Name: ______________________________ Hour: ________

Unit 3 Proofs!!!!!- Notes!!!

There are 3 main types of proof:

a).

b).

c).

Proof is a form of ____________________ reasoning.

In this class we will be using __________ and __________ skeleton and blank proofs.

What postulates or theorems do we already know about segments?

Midpoint Theorem : If B is the midpoint of AC, then $\overline{AB} \cong \overline{BC}$.

Segment Addition : If B is between collinear points A and C, then AB + BC=AC.

Angle Addition: If P is in the interior of <ABC, then <ABP+<PBC=<ABC.

NEW postulates or theorems about segments

Reflexive: $\overline{BC} \cong \overline{BC}$

Symmetric: If $\overline{BC} \cong \overline{AB}$ then, $\overline{AB} \cong \overline{BC}$

Transitive: If $\overline{XY} \cong \overline{AB}$ and $\overline{AB} \cong \overline{CD}$, then $\overline{XY} \cong \overline{CD}$

2.5

Congruence of angles is reflexive, symmetric, and transitive.

Reflexive Property $\angle 1 \cong \angle 1$ x=x

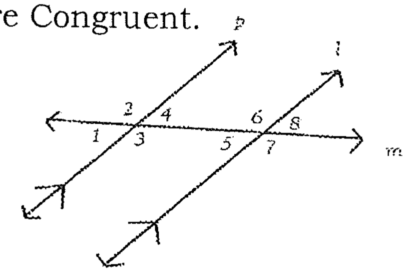
Symmetric Property If $\angle 1 \cong \angle 2$, then $\angle 2 \cong \angle 1$. x=y then y=x

Transitive Property If $\angle 1 \cong \angle 2$, and $\angle 2 \cong \angle 3$, then $\angle 1 \cong \angle 3$.

x=y and y=z then x=z
also called "substitution"

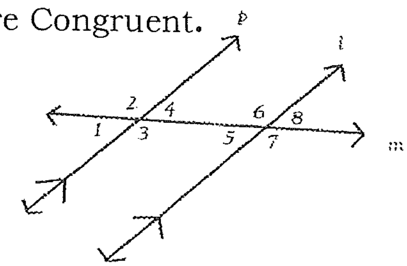
Proving Angle Relationships: Notes

Use Alternate Exterior Angles to prove **Alternate Interior Angles** are Congruent.
Given: $p // l$ *and m is a transversal of p and l*
Prove: $< 4 \cong < 5$



1. $p // l$ *and m is a transversal of p and l*	1. ____________
2. $< 1 \cong < 8$	2. ____________
3. $< 1 \cong < 4, < 8 \cong < 5$	3. ____________
4. ____________	4. Substitution
5. ____________	5. ____________

Use Alternate Exterior Angles to prove **Corresponding Angles** are Congruent.
Given: $p // l$ *and m is a transversal of p and l*
Prove: $< 2 \cong < 6$

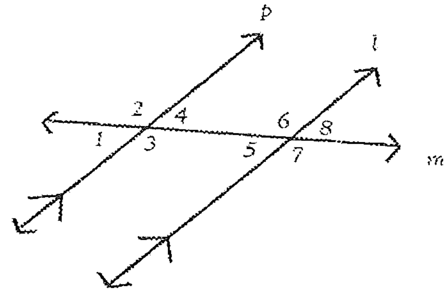


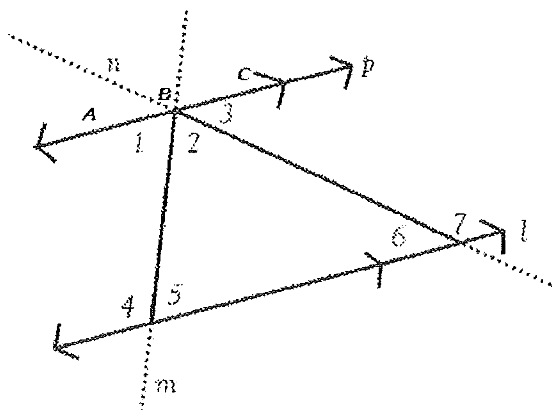
1. $p // l$ *and m is a transversal of p and l* — 1. ____________
2. $< 2 \cong < 7$ — 2. ____________
3. $< 7 \cong < 6$ — 3. ____________
4. ____________ — 4. ____________

Prove **Consecutive Interior Angles** are supplementary.

