pair if their noncommon sides are opposite rays. The angles in a linear pair are supplementary angles.



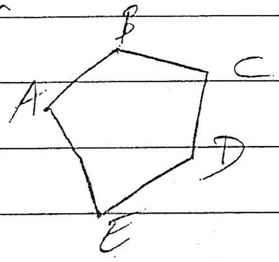

Two angles are vertical angles if their sides form two pairs of opposite rays




(∠3 & ∠4), & (∠1 & ∠2) are vertical angl

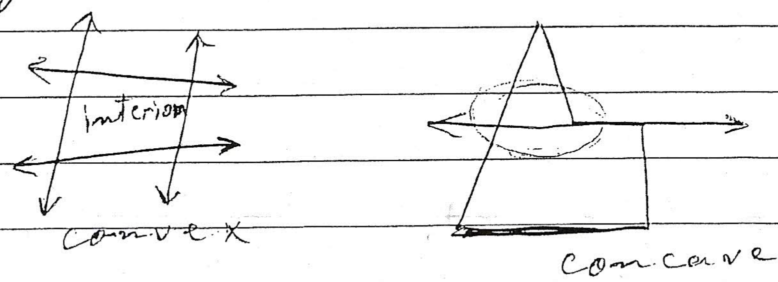
<u>Identifying Polygons:</u> In geometry, a figure that lies in a plane is called a plane figure. A polygon is a closed plane figure with the following properties.

1. It is formed by three or more line segments called sides.
2. Each side intersects exactly 2 sides, one at each endpoint, so that no 2 sides with common endpoint are collinear.



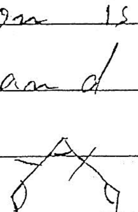

ABCDE } notation
BCDEA

A polygon is convex if no line that contains a side of the polygon contains a point in the interior of the polygon. Otherwise is called concave.




The term n-gon, where n is the number of a polygon's sides. <u>example:</u> 12-gon with 12 sides.

A regular polygon is a convex polygon that is both equilateral and equiangular.



P6

conjecture is an unproven statement that is based on observations. It must be true for all cases.
To use inductive reasoning when you find a pattern in specific cases and then write a conjecture for the general case.
A counterexample is a specific case for which the conjecture is false

Conditional statement: If (hypothesis) then (conclusion)
example: If it is raining then there are clouds in the sky

The negation of a statement is the opposite of the original statement.
ex: statement: the ball is red.
negation: the ball is not red.

The converse of a conditional statement exchange the hypothesis and conclusion.
Inverse of a conditional statement, negate both the hypothesis and the conclusion
Contrapositive first write the converse and the nega. both the hypothesis and the conclusion.
ex: C.S.: If $m\angle A = 99°$ then $\angle A$ is obtuse. True
Conv: If $\angle A$ is obtuse then $m\angle A = 99°$ False
Inv: If $m\angle A \neq 99°$ then $\angle A$ is not obtuse False
Contrapos: If $\angle A$ is not obtuse then $m\angle A \neq 99°$. True

Definition: If 2 lines intersect to form a right angle, then they are perpendicular lines.

Biconditional statement is when conditional statement and its converse are both true.
If and only if
example: 2 lines are ⊥ iff they intersect to form a right angle.

Deductive reasoning uses facts, definition, accepted properties and laws of logic to form a logical argument.

Postulate 5: Through any 2 points there exists exactly one line.

Postulate 6: A line contains at least 2 points.

Postulate 7: If 2 lines intersect, then their intersection is exactly one point.

Postulate 8: Through any 3 noncollinear points there exists exactly one plane.

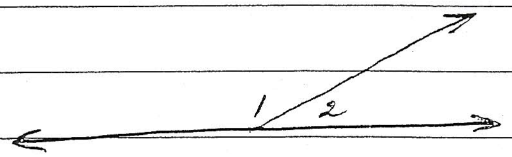
Postulate 9: A plane contains at least 3 noncollinear points.

Postulate 10: If 2 points lie in a plane, then the line containing them lies in the plane.

Postulate 11: If 2 planes intersect, then their intersection is a line.

