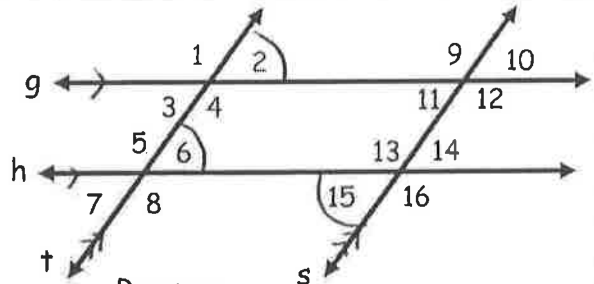
Geometry/Trig
USING Parallel Line Proofs - Page 1

Name: Answer Key
Date:

1. Given: g // h and s // t

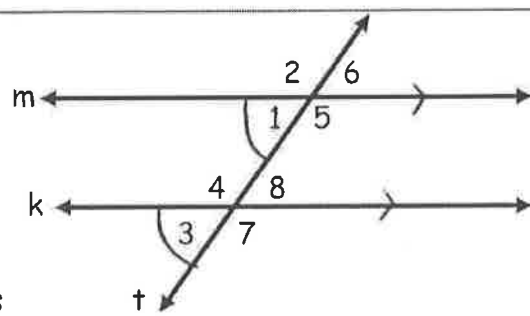
Prove: $\angle 2 \cong \angle 15$



Statements	Reasons
1). g // h	1). Given
2). $\angle 2 \cong \angle 6$	2). if lines are parallel, then corresponding angles are congruent.
3). s // t	3). Given
4). $\angle 6 \cong \angle 15$	4). if lines are parallel, then alternate interior angles are congruent.
5). $\angle 2 \cong \angle 15$	5). Transitive or Substitution

2. Given: k // m

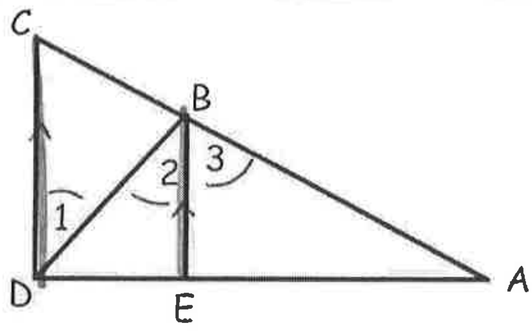
Prove: $\angle 1$ is supplementary to $\angle 7$



Statements	Reasons
1). k // m	1). Given
2). $m\angle 1 = m\angle 3$	2). if lines are parallel, then corresponding angles are congruent.
3). $m\angle 3 + m\angle 7 = 180$	3). Angle Addition Postulate
4). $m\angle 1 + m\angle 7 = 180$	4). substitution.
5). $\angle 1$ and $\angle 7$ are supplementary	5). definition of supplementary angles

3. Given: $\overleftrightarrow{CD} \parallel \overleftrightarrow{BE}$; $\angle 3 \cong \angle 1$

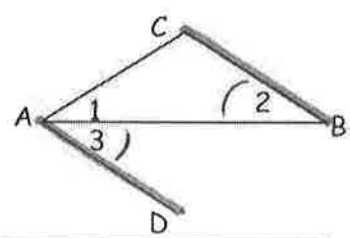
Prove: $\overrightarrow{BE}$ bisects $\angle DBA$



Statements	Reasons
1). $\overleftrightarrow{CD} \parallel \overleftrightarrow{BE}$	1). Given
2). $\angle 1 \cong \angle 2$	2) if lines are parallel, then alternate interior angles are congruent.
3). $\angle 3 \cong \angle 1$	3). Given
4). $\angle 3 \cong \angle 2$	4). substitution
5). $\overrightarrow{BE}$ bisects $\angle DBA$	5). definition of an angle bisector

4. Given: $\overleftrightarrow{AD} \parallel \overleftrightarrow{BC}$; $\angle 1 \cong \angle 2$

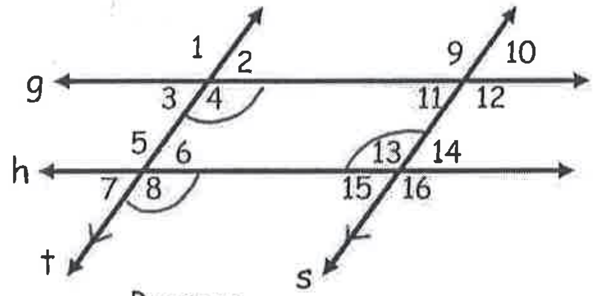
Prove: $\overrightarrow{AB}$ bisects $\angle CAD$