Given: $p//l$ *and m is a transversal of p and l*

Prove: <3 *and* <5 *are supplementary*





Prove the **Triangle Sum Theorem**

Given: $p//l$ *and m is a transversal of p and l*

Prove: $m<5+m<2+m<6=180$

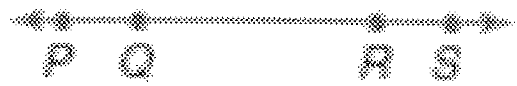
When writing a proof always

1. write down the given statements
2. write what you can derive from the given
3. write down what you know from the picture
4. ALWAYS end with what you wanted to prove

***** Before you move on to the next step, remember to justify each statement you make.

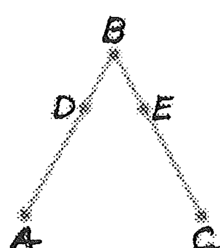
Prove the following examples:

Example 1: If $\overline{PR} \cong \overline{QS}$, then $\overline{PQ} \cong \overline{RS}$.



Statements	Reasons
1. $\overline{PR} \cong \overline{QS}$	1. Given
2. PR = PQ + QR QS = QR + RS	2. Segment Addition
3. PQ + QR = QR + RS	3. ______________________
4. ______________________	4. Subtraction.

Example 2: Given: $\overline{AD} \cong \overline{CE}$, $\overline{DB} \cong \overline{EB}$
Prove: $\overline{AB} \cong \overline{CB}$



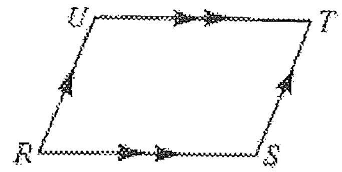
Statements	Reasons
1. ______________________	1. ______________________
2. . ______________________	2. Segment Addition
3. CB= AD+DB, AB=AD+DB	3. Substitution
4. ______________________	4. ______________________

ex. 3

Given: $\overline{RU} \parallel \overline{ST}$

$\overline{RS} \parallel \overline{UT}$

Prove: $\angle R = \angle T$



Example 4.) Angles!

Theorem: If two angles are supplementary to the same angle then they are congruent.

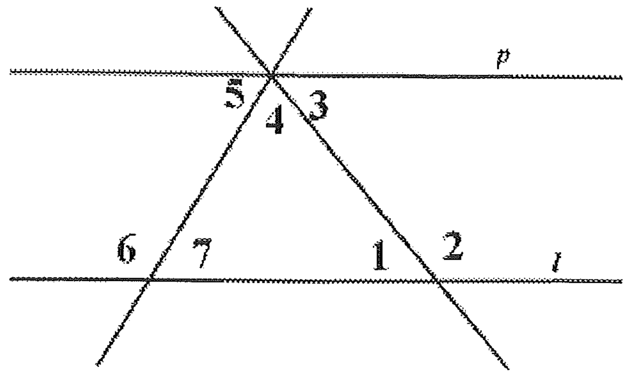
Given: ∠3 and ∠4 are supplementary; ∠3 and ∠5 are supplementary
Prove: ∠4 ≅ ∠5

1. <3 and <4 are Supplementary <3 and <5 are supplementary	1. Given
2.	2. def. of supplementary
3. <3 +<4=<3+<5	3.
4.	4. Subtraction

