Geometry
Big Ideas Chapter 2 Study Guide - Reasoning and Proofs

Definitions

Conditional Statement: a statement that can be written "if p, then q" or $p \rightarrow q$.

Hypothesis: the p of a conditional statement following the word "if".

Conclusion: the q of a conditional statement following the word "then".

Converse: a statement formed by exchanging the hypothesis and conclusion. "if q, then p."

Inverse: a statement formed by negating the hypothesis and the conclusion. "if not p, then not q."

Contrapositive: a statement formed by both exchanging and negating the hypothesis and conclusion. "if not q, then not p."

Biconditional Statement: a statement that can be written "p if and only if q" or $p \leftrightarrow q$.

Conjecture: a statement you believe to be true based on observations.

Inductive Reasoning: the process of finding a pattern based on your observations.

Deductive Reasoning: the process of using logic to draw conclusions from given facts, definitions, and properties.

Counterexample: one example in which a conjecture is not true.

Example Conjecture: For all positive numbers $n, \frac{1}{n} \leq n$.

Counterexample: Let $n = \frac{1}{2}$. Since $\frac{1}{n} = \frac{1}{\frac{1}{2}} = 2$ and $2 \not\leq \frac{1}{2}$, the conjecture is false.

Postulate: A statement taken as true, but cannot be proven.

Theorem: A statement that can be proven.

Theorems and Postulates

Two Point Postulate: Through any two points, there exists exactly one line.

Line-Point Postulate: A line contains at least two points.

Line Intersection Postulate: If two lines intersect, then their intersection is exactly one point.

Three Point Postulate: Through any three noncollinear points, there exists exactly one plane.

Plane-Point Postulate: A plane contains at least three noncollinear points.

Plane-Line Postulate: If two points lie in a plane, then the line containing them lies in the plane.

Plane Intersection Postulate: If two planes intersect, then their intersection is a line.

Linear Pair Postulate: If two angles form a linear pair, then they are supplementary.

Right Angles Congruence Theorem: All right angles are congruent.

Congruent Supplements Theorem: If two angles are supplementary to the same angle, then the two angles are congruent.

Congruent Complements Theorem: If two angles are complementary to the same angle, then the two angles are congruent.

Vertical Angles Congruence Theorem: Vertical angles are congruent.

Properties of Equality

Addition Property of Equality: If a = b, then a + c = b + c.

Subtraction Property of Equality: If a = b, then a - c = b - c.

Multiplication Property of Equality: If a = b, then a * c = b * c.

Division Property of Equality: If a = b and c ≠ 0, then a / c = b / c.

Substitution Property of Equality: If a = b, then a can be substituted for b.

Distributive Property of Equality: $a(b+c) = ab + ac$ for all real numbers a, b, and c. Likewise, $a(b-c) = ab - ac$ for all real numbers a, b, and c.

Reflexive Property of Equality: a = a

Symmetric Property of Equality: If a = b, then b = a.

Transitive Property of Equality: If a = b and b = c, then a = c.

Properties of Congruence

Reflexive Property of Congruence: For any segment AB, $\overline{AB} \cong \overline{AB}$.

Symmetric Property of Congruence: If $\angle A \cong \angle B$, then $\angle B \cong \angle A$.

Transitive Property of Congruence: If $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$, then $\overline{AB} \cong \overline{EF}$.

Geometry
Big Ideas Chapter 2 Practice Problems
Show all work!!! Use another piece of paper if necessary.

Name _____
Date _____ Period _____

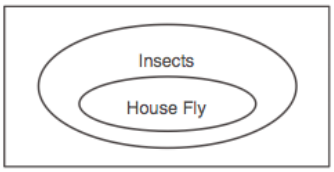
Make a conjecture about each pattern, then write or draw the next two terms.

1) A, E, F, H, I, ...

2)

3) Rewrite this quote as a conditional: "Never put off till tomorrow what you can do today." Thomas Jefferson.

4) Write a conditional statement for the information in this Venn diagram.



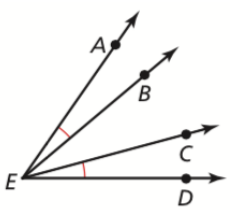
5) Draw a Venn diagram to represent the statement:
" $p \rightarrow r$ and $q \rightarrow r$ are true, but $p \rightarrow q$ is not true"

6) Draw a conclusion from this given information:
" If two segments intersect, then they are not parallel. If two segments are not parallel, then they could be perpendicular.
$\overline{EF}$ and $\overline{MN}$ intersect."

7) Determine whether a true biconditional can be written for this statement or give a counter example
" If the lamp is unplugged, then the bulb does not shine."

8) Write the definition as a biconditional. "A cube is a three-dimensional solid with six square faces."

9) On a separate piece of paper, prove the following. Use the diagram.
Given: $\angle AEB \cong \angle DEC$
Prove: $\angle AEC \cong \angle DEB$



10) Copy these angles and make them adjacent.