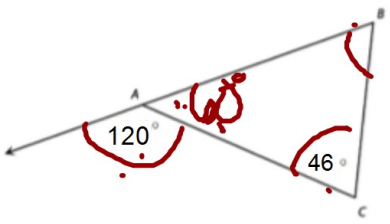
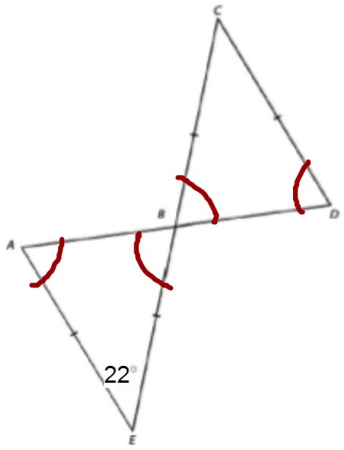
Warm-Up

#1 What is the measure of $\angle B$?



a. 67°
b. 74°
c. 113°
d. 98°

#2 What is the measure of $\angle C$?



a. 42°
b. 22°
c. 36°
d. 72°

Video Questions!

In your own words...(in your journals!)

1. What is a two-column proof essentially?

2. How do you <u>always</u> start a two-column proof? Be specific!

3. What can you do to help organize your thoughts while doing a two-column proofs?

https://www.youtube.com/watch?v=4mp9-O2G8hE

Theorem 2.2 *Properties of Angle Congruence*

Angle congruence is reflexive, symmetric, and transitive. Here are some examples:

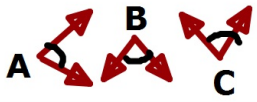
Reflexive: For any angle A, $\angle A \cong \angle A$

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 $\angle A \cong \angle C$

Given: $\angle A \cong \angle B, \angle B \cong \angle C$

Prove: $\angle A \cong \angle C$



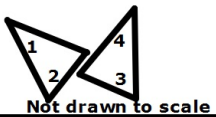
A Statements	B Reasons
1. $\angle A \cong \angle B, \angle B \cong \angle C$	1) Given
2. $m\angle A \cong m\angle B$	2) Definition of congruent angles
3. $m\angle B \cong m\angle C$	3) Definition of congruent angles
4. $m\angle A \cong m\angle C$	4) Transitive
5. $\angle A \cong \angle C$	5) Definition of congruent angles

Division
Multiplication
Subtraction
Addition
Reflexive
Symmetric

Congruent Supplements Theorem
Definition of supplementary angles
Linear Pair Postulate
,
Vertical Angles Theorem
Definition of right angle
Distributive Substitution

Given: $m\angle 3 = 40, m\angle 1 \cong m\angle 2, m\angle 2 \cong \angle 3$

Prove: $m\angle 1 = 40$



Not drawn to scale

A Statement	B Reason
1. $m\angle 3 = 40, m\angle 1 \cong m\angle 2, m\angle 2 \cong \angle 3$	1.) Given
2. $\angle 1 \cong \angle 3$	2.) Transitive
3. $m\angle 1 \cong m\angle 3$	3.) Definition of congruent angles
4. $m\angle 1 = 40$	4.) Substitution

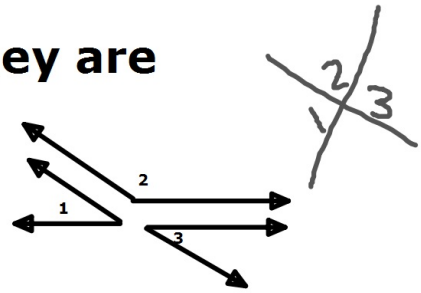
Division
Multiplication
Subtraction
Addition
Reflexive
Symmetric

Congruent Supplements Theorem
Definition of supplementary angles
Linear Pair Postulate
Definition of congruent angles
Vertical Angles Theorem
Definition of right angle
Distributive

Theorem 2.4

Congruent Supplements Theorem

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



If $m\angle 1 + m\angle 2 = 180$ and $m\angle 2 + m\angle = 180$, then $\angle 1 \cong \angle 3$.

Proof is on the next page

Given: $\angle 1$ and $\angle 2$ are supplements,

$\angle 3$ and $\angle 4$ are supplements, $\angle 1 \cong \angle 4$

Prove: $\angle 2 \cong \angle 3$

A Statements	B Reasons
1. $\angle 1$ and $\angle 2$ are supplements, $\angle 3$ and $\angle 4$ are supplements, $\angle 1 \cong \angle 4$	1) Given
2. $m\angle 1 + \angle 2 = 180$ $m\angle 3 + m\angle 4 = 180$	2) Definition of supplementary angles
3. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	3.) Substitution
4. $m\angle 1 = m\angle 4$	4) Definition of congruent angles
5. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 1$	5) Substitution
6. $m\angle 2 = m\angle 3$	6.) Subtraction
7. $\angle 2 \cong \angle 3$	7) Definition of congruent angles

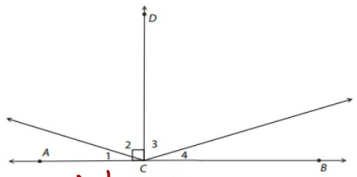
Division
Multiplication
Addition
Reflexive
Transitive
Symmetric

Congruent Supplements Theorem
Linear Pair Postulate
Definition of congruent angles
Definition of right angle
Vertical Angles Theorem
Distributive

Example 1

Prove the theorem that angles complementary to congruent angles are congruent using the given information.