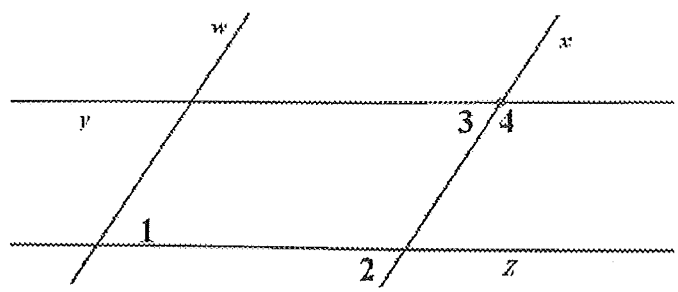
Name: ______________________________ Date: __________ Hr: __________

Parallels Cut by Transversals Proofs HW

1. Given: <7≅<1 and l // p
Prove: <5≅<3



1. <7≅<1 and l // p	1. Given
2. <7≅<5, <3≅<1	2. ______________
3. ______________	3. Substitution
4. <5≅<3	4. ______________



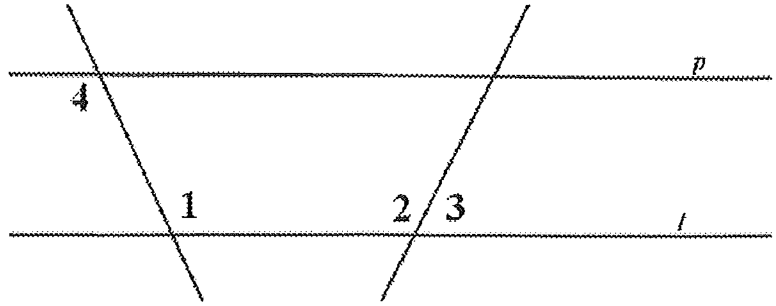
2. Given: w // x and y // z
Prove: <1 and <4 are supplementary

1. w // x and y // z	1. ______________
2. <1≅<2	2. ______________
3. <2≅<3	3. ______________
4. <3 + <4 = 180	4. ______________
5. <2 + <4 = 180	5. ______________
6. <1 + <4 = 180	6. ______________
7. <1 and <4 are supplementary	7. ______________

3. Given: <1≅<2 and l // p

Prove: <3 + <4 = 180°

(Hint: you should have 5 steps)



Geo Section 3.5
Proving Lines Parallel Notes

Name________________________________

Date________

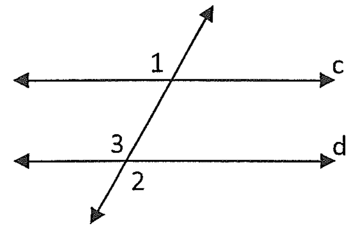
Corresponding Angles Converse Postulate:

- If corresponding angles are ________________ then the lines are ____________________.

Proof of the Alternate Exterior Angles Converse Theorem:

- If alternate exterior angles are ________________ then the lines are ____________________..

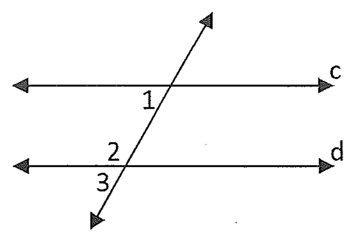
Given: $\angle 1 \cong \angle 2$
Prove: $c \parallel d$



Proof of the Consecutive Interior Angles Converse Theorem:

- If consecutive interior angles are ________________ then the lines are ____________________.

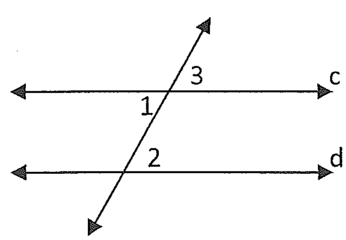
Given: $\angle 1$ & $\angle 2$ *are supplementary*
Prove: $c \parallel d$



Proof of the Alternate Interior Angles Converse Theorem:

- If alternate interior angles are ________________ then the lines are ____________________.