Statements	Reasons
1). $\overleftrightarrow{AD} \parallel \overleftrightarrow{BC}$	1). Given
2). $\angle 3 \cong \angle 2$	2) if lines are parallel, then alternate interior angles are congruent.
3). $\angle 1 \cong \angle 2$	3). Given
4). $\angle 1 \cong \angle 3$	4). substitution
5). $\overrightarrow{AB}$ bisects $\angle CAD$	5). definition of an angle bisector

5. Given: $\angle 4 \cong \angle 13$; $t \parallel s$

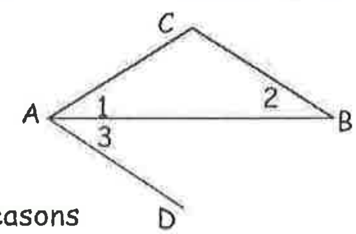
Prove: $h \parallel g$



Statements	Reasons
1) $t \parallel s$	1) Given
2). $\angle 8 \cong \angle 13$	2) if lines are parallel, then alternate interior angles are congruent.
3). $\angle 4 \cong \angle 13$	3). Given
4). $\angle 4 \cong \angle 8$	4). transitive or substitution
5). $h \parallel g$	5). if corresponding angles are congruent, then lines are parallel

6. Given: $\overrightarrow{AB}$ bisects $\angle CAD$; $\angle 1 \cong \angle 2$

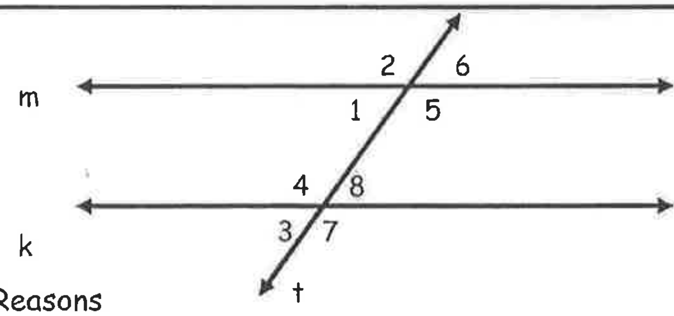
Prove: $\overleftrightarrow{AD} \parallel \overleftrightarrow{BC}$



Statements	Reasons
1). $\overrightarrow{AB}$ bisects $\angle CAD$	1). Given
2). $\angle 1 \cong \angle 3$	2) definition of an angle bisector
3). $\angle 1 \cong \angle 2$	3). Given
4). $\angle 2 \cong \angle 3$	4). Transitive or Substitution
5). $\overleftrightarrow{AD} \parallel \overrightarrow{BC}$	5). If alternate interior angles are congruent, then lines are parallel.

7. Given: $\angle 1 \cong \angle 8$

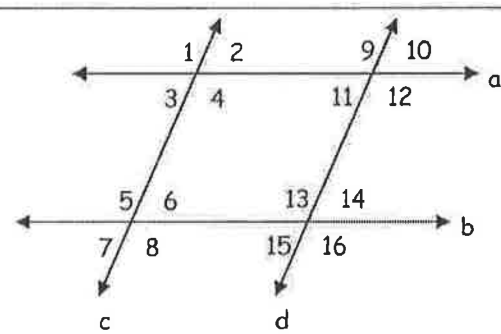
Prove: $\angle 5 \cong \angle 7$



Statements	Reasons
1). $\angle 1 \cong \angle 8$	1) Given
2). m // K	2). if alternate interior angles are congruent, then lines are parallel.
3). $\angle 5 \cong \angle 7$	3). If lines are parallel, then corresponding angles are congruent.

8. Given: c // d; $\angle 1$ and $\angle 14$ are supplementary

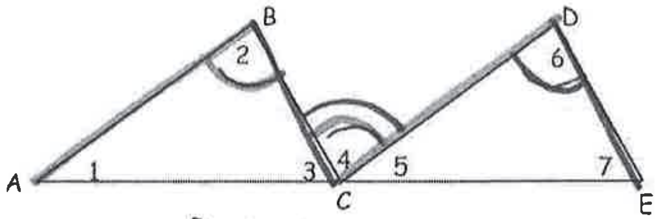
Prove: a // b



Statements	Reasons
1). c // d	1) Given
2). $\angle 1 \cong \angle 12$	2). if lines are parallel then alternate exterior angles are congruent.
3). $\angle 1$ and $\angle 14$ are supplementary	3). Given
4) $m\angle 1 + m\angle 14 = 180$	4) definition of supplementary angles
5). $m\angle 12 + m\angle 14 = 180$	5). substitution
6) $\angle 12$ and $\angle 14$ are supplementary	6) definition of supplementary angles
7). a // b	7) if same side interior angles are supplementary, then lines are parallel.