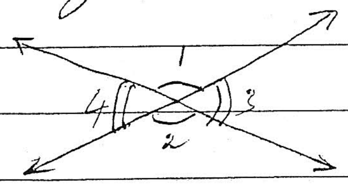
Theorem 2.5: Congruent supplements theorem
If 2 angles are supplementary to the same angle then they are congruent.
**If** $\angle 4$ and $\angle 5$ are supplementary **and** $\angle 6$ and $\angle 5$ are supplementary **then** $\angle 4 \cong \angle 6$.

Postulate 12: Linear pair postulate
If 2 angles form a linear pair, then they are supplementary



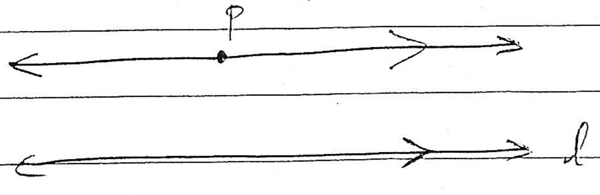

$\angle 1$ & $\angle 2$ form a linear pair
$\angle 1$ & $\angle 2$ are supplementary

Theorem 2.6: Vertical angles congruence theorem
vertical angles are congruent.

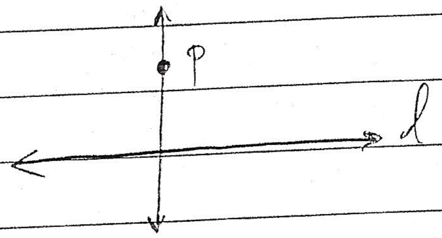



$\angle 1$ & $\angle 2$ are vertical.

Postulate 13: Parallel Postulate
If there is a line and a point not on the line, the there is exactly one line through the point parallel to the given line. There is exactly one line through P // to l

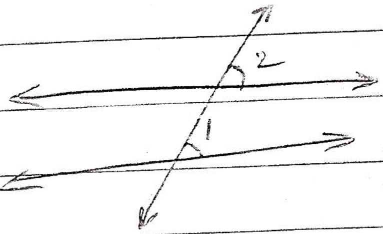


stulate 14: Perpendicular Postulate
f there is a line and a point not on the line, then
here is exactly one line through the point perpendicular
to the given point, there is exactly one line throug
P ⊥ to l.