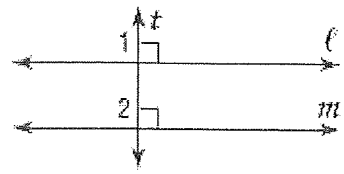
Given: $\angle 1 \cong \angle 2$
Prove: $c \parallel d$



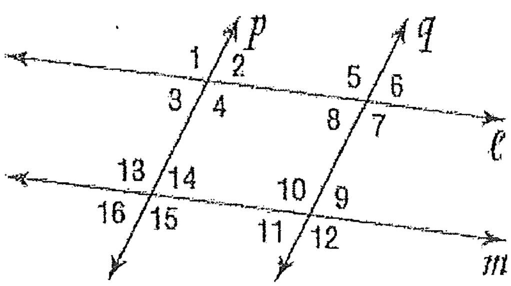
Proof of:

- If two lines are ______________________ to the same line, then they are _________________.

Given: $l \perp t$ and $m \perp t$
Prove: $l \parallel m$



Example1: Determine which lines, if any, are parallel. State which postulate or theorem that justifies your answer.



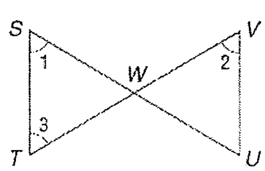
a) $\angle 16 \cong \angle 3$

b) $m\angle 14 + m\angle 10 = 180$

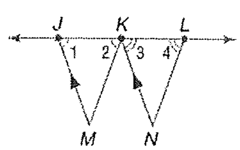
C.) <2 = <8

d.) <11 = <8

23. Given: $\angle 2 \cong \angle 1$
$\angle 1 \cong \angle 3$
Prove: $\overline{ST} \parallel \overline{UV}$

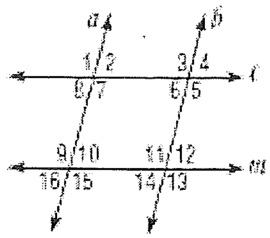


24. Given: $\overline{JM} \parallel \overline{KN}$
$\angle 1 \cong \angle 2$
$\angle 3 \cong \angle 4$
Prove: $\overline{KM} \parallel \overline{LN}$



Proving Lines Parallel HW

Given the following information, determine which lines, if any, are parallel. State the postulate or theorem that justifies your answer.



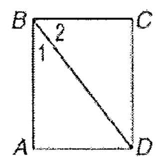
1. $\angle 3 \cong \angle 7$

2. $\angle 9 \cong \angle 11$

3. $\angle 2 \cong \angle 16$

4. $m\angle 5 + m\angle 12 = 180$

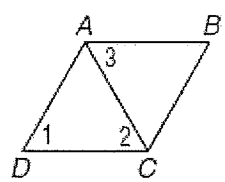
5. Given: $\angle 1$ and $\angle 2$ are complementary.
$\overline{BC} \perp \overline{CD}$
Prove: $\overline{BA} \parallel \overline{CD}$
Proof:



Statements	Reasons

6. **Given:** $\angle 1 \cong \angle 2$, $\angle 1 \cong \angle 3$

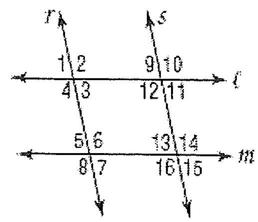
Prove: $\overline{AB} \parallel \overline{DC}$



7. **For Exercises 1–6, complete the proof.**

Given: $\angle 1 \cong \angle 5$, $\angle 15 \cong \angle 5$

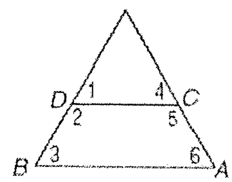
Prove: $\ell \parallel m$, $r \parallel s$



Statements	Reasons
1. $\angle 15 \cong \angle 5$	1. ________
2. $\angle 13 \cong \angle 15$	2. ________
3. $\angle 5 \cong \angle 13$	3. ________
4. $r \parallel s$	4. ________
5. ________	5. Given
6. ________	6. If corr ∡ are ≅, then lines ∥.

