VOCABULARY

Conjecture A conjecture is an unproven statement that is based on observations.

Inductive Reasoning Inductive reasoning is the process of finding a pattern for specific cases and then writing a conjecture for the general case.

Counterexample A counterexample is a specific case for which the conjecture is false.

VOCABULARY

Conditional statement A logical statement that has two parts, a hypothesis and a conclusion.

If-then form A form of a conditional statement in which the "if" part contains the hypothesis and the "then" part contains the conclusion.

Hypothesis A hypothesis is the "if" part of a conditional statement.

Conclusion A conclusion is the "then" part of a conditional statement.

Negation The negation of a statement is the opposite of the original statement.

Converse The converse of a conditional statement is formed by switching the hypothesis and conclusion.

Inverse The inverse of a conditional statement is formed by negating both the hypothesis and conclusion.

Contrapositive The contrapositive of a conditional statement is formed by writing the converse and then negating both the hypothesis and conclusion.

Equivalent statements Equivalent statements are two statements that are both true or both false.

Perpendicular lines Two lines that intersect to form a right angle are perpendicular lines.

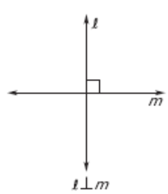
Biconditional statement A statement that contains the phrase "if and only if."

PERPENDICULAR LINES

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

The definition can also be written using the converse: If any two lines are perpendicular lines, then they intersect to form a right angle.

You can write "line ℓ is perpendicular to line m" as $\ell \perp m$.



VOCABULARY

Deductive Reasoning Using facts, definitions, accepted properties, and the laws of logic to form a logical argument

LAWS OF LOGIC

Law of Detachment If the hypothesis of a true conditional statement is true, then the conclusion is also true.

Law of Syllogism

If hypothesis p, then conclusion q. ← If these statements are true,
If hypothesis q, then conclusion r. ←
If hypothesis p, then conclusion r. ← then this statement is true.

VOCABULARY

Line perpendicular to a plane A line is perpendicular to a plane if and only if the line intersects the plane in a point and is perpendicular to every line in the plane that intersects it at that point.

POINT, LINE, AND PLANE POSTULATES

Postulate 5 Through any two points there exists exactly one line.

Postulate 6 A line contains at least two points.

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

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

Postulate 9 A plane contains at least three noncollinear points.

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

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

CONCEPT SUMMARY: INTERPRETING A DIAGRAM

When you interpret a diagram, you can only assume information about size or measure if it is marked.

YOU CANNOT ASSUME

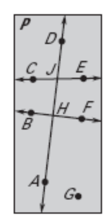
All points shown are coplanar.

$\angle AHB$ and $\angle BHD$ are a linear pair.

$\angle AHF$ and $\angle BHD$ are vertical angles.

A, H, J, and D are collinear.

$\overleftrightarrow{AD}$ and $\overleftrightarrow{BF}$ intersect at H.



YOU CANNOT ASSUME

G, F, and E are collinear.

$\overleftrightarrow{BF}$ and $\overleftrightarrow{CE}$ intersect.

$\overleftrightarrow{BF}$ and $\overleftrightarrow{CE}$ do not intersect.

$\angle BHA \cong \angle CJA$

$\overleftrightarrow{AD} \perp \overleftrightarrow{BF}$ or $m\angle AHB = 90°$

DISTRIBUTIVE PROPERTY

$a(b + c) =$ __$ab + ac$__, where a, b, and c are real numbers.

ALGEBRAIC PROPERTIES OF EQUALITY

Let a, b, and c be real numbers.

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 $c \neq 0$, then __$\frac{a}{c} = \frac{b}{c}$__.
Substitution Property	If $a = b$, then __a can be substituted for b in any equation or expression__.

REFLEXIVE PROPERTY OF EQUALITY

Real Numbers	For any real number a, __$a = a$__.
Segment Length	For any segment AB, __$AB = AB$__.
Angle Measure	For any angle A, __$m\angle A = m\angle A$__.

