<name>
Class: Honors Geometry
Date: 9/14/06
Topic: Lesson 2-4 (Reasoning in Algebra)

Geometric proof premises	1. Defns & Undefn'd terms (points for instance) 2. Postulates 3. Prev accepted or proven geom. conjectures (theorems) 4. Props of algebra (equality & congruence)
Be a lawyer	Doing a proof is like being a lawyer in court Convince jury Justify every point with facts and evidence
Math proof evidence	Geometric proof premises (see top of notes page) Must have these down pat! Jury won't believe us if we keep saying "wait; let me look that up…" *****KEEP LISTS UP-TO-DATE…MEMORIZE*****
Properties of equality	***** MUST KNOW THESE ***** Addition: If $a = b$, then $a + c = b + c$ Subtraction: If $a = b$, then $a - c = b - c$ Multiplication: If $a = b$, then $a \cdot c = b \cdot c$ Division: If $a = b$ and $c \neq 0$, then $\frac{a}{c} = \frac{b}{c}$ Reflexive: $a = a$ Symmetric: If $a = b$, then $b = a$ Transitive: If $a = b$ and $b = c$, then $a = c$ Substitution: If $a = b$, then b can be replaced by a in any expression
Properties of algebra	Any known property of algebra is true Distributive Property: $a(b + c) = ab + ac$
Extremely Important	*****KEEP LISTS UP-TO-DATE…MEMORIZE*****

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How to justify a step in algebra proof

Consider what chg'd from prior step:

1. if chgs all on 1 side:
   - Simplified
   - Substitution Prop of Equality
   - Distributive Prop of Algebra
2. if chgs on both sides:
   - ID operation performed
   - +, -, ×, ÷
   - Will tell what Prop of Equality was used

Example

Pg 90, Example #1

Solve for x and justify each step.

Given: $m\angle AOC = 139$

$m\angle AOB + m\angle BOC = m\angle AOC$	Angle Addition Postulate
x + 2x + 10 = 139	Substitution Prop (**on 1 side**)
3x + 10 = 139	Simplify (**all on 1 side**)
3x = 129	Subtr Prop of Eq (**-10 ea side**)
x = 43	Div Prop of Eq (**÷3 ea side**)

Example

Pg 90, Check Understanding #1

Fill in each missing reason.

Given: $\overrightarrow{LM}$ bisects $\angle KLN$

$\overrightarrow{LM}$ bisects $\angle KLN$	Given
$m\angle MLN = m\angle KLM$	Definition of angle bisector
4x = 2x + 40	Substitution (**all on 1 side**)
2x = 40	Subtr Prop of Eq (**-2x ea side**)
x = 20	Div Prop of Eq (**÷2 ea side**)

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Example

Example – not in book – Solve for x and justify each step.
Given: 5x – 12 = 32 + x

5x – 12 = 32 + x	Given
5x = 44 + x	Add Prop of Eq (**+12 ea side**)
4x = 44	Subtr Prop of Eq (**-x ea side**)
x = 11	Div Prop of Eq (**÷4 ea side**)

Properties of congruence

Reflexive: $\overline{AB} \cong \overline{AB}$
$\angle A \cong \angle A$

Symmetric: 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: 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 $\angle A \cong \angle C$

Example

Pg 91, Check Understanding #3
Name the property of equality or congruence illustrated.

a) $\overline{XY} \cong \overline{XY}$ **Reflexive Property of Congruence**

b) If $m\angle A = 45$ and $45 = m\angle B$, then $m\angle A = m\angle B$
Transitive Property of Congruence or Substitution Prop of Congruence

Example

Example – not in book
Name the property that justifies each statement.
a) If x = y and y + 4 = 3x, then x + 4 = 3x
Substitution Prop of Equality

b) If x + 4 = 3x, then 4 = 2x
Subtraction Prop of Equality

c) If $\angle P \cong \angle Q$ and $\angle Q \cong \angle R$ and $\angle R \cong \angle S$, then $\angle P \cong \angle S$
Transitive Prop of Congruence