8. **Given:** $\angle 2$ and $\angle 3$ are supplementary.

Prove: $\overline{AB} \parallel \overline{CD}$



1.________________ 1. Given

2. ________________ 2. ________________

YEP only 2 steps!

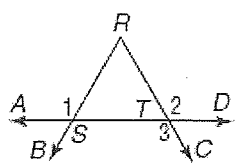
Other Proof Review

9. **Example** Write a two-column proof.

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

Prove: $m\angle 1 = m\angle 3$

Proof:

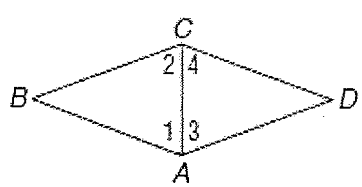


10. **Given:** $\overline{AC}$ bisects $\angle BAD$.

$\overline{AC}$ bisects $\angle BCD$.

$\angle 1 \cong \angle 2$

Prove: $\angle 3 \cong \angle 4$



Geometry

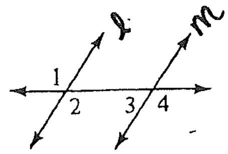
Practice 2.8

Name___________________________

Write a two-column proof for each of the following.

(1) *Given:* $\angle 1 = \angle 4$

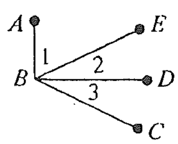
Prove: $\angle 3$ and $\angle 2$ are supplements.



(2) *Given:* $\overline{AB} \perp \overline{BD}$

$\overrightarrow{BD}$ bisects $\angle EBC$.

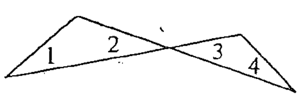
Prove: $\angle 1$ and $\angle 3$ are complements.



(3) *Given:* $\angle 1 = \angle 2$

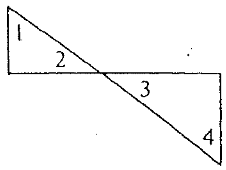
$\angle 3 = \angle 4$

Prove: $\angle 1 = \angle 4$



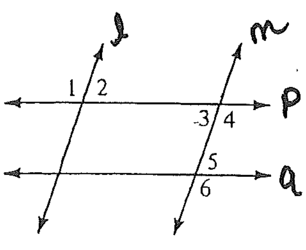
(4) *Given:* $\angle 1$ and $\angle 2$ are complements.
$\angle 3$ and $\angle 4$ are complements.

Prove: $\angle 1 = \angle 4$



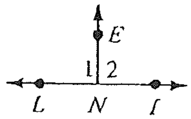
(5). *Given:* $\angle 4$ and $\angle 5$ are supplements.
$\angle 2 = \angle 3$

Prove: $\angle 2 = \angle 5$



(6) *Given:* $\angle 1 = \angle 2$

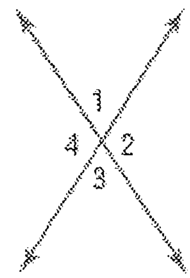
Prove: $\overleftrightarrow{LI} \perp \overleftrightarrow{NE}$



Name: ______________________ Date:__________________ Hour: ______________________

In-Class Proof Practice #1

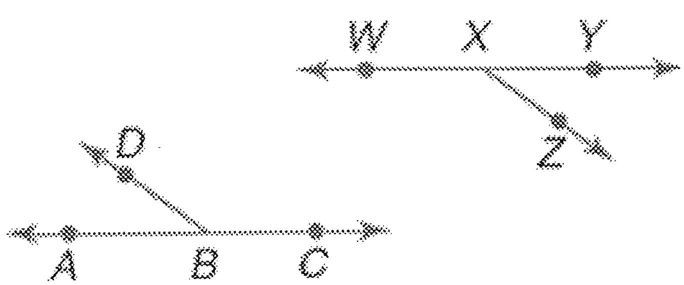
1. In the figure, ∠1 and ∠2 form a linear pair and ∠2 and ∠3 form a linear pair. Prove that ∠1 and ∠3 are congruent.