SYMMETRIC PROPERTY OF EQUALITY

Real Numbers	For any real numbers a and b, if $a = b$, then __$b = a$__.
Segment Length	For any segments AB and CD, if $AB = CD$, then __$CD = AB$__.
Angle Measure	For any angles A and B, if $m\angle A = m\angle B$, then __$m\angle B = m\angle A$__.

TRANSITIVE PROPERTY OF EQUALITY

Real Numbers	For any real numbers a, b, and c, if $a = b$ and $b = c$, then __$a = c$__.
Segment Length	For any segments AB, CD, and EF, if $AB = CD$ and $CD = EF$, then __$AB = EF$__.
Angle Measure	For any angles A, B, and C, if $m\angle A = m\angle B$ and $m\angle B = m\angle C$, then __$m\angle A = m\angle C$__.

VOCABULARY

Proof A proof is a logical argument that shows a statement is true.

Two-column proof A two-column proof has numbered statements and corresponding reasons that show an argument in logical order.

Theorem A theorem is a statement that can be proven.

THEOREM 2.1 CONGRUENCE OF SEGMENTS

Segment congruence is reflexive, symmetric, and transitive.

Reflexive	For any segment AB, __$\overline{AB} \cong \overline{AB}$__.
Symmetric	If $\overline{AB} \cong \overline{CD}$, then __$\overline{CD} \cong \overline{AB}$__.
Transitive	If $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$, then __$\overline{AB} \cong \overline{EF}$__.

THEOREM 2.2 CONGRUENCE OF ANGLES

Angle congruence is reflexive, symmetric, and transitive.

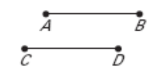
Reflexive	For any angle A, __$\angle A \cong \angle A$__.
Symmetric	If $\angle A \cong \angle B$, then __$\angle B \cong \angle A$__.
Transitive	If $\angle A \cong \angle B$ and $\angle B \cong \angle C$, then __$\angle A \cong \angle C$__.

CONCEPT SUMMARY: WRITING A TWO-COLUMN PROOF

Proof of the Symmetric Property of Segment Congruence

Given $\overline{AB} \cong \overline{CD}$

Prove $\overline{CD} \cong \overline{AB}$



Copy or draw diagrams and label information to help develop proofs.

Statements	Reasons
1. $\overline{AB} \cong \overline{CD}$	1. Given
2. $AB = CD$	2. Definition of congruent segments
3. $CD = AB$	3. Symmetric Property of Equality
4. $\overline{CD} \cong \overline{AB}$	4. Definition of congruent segments

The number of statements will vary.

Remember to give a reason for the last statement.

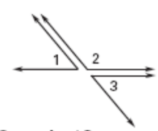
Definitions, postulates, or proven theorems that allow you to state the corresponding statement.

THEOREM 2.3 RIGHT ANGLES CONGRUENCE THEOREM

All right angles are __congruent__.

THEOREM 2.4 CONGRUENT SUPPLEMENTS THEOREM

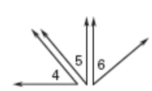
If two angles are supplementary to the same angle (or to congruent angles), then they are __congruent__.



If $\angle 1$ and $\angle 2$ are supplementary and $\angle 3$ and $\angle 2$ are supplementary, then __$\angle 1 \cong \angle 3$__.

THEOREM 2.5 CONGRUENT COMPLEMENTS THEOREM

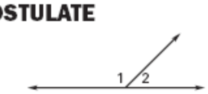
If two angles are complementary to the same angle (or to congruent angles), then they are __congruent__.



If $\angle 4$ and $\angle 5$ are complementary and $\angle 6$ and $\angle 5$ are complementary, then __$\angle 4 \cong \angle 6$__.

POSTULATE 12 LINEAR PAIR POSTULATE

If two angles form a linear pair, then they are __supplementary__.



$\angle 1$ and $\angle 2$ form a linear pair, so $\angle 1$ and $\angle 2$ are supplementary and $m\angle 1 + m\angle 2 =$ __$180°$__.

THEOREM 2.6 VERTICAL ANGLES CONGRUENCE THEOREM

Vertical angles are __congruent__.