Analytic Geometry February 10, 2016

Today we will use our knowledge of angle relationships and triangle theorems to write proofs.

EQ: What is a proof and what are the 3 ways to write one?

MCC9-12.G.CO.9 Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.

MCC9-12.G.CO.10 Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point

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Key Concepts

A __proof___ is a logical argument that convinces someone that a statement is true.

To write a proof, you need to write a logical sequence of __statements___ and __reasons___. Begin with what you know (__the given___) and end with what you were asked to prove.

We will write proofs 3 different ways:

1) Two Column
2) Paragraph
3) Flow

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Properties for Writing Proofs

Reflexive Property: $\overline{AB}$ $\overline{AB}$ <A <A

Symmetric Property: If $\overline{AB}$ $\overline{CD}$, then $\overline{CD}$ $\overline{AB}$

If <A <B, then <B <A

Transitive Property: If AB CD and CD EF, then AB $\overline{EF}$

If <A <B and <B <C, then <A <C

If <B <A and <B <C, then <A <C

Substitution Property: AB = 2x; BC = 3x; AC = 20

If AB + BC = AC, then 2x + 3x = 20

Examples: Use the given property to complete each statement.

1. Symmetric Property: If AB = YU, then YU = AB
2. Symmetric Property: If <H <K, then <K <H
3. Reflexive Property: <PQR <PQR
4. Substitution Property: If LM = 7 and EF + LM = NP, then EF + 7 = NP
5. Transitive Property: If <XYZ <AOB and <AOB <WYT then <XYZ <WYT .

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Other Properties used in Proofs:

* Vertical Angles are Congruent
* Linear Pairs are Supplementary
* Supplementary Angles Sum to 180°
* Complementary Angles Sum to 90°
* Angle Addition Postulate
* Right Angles measure 90°
* Right Angles are Congruent
* Triangle Angle Sum Theory

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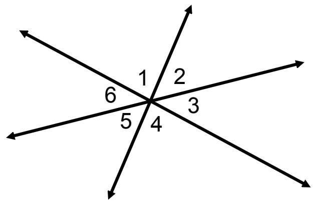
Two Column Proof

Complete the following proof by filling in the blanks.

Given: <1   <3

Prove: <6   <4



Statements	Reasons
1) <1 <3	1) Given
2) <3 <6	2) Vertical Angles Theorem
3) <1 <6	3) Transitive Property
4) <1 <4	4) Vertical Angles Theorem
5) <6 <4	5) Transitive Property

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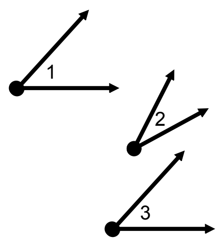
Paragraph Proof

Complete the following proof by filling in the blanks.

Given: <1 and <2 are complementary
<3 and <2 are complementary

Prove: <1   <3



<1 and <2 are complementary and <3 and <2 are complementary because it is given. By the definition of complementary angles m<1 + m<2 = 90^o and m<3 + m<2 = 90^o. Then m<1 + m<2 = m<3 + m<2 by the Transitive Property. Subtract m<2 from each side. By the Subtraction Property, you get m<1 = m<3. Angles with the same measure are congruent, so <1   <3.

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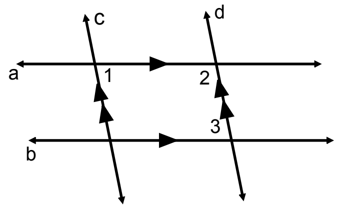
You Try!

Complete the proof by filling in the blanks.

Given: a||b, c||d

Prove: <1 <3



Statements	Reasons
1) a||b	1) Given
2) <3 and <2 are supplementary	2) Same-Side Interior Angles are Supplementary
3) c||d	3) Given
4) <1 and <2 are supplementary	4) Same-Side Interior Angles are Supplementary
5) <1 <3	5) If 2 angles are supplementary to the same angle, then they are congruent.

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Homework: Worksheet

On-line and textbook help references: p. 44

- http://www.ixl.com/math/geometry/proofs-involving-parallel-lines
- https://www.khanacademy.org/math/geometry/geometry-worked-examples/v/ca-geometry-more-proofs
- http://www.regentsprep.org/Regents/math/geometry/GP11/LsimilarProof.htm

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