Key

Math 1
6-5 Parallel Lines Proofs Part 1

Name KEY

**LINEAR PAIR POSTULATE:** → assumed true

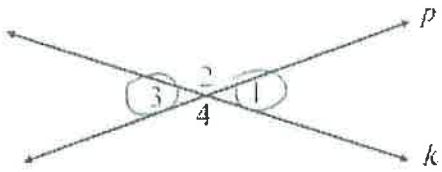
If two angles are a linear pair, then they are supplementary.

**VERTICAL ANGLE THEOREM:** → need to prove true

If two angles are vertical angles, then they are congruent.

We already know this property about vertical angles; we must now show that it is true. We cannot assume anything. We all know what happens when you assume. As you write a proof, you will make statements that tell what you know, and then you must justify each of those statements.

1. Complete the following proof:




Given: Lines $k$ and $p$ intersect at a given point.

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

| STATEMENT | REASON |
|---|---|
| 1) Lines k and p intersect at a point | 1) Given |
| 2) $m\angle 1 + m\angle 2 = 180°$ | 2) Linear pair postulate |
| 3) $m\angle 2 + m\angle 3 = 180°$ | 3) Linear pair postulate |
| 4) $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$ | 4) ~~substitution~~ Transitive Property |
| 5) $m\angle 1 = m\angle 3$ | 5) subtraction |

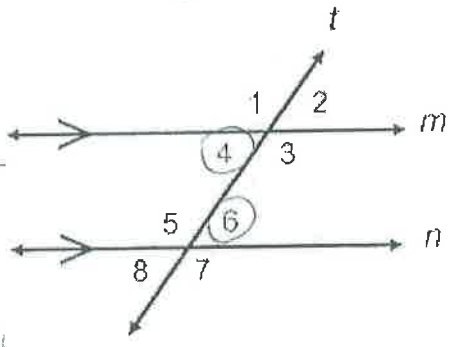
**CORRESPONDING ANGLES POSTULATE:**

Given two parallel lines cut by a transversal, corresponding angles are congruent.

**ALTERNATE INTERIOR ANGLES THEOREM:**

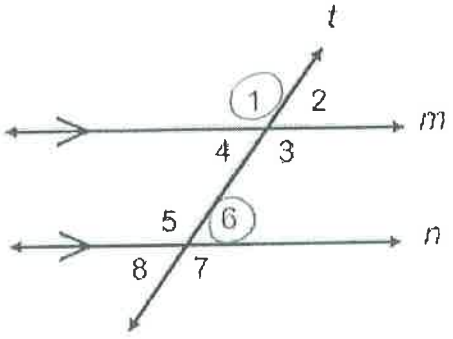
Given two parallel lines cut by a transversal, alternate interior angles are congruent.

2. Given: Line $m$ is parallel to line $n$ with transversal $t$.
Prove: $m\angle 4 = m\angle 6$




| STATEMENT | REASON |
|---|---|
| 1) m // n with transversal t | 1) Given |
| 2) $m\angle 4 = m\angle 8$ | 2) corresponding angles postulate |
| 3) $m\angle 8 = m\angle 6$ | 3) vertical angles theorem |
| 4) $m\angle 4 = m\angle 6$ | 4) ~~substitution~~ Transitive Property |

3. Given: Line $m$ is parallel to line $n$ with transversal $t$.
Prove: $m\angle 1 + m\angle 6 = 180°$

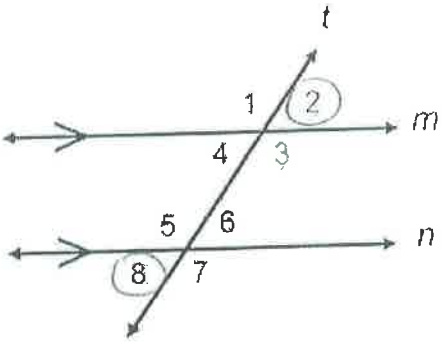



- m // n with transversal t : Given
- $m\angle 1 + m\angle 4 = 180°$ : linear pair postulate
- $m\angle 4 = m\angle 6$ : alternate interior angles theorem
- $m\angle 1 + m\angle 6 = 180°$ : substitution

**ALTERNATE EXTERIOR ANGLES THEOREM:**

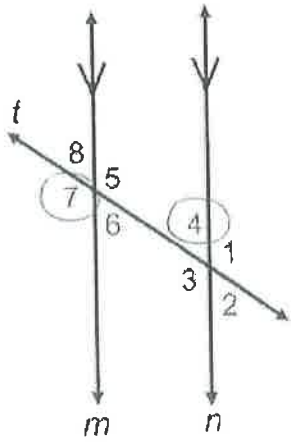
Given two parallel lines cut by a transversal, alternate exterior angles are congruent.

4. Given: Line $m$ is parallel to line $n$ with transversal $t$.
Prove: $m\angle 2 = m\angle 8$




- m//n with transversal t: Given
- m∠2 = m∠6: corresponding angles postulate
- m∠6 = m∠8: vertical angles theorem
- m∠2 = m∠8: ~~substitution~~ Transitive Property

5. Given: Line $m$ is parallel to line $n$ with transversal $t$.
Prove: $m\angle 4 + m\angle 7 = 180°$

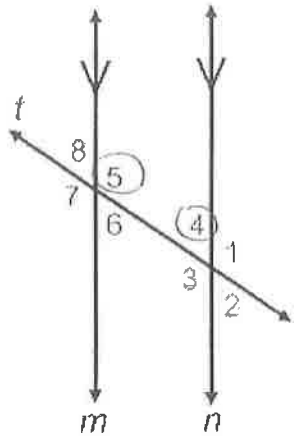



- m∠4 = m∠6: alternate interior angles theorem
- m∠6 + m∠7 = 180°: linear pair postulate
- m∠4 + m∠7 = 180°: substitution

**SAME SIDE INTERIOR ANGLES THEOREM:**

Given two parallel lines cut by a transversal, same side interior angles are supplementary

6. Given: Line $m$ is parallel to line $n$ with transversal $t$.
Prove: $m\angle 4 + m\angle 5 = 180°$




- m // n with transversal t: Given
- m∠4 + m∠3 = 180°: linear pair postulate
- m∠3 = m∠5: alternate interior angles theorem
- m∠4 + m∠5 = 180°: substitution