Proving Lines Parallel Notes

Name______________________________

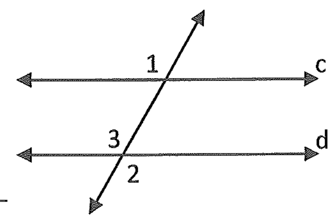
Corresponding Angles Converse Postulate:

- 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: $c \parallel d$



1. ________________ 1. __________________

2. <3≅<2 2. ____________________________

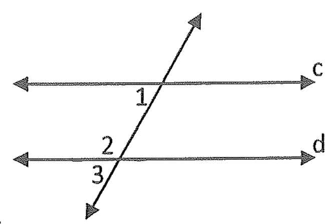
3. ________________ 3. ____________________________

4. $c \parallel d$ 4. ____________________________

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: $c \parallel d$



1. ________________ 1. __________________

2. ________________ 2. ____________________________

3. $< 2 + < 3 = 180$ 3. ____________________________

4. ________________ 4. ____________________________

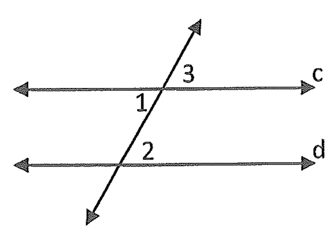
5. <1 ≅ <3 5. Subtraction

6. $c \parallel d$ 6. ____________________________

Proof of the Alternate Interior Angles Converse Theorem:

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

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



1. ________________ 1. __________________

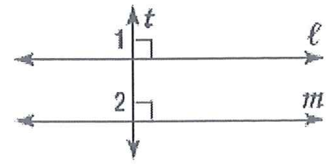
2. ________________ 2. ____________________________

3. ________________ 3. ____________________________

4. $c \parallel d$ 4. ____________________________

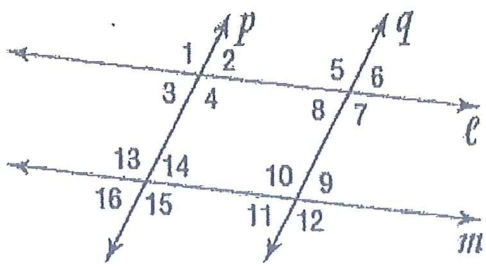
- If two lines are ______________ to the same line, then they are ______________.

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



1. ______________	1. ______________
2. ______________ ______________	2. Definition of Perpendicular
3. ______________	3. ______________
4. $l \parallel m$	4. ______________

Example 1: Determine which lines, if any, are parallel. State which postulate or theorem that justifies your answer.



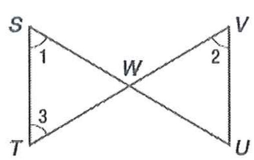
a) $\angle 16 \cong \angle 3$ ______ because ______________

b) $m\angle 14 + m\angle 10 = 180$ ______ because ______________

c.) $\angle 3 \cong \angle 6$ ______ because ______________

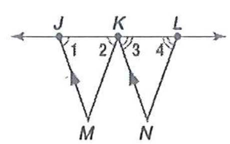
d.) $\angle 8 \cong \angle 9$ ______ because ______________

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



1. ______________	1. ______________
2. ______________	2. ______________
3. ______________	3. ______________

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



1. ______________	1. ______________
2. <1≅<3	2. ______________
3. ______________	3. Substitution
4. ______________	4. ______________

You try: use the figure from Example 1.

A.) <10+<8=180 ____//____ because ______________

B.) <10≅<15 ____//____ because ______________

C.) <15≅<4 ____//____ because ______________

D.) <13≅<12 ____//____ because ______________

Proving Lines Parallel Notes

Name Key

Corresponding Angles Converse Postulate:

- If corresponding angles are $\cong$ then the lines are parallel.

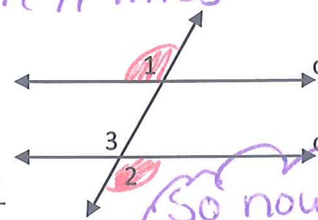
"$\cong$ corr. ∠s form // lines"

Proof of the Alternate Exterior Angles Converse Theorem:

- If alternate exterior angles are $\cong$ then the lines are parallel..

"$\cong$ alt. ext ∠s form // lines"

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



1. $\angle 1 \cong \angle 2$ — 1. Given
2. $\angle 3 \cong \angle 2$ — 2. Vertical ∠s are $\cong$
3. $\angle 1 \cong \angle 3$ — 3. Substitution
4. $c \parallel d$ — 4. $\cong$ corr. ∠s form // lines

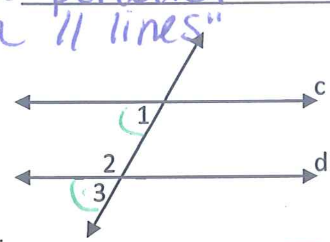
So now we know "$\cong$ alt. ext ∠s form // lines" is a theorem

Proof of the Consecutive Interior Angles Converse Theorem:

- If consecutive interior angles are suppl. then the lines are parallel.

