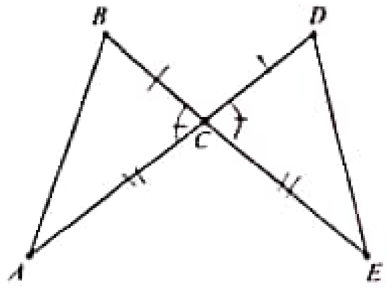
Geometry, Unit 5 – Congruent Triangles Proof Activity – Part I Name Key

For each problem, do the following:

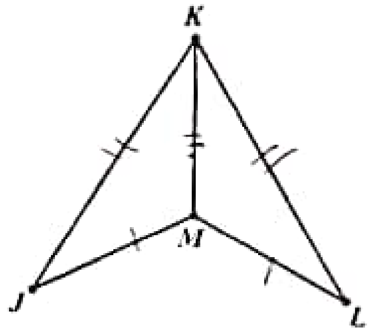
a. Show the given information in the diagram (using tick marks to show congruent sides and arcs to show congruent angles)
b. Show any other congruent parts you notice (from vertical angles, sides shared in common, or alternate interior angles with parallel lines)
c. Give the postulate or theorem that proves the triangles congruent (SSS, SAS, ASA, AAS, HL)
d. Finally, fill in the blanks to complete the proof.

1. Given: $\overline{BC} \cong \overline{DC}$; $\overline{AC} \cong \overline{EC}$
Prove: $\Delta BCA \cong \Delta DCE$



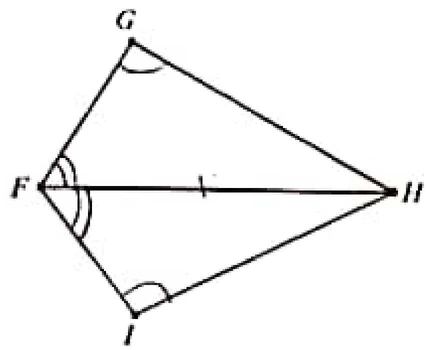
Statements	Reasons
1. $\overline{BC} \cong \overline{DC}$; $\overline{AC} \cong \overline{EC}$	1. Given
2. $\angle BCA \cong \angle DCE$	2. Vertical $\angle$s Theorem
3. $\Delta BCA \cong \Delta DCE$	3. SAS

2. Given: $\overline{JK} \cong \overline{LK}$; $\overline{JM} \cong \overline{LM}$
Prove: $\Delta KJM \cong \Delta KLM$



Statements	Reasons
1. $\overline{JK} \cong \overline{LK}$, $\overline{JM} \cong \overline{LM}$	1. Given
2. $\overline{KM} \cong \overline{KM}$	2. Reflexive Prop.
3. $\Delta KJM \cong \Delta KLM$	3. SSS

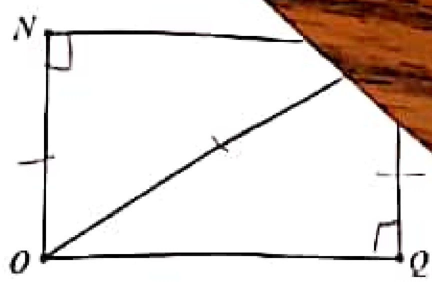
3. Given: $\angle G \cong \angle I$; $\overline{FH}$ bisects $\angle GFI$
Prove: $\Delta GFH \cong \Delta IFH$



Statements	Reasons
1. $\angle G \cong \angle I$; $\overline{FH}$ bisects $\angle GFI$	1. Given
2. $\angle GFH \cong \angle IFH$	2. Def. of Bisects
3. $\overline{FH} \cong \overline{FH}$	3. Reflexive Prop.
4. $\Delta GFH \cong \Delta IFH$	4. AAS

4. Given: $\angle N$ and $\angle Q$ are right angles; $\overline{NO} \cong \overline{PQ}$

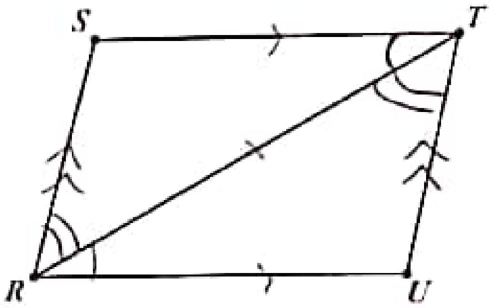
Prove: $\Delta ONP \cong \Delta PQO$



Statements	Reasons
1. $\angle N$ and $\angle Q$ are right angles	1. Given
2. ΔONP and ΔPQO are Right triangles	2. Def. of right triangle
3. $\overline{OP} \cong \overline{OP}$	3. Reflexive Prop.
4. $\overline{NO} \cong \overline{PQ}$	4. Given
5. $\Delta ONP \cong PQO$	5. HL