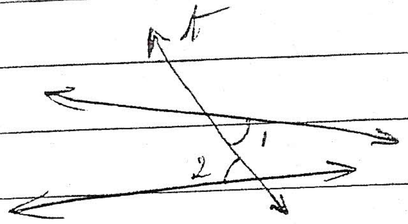



Angles formed by transversals

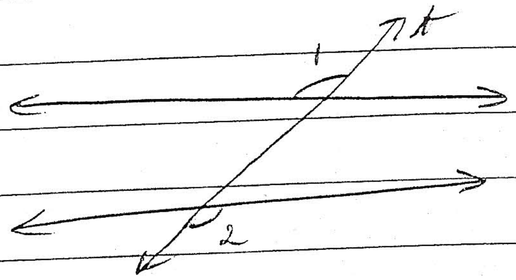
corresponding angles:
∠1 & ∠2



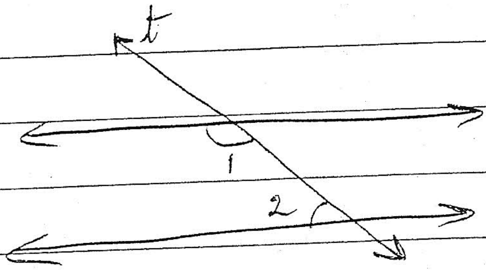

Alternate interior angles:
∠1 & ∠2



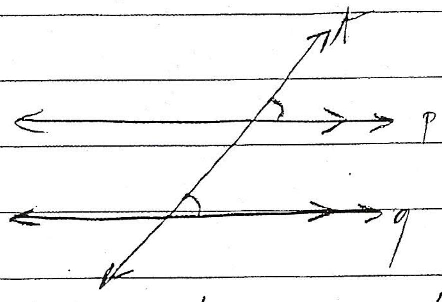

alternate exterior angles:
∠1 & ∠2



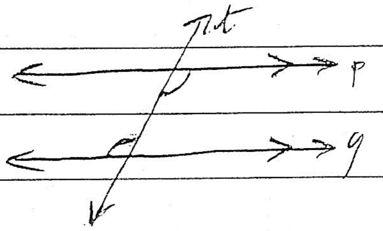

consecutive interior:
∠1 & ∠2



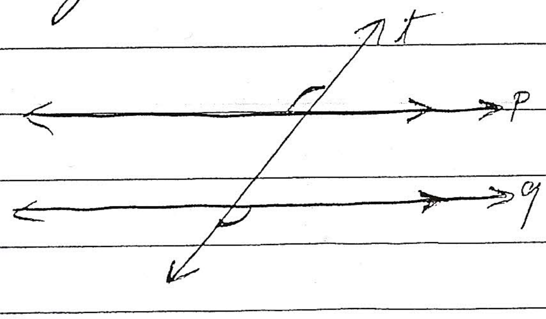
Postulate 15: Corresponding angles Postulate.
If 2 // lines are cut by a transversal, then the pairs of corresponding angles are congruent.



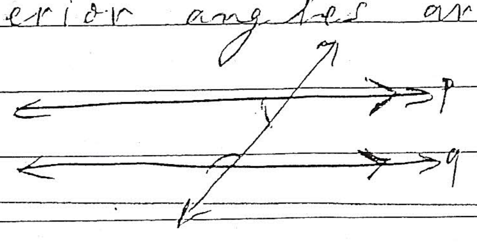

Theorem 3.1: Alternate interior angles theorem
If 2 // lines are cut by a transversal, then the pairs of alternate interior angles are ≅.



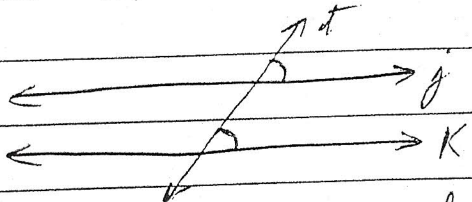

Theorem 3.2: Alternate exterior angles theorem
If 2 // lines are cut by a transversal, then the pairs of alternate exterior angles are ≅.




Theorem 3.3: Consecutive interior angles theorem
If 2 // lines are cut by a transversal, then the pairs of consecutive interior angles are supplementary.

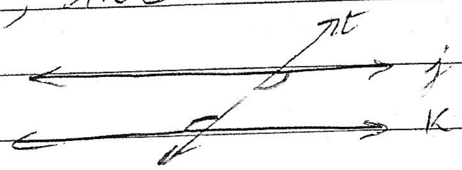


Postulate 16: corresponding angles converse
If 2 lines are cut by a transversal so the corresponding angles are ≅, then the lines are //.

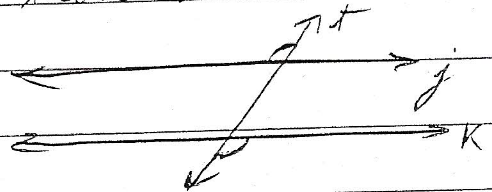



⇒ j//K

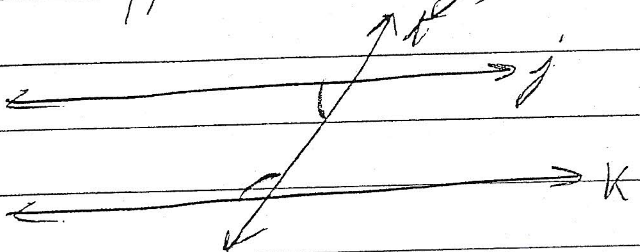
Theorem 3.4: Alternate interior angles converse
If 2 lines are cut by a transversal so the alternate interior angles are ≅, then the lines are //.




Theorem 3.5: Alternate exterior angles converse
If 2 lines are cut by a transversal so the alternate exterior angles are ≅, then the lines are //.



