Proving Lines Parallel Notes

Name________________________________

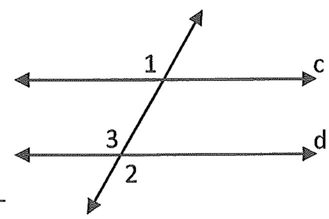
Corresponding Angles Converse Postulate:

- 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 ∥ d

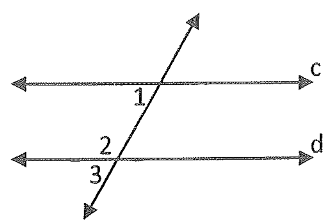


1. __________________	1. __________________
2. <3≅<2	2. ______________________________
3. __________________	3. ______________________________
4. c ∥ d	4. ______________________________

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 ∥ d

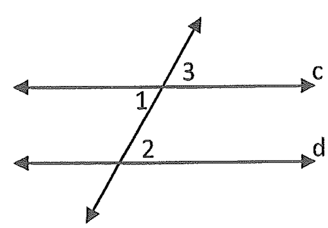


1. __________________	1. __________________
2. __________________	2. ______________________________
3. $\angle 2 + \angle 3 = 180$	3. ______________________________
4. __________________	4. ______________________________
5. <1 ≅ <3	5. Subtraction
6. c ∥ d	6. ______________________________

Proof of the Alternate Interior Angles Converse Theorem:

- If alternate interior angles are __________________ then the lines are ______________________.

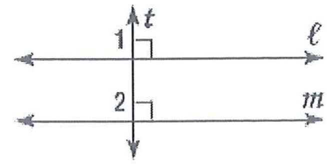
Given: $\angle 1 \cong \angle 2$
Prove: c ∥ d



1. __________________	1. __________________
2. __________________	2. ______________________________
3. __________________	3. ______________________________
4. c ∥ 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. ____________________

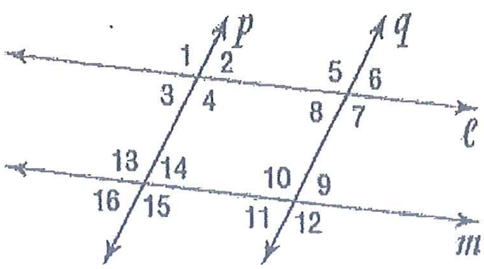
2. ____________________ 2. Definition of Perpendicular

____

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 ________

____

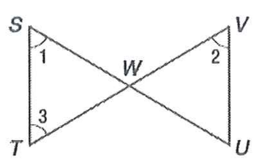
c.) <3≅<6 ________ because

____

d.) <8≅<9 ________ because

____

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

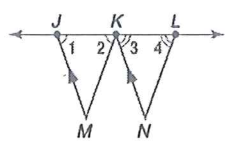


1. ____________________ 1. ____________________

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 ≅ then the lines are parallel.

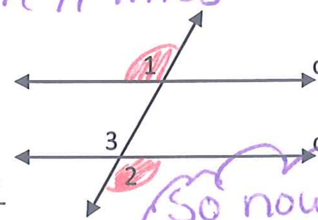
"≅ corr. ∠s form // lines"

Proof of the Alternate Exterior Angles Converse Theorem:

- If alternate exterior angles are ≅ then the lines are parallel..

"≅ alt. Ext ∠s form // lines"

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



1. ∠1 ≅ ∠2	1. Given
2. <3≅<2	2. vertical ∠s are ≅
3. ∠1 ≅ ∠3	3. Substitution
4. c ∥ d	4. ≅ corr. ∠s form // lines

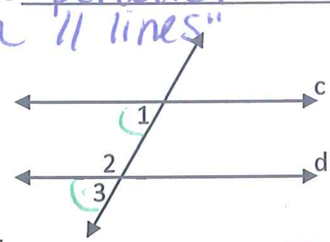
So now we know "≅ alt. ext ∠s form // lines" is a theorem

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 ∥ d



1. ∠1 and ∠2 are suppl.	1. Given
2. ∠1 + ∠2 = 180	2. def of suppl.
3. < 2+< 3 = 180	3. linear pairs are suppl.
4. ∠1 + ∠2 = ∠2 + ∠3	4. Substitution
5. ∠1 ≅ ∠3	5. Subtraction
5. c ∥ d	5. ≅ corr. ∠s form // lines

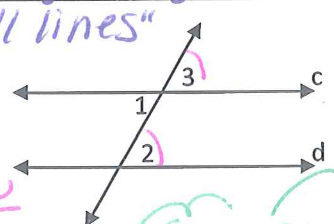
So now we know "Suppl. con. int. ∠s form // lines" is a theorem.

Proof of the Alternate Interior Angles Converse Theorem:

- If alternate interior angles are ≅ then the lines are Parallel.

"≅ alt. int. ∠s form // lines"

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

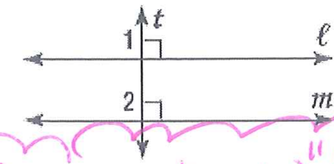


1. ∠1 ≅ ∠2	1. Given
2. ∠1 ≅ ∠3	2. vertical ∠s are ≅
3. ∠3 ≅ ∠2	3. Substitution
4. c ∥ d	4. ≅ corr. ∠s form // lines

So now we know "≅ 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 ∥"

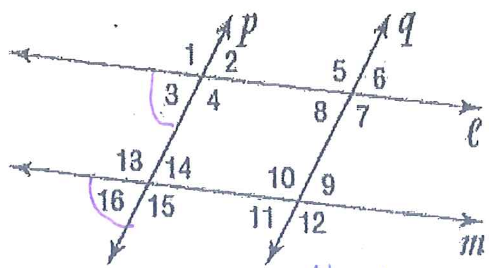
Given: $l \perp t$ and $m \perp t$
Prove: $l \parallel m$



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

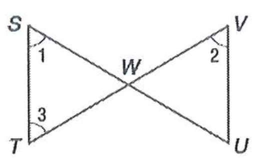
b) $m\angle 14 + m\angle 10 = 180$ p ∥ q because suppl. con. int ∠s form ∥ lines.

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

d.) $\angle 8 \cong \angle 9$ $l \parallel m$, because ≅ alt. int. ∠s form ∥ lines.

Example 2

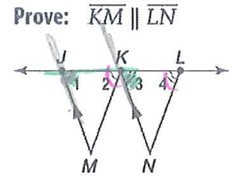
Given: $\angle 2 \cong \angle 1$
$\angle 1 \cong \angle 3$
Prove: $\overline{ST} \parallel \overline{UV}$



1. $\angle 2 \cong \angle 1$, $\angle 1 \cong \angle 3$ 1. Given
2. $\angle 2 \cong \angle 3$ 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: $l \parallel m$ suppl. con. int ∠s form ∥ lines
B.) ∠10 ≅ ∠15: p ∥ q bc ≅ alt. int ∠s form ∥ lines
C.) ∠15 ≅ ∠4: $l \parallel m$ ≅ corr. ∠s form ∥ lines.
D.) ∠13 ≅ ∠12 p ∥ q ≅ alt. Ext. ∠s form ∥ lines.