5. Given: $\overline{ST} \parallel \overline{RU}$; $\overline{SR} \parallel \overline{TU}$

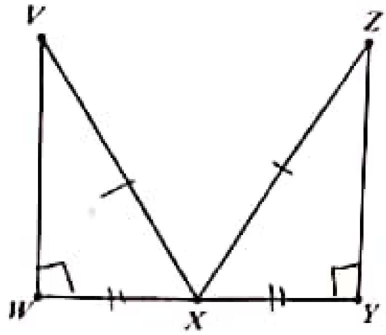
Prove: $\Delta SRT \cong \Delta UTR$



Statements	Reasons
1. $\overline{ST} \parallel \overline{RU}$	1. Given
2. $\angle STR \cong \angle URT$	2. If lines $\parallel$, alt. int. $\angle$s $\cong$
3. $\overline{SR} \parallel \overline{TU}$	3. Given
4. $\angle SRT \cong \angle UTR$	4. If lines $\parallel$, alt int $\angle$s $\cong$
5. $\overline{TR} \cong \overline{RT}$	5. Reflexive property
6. $\Delta SRT \cong \Delta UTR$	6. ASA

6. Given: $\angle W$ and $\angle Y$ are right angles; $\overline{VX} \cong \overline{ZX}$; X is the midpoint of $\overline{WY}$

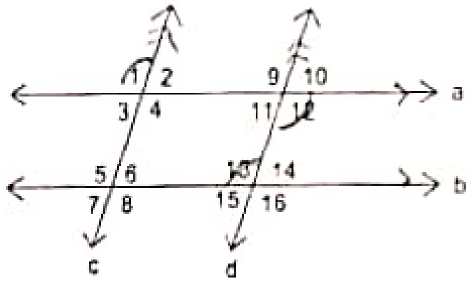
Prove: $\Delta VWX \cong \Delta ZYX$



Statements	Reasons
1. $\angle W$ and $\angle Y$ are right angles	1. Given
2. ΔWVX and ΔYZX are rt Δs	2. Def. of right triangle
3. $\overline{VX} \cong \overline{ZX}$; X is the midpoint of $\overline{WY}$	3. Given
4. $\overline{WX} \cong \overline{YX}$	4. Def. of midpoint
5. $\Delta VWX \cong \Delta ZYX$	5. HL

1. Given: $a \parallel b$; $c \parallel d$

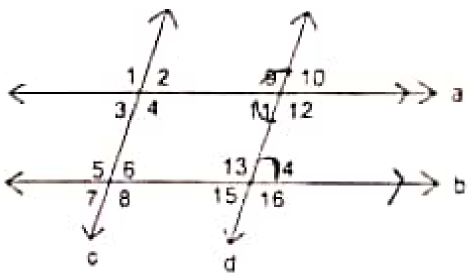
Prove: $\angle 1 \cong \angle 13$



Statements	Reasons
1. $a \parallel b$; $c \parallel d$	1. Given
2. $\angle 1 \cong \angle 12$	2. IF lines are parallel, Alt ext ∡s are ≅
3. $\angle 12 \cong \angle 13$	3. " " Alt ext ∡s are ≅
4. $\angle 1 \cong \angle 13$	4. Transitive Property / Substitution

2. Given: $a \parallel b$

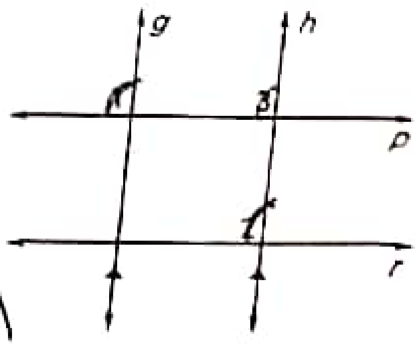
Prove: $m\angle 9 + m\angle 14 = 180°$



Statements	Reasons
1. $a \parallel b$	1. Given
2. $m\angle 9 + m\angle 11 = 180°$	2. Linear Pairs are supplementary
3. $m\angle 11 = m\angle 14$	3. IF lines are ∥, alt int ∡s are ≅
4. $m\angle 9 + m\angle 14 = 180°$	4. Substitution