9. Given: $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$; $\angle 2 \cong \angle 6$

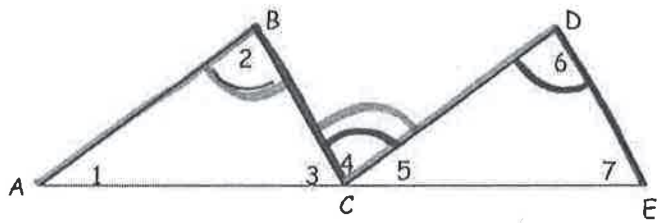
Prove: $\overleftrightarrow{BC} \parallel \overleftrightarrow{DE}$



Statements	Reasons
1). $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$	1). Given
2). $\angle 2 \cong \angle 4$	2). If lines are parallel then alternate interior angles are congruent.
3). $\angle 2 \cong \angle 6$	3). Given
4). $\angle 4 \cong \angle 6$	4). transitive or Substitution
5). $\overleftrightarrow{BC} \parallel \overleftrightarrow{DE}$	5). If alternate interior angles are congruent, then the lines are parallel.

10. Given: $\overleftrightarrow{BC} \parallel \overleftrightarrow{DE}$; $\angle 2 \cong \angle 6$

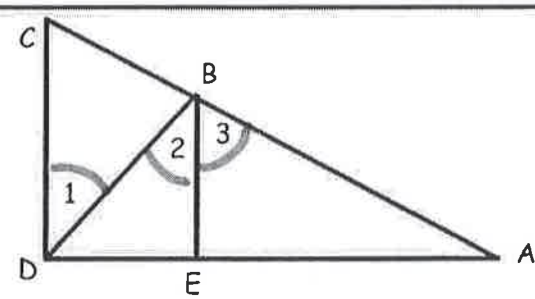
Prove: $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$



Statements	Reasons
1). $\overleftrightarrow{BC} \parallel \overleftrightarrow{DE}$	1). Given
2). $\angle 4 \cong \angle 6$	2). If lines are parallel then alternate interior angles are congruent.
3). $\angle 2 \cong \angle 6$	3). Given
4). $\angle 4 \cong \angle 2$	4). transitive or Substitution
5). $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$	5). If alternate interior angles are congruent, then the lines are parallel.

11. Given: $\overrightarrow{BE}$ bisects $\angle DBA$; $\angle 3 \cong \angle 1$

Prove: $\overleftrightarrow{CD} \parallel \overleftrightarrow{BE}$

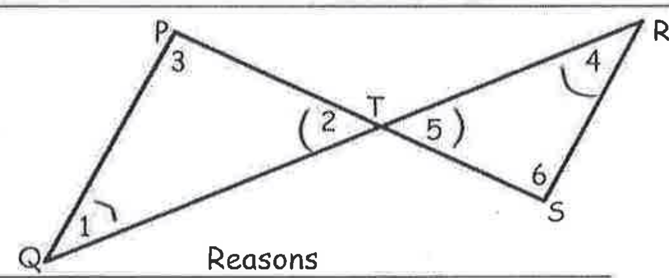


Statements	Reasons
1) $\overrightarrow{BE}$ bisects $\angle DBA$	1). Given
2) $\angle 2 \cong \angle 3$	2) definition of an angle bisector
3). $\angle 3 \cong \angle 1$	3). Given
4) $\angle 1 \cong \angle 2$	4). Transitive or substitution
5). $\overleftrightarrow{CD} \parallel \overleftrightarrow{BE}$	5). if alternate angles are congruent then the lines are parallel.

12. Given: $\angle 1 \cong \angle 2$; $\angle 4 \cong \angle 5$

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

HINT: First prove $\overleftrightarrow{PQ} \parallel \overleftrightarrow{RS}$, then you should just need one more step to get to this prove.



Statements	Reasons
1). $\angle 1 \cong \angle 2$	1). Given
2). $\angle 2 \cong \angle 5$	2). vertical angle theorem
3). $\angle 1 \cong \angle 5$	3) transitive
4). $\angle 4 \cong \angle 5$	4). Given
5). $\angle 1 \cong \angle 4$	5). Transitive or substitution
6). $\overleftrightarrow{PQ} \parallel \overleftrightarrow{RS}$	6). if alternate interior angles are congruent then the lines are parallel.
7). $\angle 3 \cong \angle 6$	7). if lines are parallel, then alternate interior angles are congruent.