In the following figure, prove that $\angle 1$ is congruent to $\angle 4$, given that $\overline{AC}$ is perpendicular to $\overline{CD}$ and $\angle 2$ is congruent to $\angle 3$.

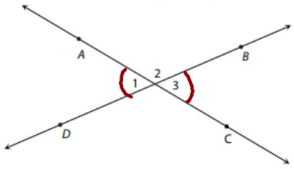


Statement	reason
1) $\overline{AC} \perp \overline{DC}$ $\angle 2 \cong \angle 3$	1) Given
2) $\angle 1 + \angle 2 = 90°$ $\angle 3 + \angle 4 = 90°$	2) def. of $\perp$ lines.
3) $m\angle 2 = m\angle 3$	3) def of $\cong \angle$'s
4) $\angle 1 + \angle 2 = \angle 3 + \angle 4$	4) Substitution
5) $\angle 1 + \angle 2 = \angle 2 + \angle 4$	5) Substitution
6) $\angle 1 = \angle 4$	6) Subtraction
7) $\angle 1 \cong \angle 4$	7) Def of $\cong \angle$s

Example 2

Prove that vertical angles are congruent given a pair of intersecting lines, $\overline{AC}$ and $\overline{BD}$.

1. Draw a diagram and label three adjacent angles.



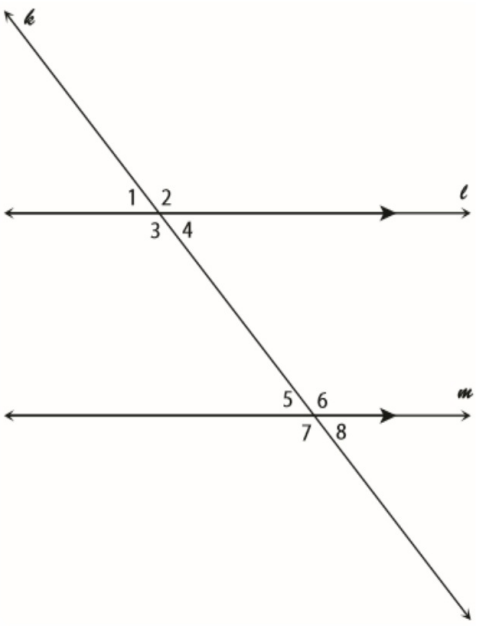
Statements	reasons
1) $\overline{AC}$ intersects $\overline{BD}$	1) Given
2) $\angle 1+\angle 2=180°$, $\angle 2+\angle 3=180°$	2) def. of a Linear pair
3) $\angle 1+\angle 2=\angle 2+\angle 3$	3) Substitution
4) $\angle 1=\angle 3$	4) Subtraction
5) $\angle 1\cong\angle 3$	5) def. of $\cong$ $\angle$'s

Example 3

Given two parallel lines and a transversal, prove that alternate interior angles are congruent. In the following diagram, lines ℓ and m are parallel. Line k is the transversal.

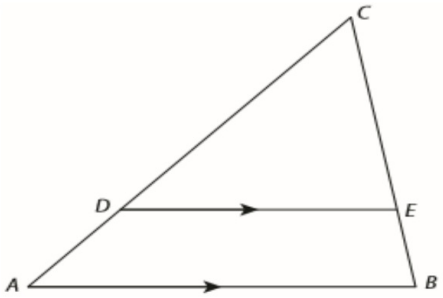
Given: $\ell \parallel m$, and line k is a transversal.

Prove: $\angle 3\cong\angle 6$



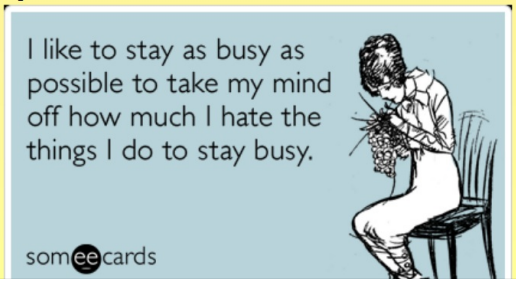
Example 4

Given $\overline{AB} \| \overline{DE}$, prove that $\triangle ABC \sim \triangle DEC$.



Independent Practice/HW

- Go to my website: msbradymath.weebly.com
- Go to math 2 and scroll down to Unit 4.
- Under the google doc there is a link next to Classwork 4/16
- You may work with a partner. Turn in your individual paper.
  - Select one Complementary angles
  - One Supplementary Angles
  - Vertical angles
  - 2 Parallel Lines
  - One Converse of parallel lines
  - ~~One Triangle Angle Sum~~
  - ~~Triangle Exterior Angle Theorem~~
  - ~~2 Congruent Triangles~~
- You will fill out the proofs online and then once you check it and it is correct, write the proof on your paper.
- What you didn't finish in class will be homework due Tuesday!



https://mathbitsnotebook.com/Geometry/SegmentsAnglesTriangles/SATProofPractice.html

https://feromax.com/cgi-bin/ProveIt.pl