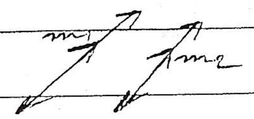

Theorem 3.6: Consecutive interior angles converse
If 2 lines are cut by a tranversal so the consecutiv interior angles are supplementary, then the lines are //




Theorem 3.7: Transitive property of parallel lines
If 2 lines are // to the same line, then they are // to each other.

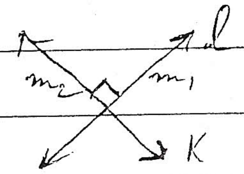
Postulate 17: Slopes of parallel lines
In a coordinate plane, two nonvertical lines are //
iff they have the same slope.

$m_1 = m_2$




Postulate 18: slopes perpendicular lines

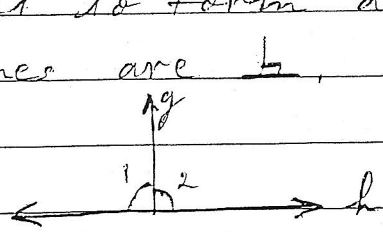
$m_1 \cdot m_2 = -1$



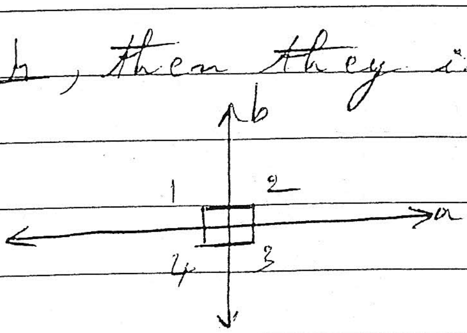

slope-intercept form of a linear equation; $y = mx +$
standard form of linear equation; $ax + by = c$

Theorem 3.8: If 2 lines intersect to form a linear
pair of $\cong$ angles, then the lines are $\perp$.

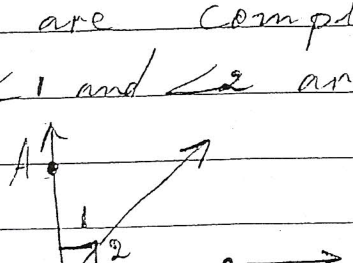
If $\angle 1 \cong \angle 2$ then $g \perp h$



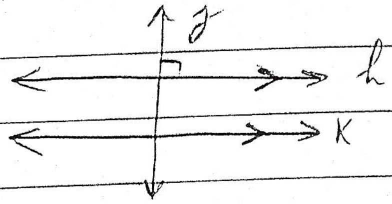

Theorem 3.9: If 2 lines are $\perp$, then they intersec
to form 4 right angles.
If $a \perp b$ then $\angle 1, \angle 2, \angle 3$ and $\angle 4$
are right angles.



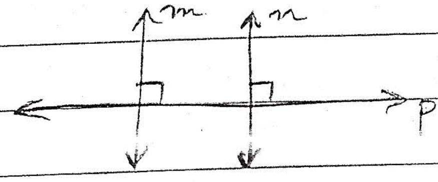

Theorem 3.10: If 2 sides of 2 adjacent acute angles ar
$\perp$, then thes angles are complementary.
If $\overrightarrow{BA} \perp \overrightarrow{BC}$ then $\angle 1$ and $\angle 2$ are complementary



eorem 3.11: Perpendicular transversal theorem
f a transversal is ⊥ to one of two // lines, then it
s ⊥ to the other.
f h // K and j ⊥ h then j ⊥ K

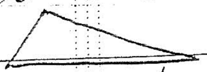



heorem 3.12: Lines perpendicular to a transversal theorem
n a plane, if 2 lines are ⊥ to the same line,
hen they are // to each other.
f m ⊥ p and n ⊥ p then m // n




lassifying triangles by sides:

scalene △

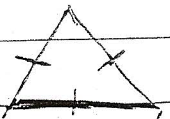


no ≅ sides

isosceles △

at least 2 ≅ sides

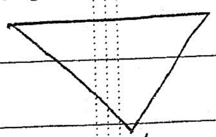
equilateral △



3 ≅ sides

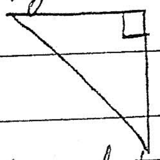
lassifying triangles by angles:

acute △



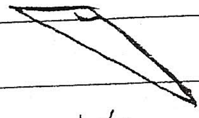
3 acute ∠s

Right △



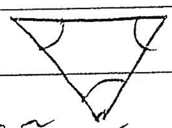
1 right ∠

obtuse △



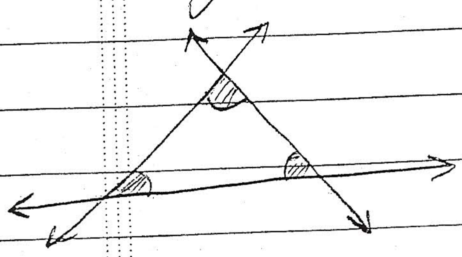
1 obtuse ∠

equilateral △

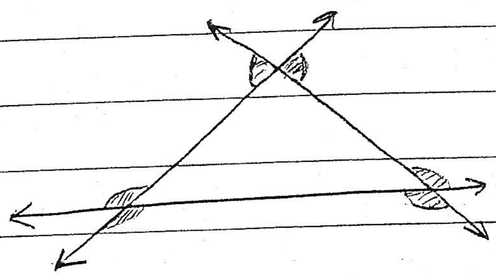


3 ≅ ∠s

Interior angles

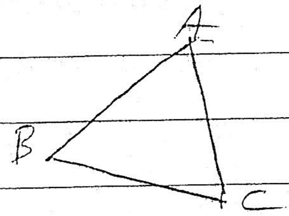


exterior angles



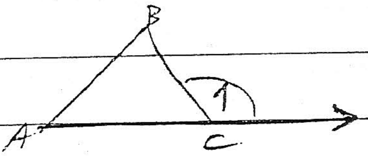
Theorem 4.1: triangle sum theorem
The sum of the measures of the interior ∠s of a triangle is 180°

$m\angle A + m\angle B + m\angle C = 180^\circ$



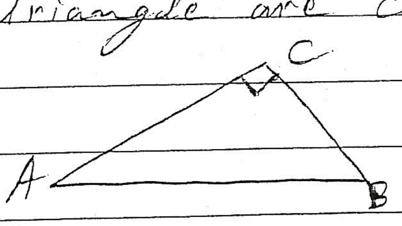

Theorem 4.2: Exterior angle theorem
The measure of an exterior angle of a triangle is equal to the sum of the measures of the 2 nonadjacent interior angles.

$m\angle 1 = m\angle A + m\angle B$

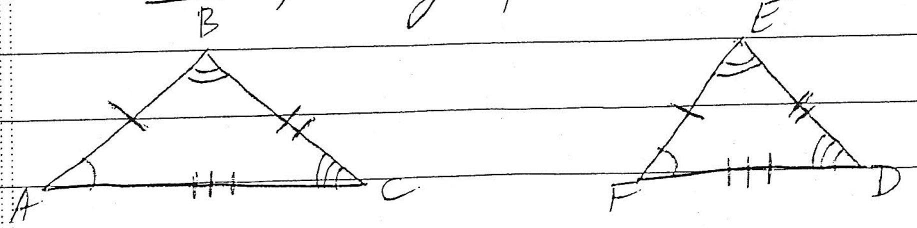



Corollary: Corollary to the triangle sum theorem
The acute ∠s of a right triangle are complementary

$m\angle A + m\angle B = 90^\circ$




In two congruent figures all the parts of one figure are ≅ to the corresponding parts of the other figure.




Theorem 4.3: Third angles theorem
If 2 ∠s of one triangle are ≅ to 2 ∠s of another triangle, then the third angles are also ≅.