"suppl. con. int ∠s form // lines"

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



1. $\angle 1$ and $\angle 2$ are suppl. — 1. Given
2. $\angle 1 + \angle 2 = 180$ — 2. def of suppl.
3. $\angle 2 + \angle 3 = 180$ — 3. linear pairs are suppl.
4. $\angle 1 + \angle 2 = \angle 2 + \angle 3$ — 4. Substitution
5. $\angle 1 \cong \angle 3$ — 5. subtraction
5. $c \parallel d$ — 5. $\cong$ corr. ∠s form // lines

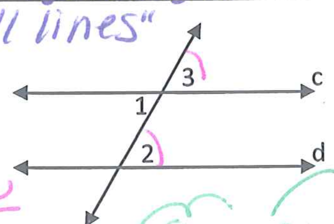
So now we know "suppl. con. int. ∠s form // lines" is a theorem.

Proof of the Alternate Interior Angles Converse Theorem:

- If alternate interior angles are $\cong$ then the lines are Parallel.

"$\cong$ alt. int. ∠s form // lines"

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

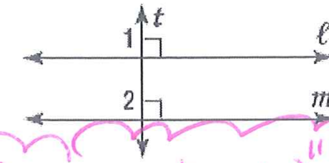


1. $\angle 1 \cong \angle 2$ — 1. Given
2. $\angle 1 \cong \angle 3$ — 2. vertical ∠s are $\cong$
3. $\angle 3 \cong \angle 2$ — 3. Substitution
4. $c \parallel d$ — 4. $\cong$ corr. ∠s form // lines

So now we know "$\cong$ alt. int. ∠s form // lines" is a theorem.

- If two lines are perpendicular to the same line, then they are parallel.
"lines ⊥ to the same line are ∥"

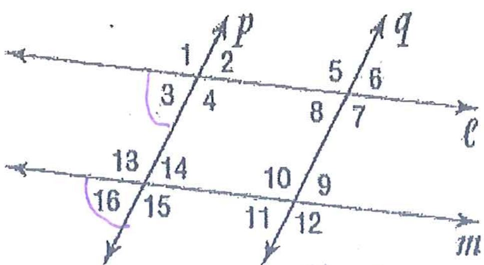
Given: $l \perp t$ and $m \perp t$
Prove: $l \parallel m$



1. $l \perp t$ and $m \perp t$ — 1. Given
2. $\angle 1 = 90°$, $\angle 2 = 90°$ — 2. Definition of Perpendicular
3. $\angle 1 \cong \angle 2$ — 3. Substitution
4. $l \parallel m$ — 4. ≅ corr. ∠s form ∥ lines

Now we know "lines ⊥ to the same lines are Parallel" is a theorem

Example 1: Determine which lines, if any, are parallel. State which postulate or theorem that justifies your answer.



a) $\angle 16 \cong \angle 3$ ℓ∥m ≅ corresponding ∠s form ∥ lines.

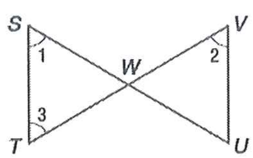
b) $m\angle 14 + m\angle 10 = 180$ p∥q because suppl. con. int ∠s form ∥ lines.

c.) ∠3 ≅ ∠6 p∥q because ≅ alt. Ext. ∠s form ∥ lines.

d.) ∠8 ≅ ∠9 ℓ∥m, because ≅ alt. int. ∠s form ∥ lines.

Example 2

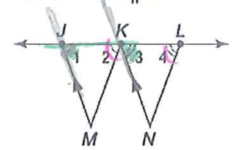
Given: $\angle 2 \cong \angle 1$
$\angle 1 \cong \angle 3$
Prove: $\overline{ST} \parallel \overline{UV}$



1. ∠2 ≅ ∠1, ∠1 ≅ ∠3 — 1. Given
2. ∠2 ≅ ∠3 — 2. Substitution
3. $\overline{ST} \parallel \overline{UV}$ — 3. ≅ alt int. ∠s form ∥ lines.

Example 3

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



1. JM∥KN, ∠1 ≅ ∠2, ∠3 ≅ ∠4 — 1. Given
2. <1≅<3 — 2. ∥ lines form ≅ corr. ∠s
3. ∠2 ≅ ∠4 — 3. Substitution
4. KM∥LN — 4. ≅ corr. ∠s form parallel lines.

A.) ∠10 + ∠8 = 180: ℓ∥m suppl. con. int ∠s form ∥ lines
B.) ∠10 ≅ ∠15: p∥q bc ≅ alt. int ∠s form ∥ lines
C.) ∠15 ≅ ∠4: ℓ∥m ≅ corr. ∠s form ∥ lines.
D.) ∠13 ≅ ∠12 p∥q ≅ alt. Ext. ∠s form ∥ lines.