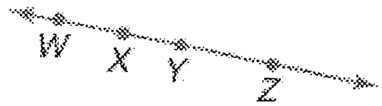
Given: ∠1 and ∠2 form a linear pair.
∠2 and ∠3 form a linear pair.

Prove: $\angle 1 \cong \angle 3$

2. **Given:** $\angle ABD \cong \angle YXZ$
Prove: $\angle CBD \cong \angle WXZ$



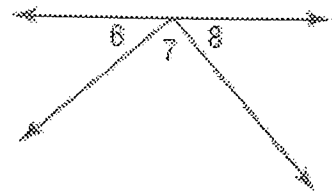
3. **Given:** X is the midpoint of $\overline{WY}$.
Prove: $WX + YZ = XZ$



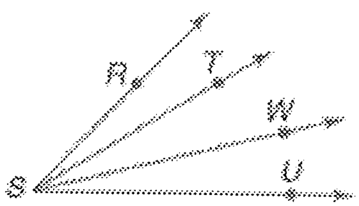
Name: ____________________ Date: ___________________ Hour: __________________________

In-Class Proof Practice #2

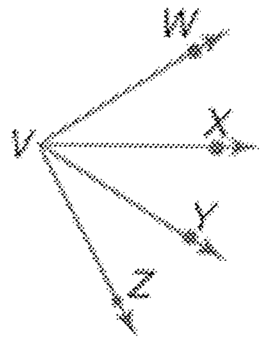
Ex 5.) Prove: If <6 and <8 are complementary, the <7 is a right angle.



Ex 6.) **Given:** $m\angle RSW = m\angle TSU$
Prove: $m\angle RST = m\angle WSU$



Ex. 7) **Given:** $\overrightarrow{VX}$ bisects $\angle WVY$.
$\overrightarrow{VY}$ bisects $\angle XVZ$.
Prove: $\angle WVX \cong \angle YVZ$



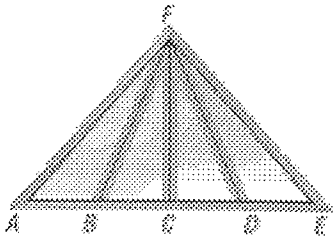
Ex.8) **PROOF** Write a two-column proof.
Given: $\angle 1$ and $\angle 2$ form a linear pair
$m\angle 2 = 2(m\angle 1)$
Prove: $m\angle 1 = 60$

Name: ______________________ Date: ________________ Hour: ______________

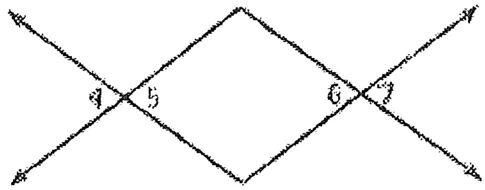
PROOF HOMEWORK #2

1. If $AB = BC$, then $AC = 2BC$.

2. **DESIGN** The front of a building has a triangular window. If $\overline{AB} \cong \overline{DE}$ and C is the midpoint of $\overline{BD}$, prove that $\overline{AC} \cong \overline{CE}$.



3. Given: $\angle 5 \cong \angle 6$
Prove: $\angle 4 \cong \angle 7$



4. **LIGHTING** In the light fixture, $\overline{AB} \cong \overline{EF}$ and $\overline{BC} \cong \overline{DE}$. Prove that $\overline{AC} \cong \overline{DF}$.