Theorem 4.4: Properties of congruent triangles

eflexive: $\triangle ABC \cong \triangle ABC$

Symmetric: If $\triangle ABC \cong \triangle EFG$ then $\triangle EFG \cong \triangle ABC$

ransitive: If $\triangle ABC \cong \triangle DEF$ and $\triangle DEF \cong \triangle JKL$

Then $\triangle ABC \cong \triangle JKL$

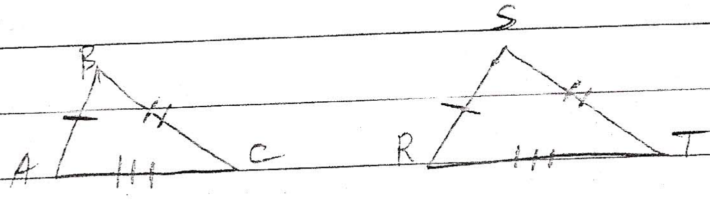
Postulate 19: (SSS) Side - Side - Side congruence postulate

If 3 sides of one triangle are $\cong$ to 3 sides of a second triangle, then the 2 $\triangle$s are $\cong$.

If $\overline{AB} \cong \overline{RS}$ then $\triangle ABC \cong \triangle RST$

$\overline{BC} \cong \overline{ST}$

$\overline{CA} \cong \overline{TR}$



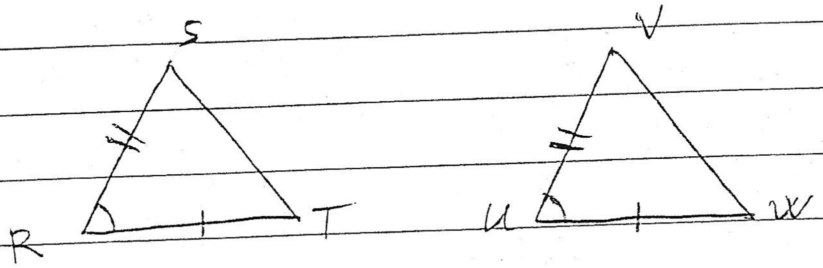

Postulate 20: Side - Angle - Side (SAS) congruence postulate

If 2 sides and the included angle of one triangle are $\cong$ to 2 sides and the included angle of a second triangle then the 2 $\triangle$s are $\cong$.

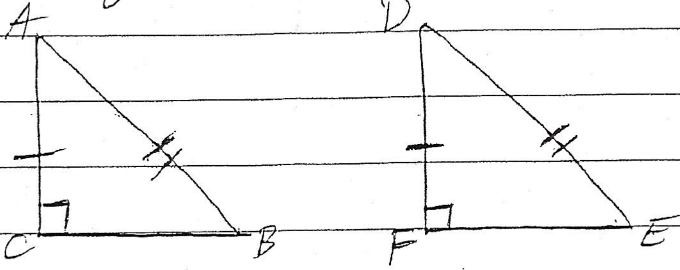
If $\overline{RS} \cong \overline{UV}$ then $\triangle RST \cong \triangle UVW$

$\angle R \cong \angle U$

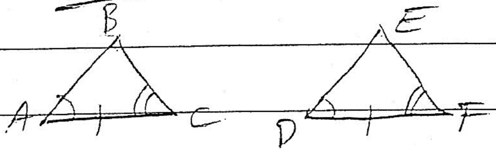
$\overline{RT} \cong \overline{UW}$



Theorem 4.5: Hypothenuse — leg (HL) congruence theorem
If the hypothenuse and a leg of a right triangle are congruent to the hypothenuse and a leg of a second right triangle, then the 2 $\triangle$s are $\cong$.




Postulate 21: Angle-Side-Angle (ASA) congruence postulate
If 2 $\angle$s and included side of one triangle are $\cong$ to 2 $\angle$s and included side of a second triangle, then the 2 $\triangle$s are $\cong$.
If $\angle A \cong \angle D$, $\overline{AC} \cong \overline{DF}$ then $\triangle ABC \cong \triangle DEF$
$\angle C \cong \angle F$




Theorem 4.6: Angle-Angle-Side (AAS) congruence theorem
If 2 $\angle$s and a non-included side of one triangle are congruent to 2 $\angle$s and the corresponding non-included side of a second triangle, then the 2 $\triangle$s are $\cong$.
If $\angle A \cong \angle D$, $\angle C \cong \angle F$ then $\triangle ABC = \triangle DEF$
$\overline{BC} \cong \overline{EF}$