3. GIVEN: $g \parallel h$, $\angle 1 \cong \angle 2$
PROVE: $p \parallel r$

Statements	Reasons
1. $g \parallel h$, $\angle 1 \cong \angle 2$	1. Given
2. $\angle 1 \cong \angle 3$	2. IF lines are ∥, corresp. angles are ≅
3. $\angle 2 \cong \angle 3$	3. Transitive / Substitution
4. $p \parallel r$	4. IF Corresponding angles are ≅, lines are parallel



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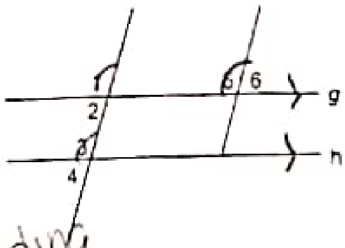
4. Given: $g \parallel h$; $\angle 1 \cong \angle 5$

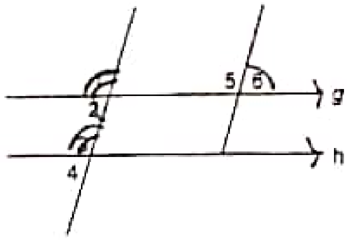
Prove: $\angle 5 \cong \angle 3$



Statements	Reasons
$g \parallel h$, $\angle 1 \cong \angle 5$	Given
$\angle 1 \cong \angle 3$	If lines are $\parallel$, Corresponding angles are $\cong$
$\angle 5 \cong \angle 3$	Transitive / Substitution

5. Given: $g \parallel h$; $\angle 6$ & $\angle 3$ are supplementary

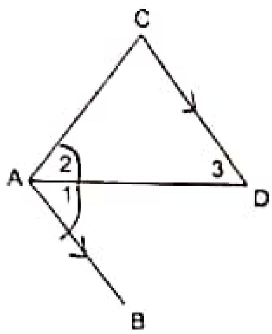
Prove: $\angle 6 \cong \angle 2$



Statements	Reasons
$g \parallel h$, $\angle 6$ and $\angle 3$ are supplementary	given
$m\angle 6 + m\angle 3 = 180$	Definition of Supplementary
$\angle 3$ and $\angle 2$ are supp	If lines are $\parallel$, Consec. Int. Angles are supp
$m\angle 3 + m\angle 2 = 180$	Definition of supplementary
$\angle 6 \cong \angle 2$	Substitution

6. Given: $\overline{CD} \parallel \overline{AB}$; $\angle 2 \cong \angle 1$

Prove: $\angle 2 \cong \angle 3$



Statements	Reasons
$\overline{CD} \parallel \overline{AB}$, $\angle 2 \cong \angle 1$	Given
$\angle 1 \cong \angle 3$	If lines $\parallel$, Alt int $\angle$s congruent
$\angle 2 \cong \angle 3$	Transitive / Substitution

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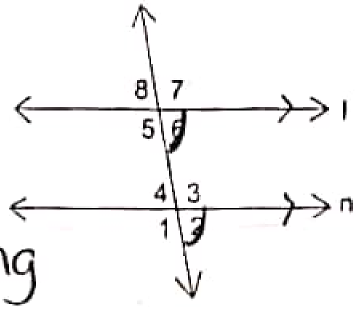
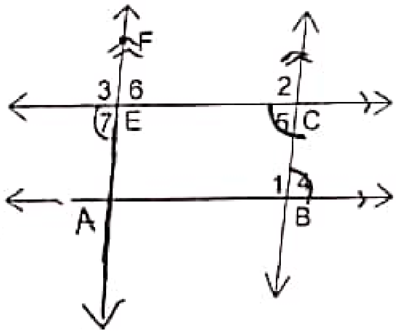
...: $m\angle 2 + m\angle 7 = 180°$



Statements	Reasons
l ∥ n	Given
∠2 ≅ ∠6	If lines ∥, Corresponding angles are ≅
m∠6 + m∠7 = 180°	Linear Pair
m∠2 + m∠7 = 180	Substitution

8. Given: $\overleftrightarrow{AB} \parallel \overleftrightarrow{EC}$; $\overleftrightarrow{BC} \parallel \overleftrightarrow{EF}$

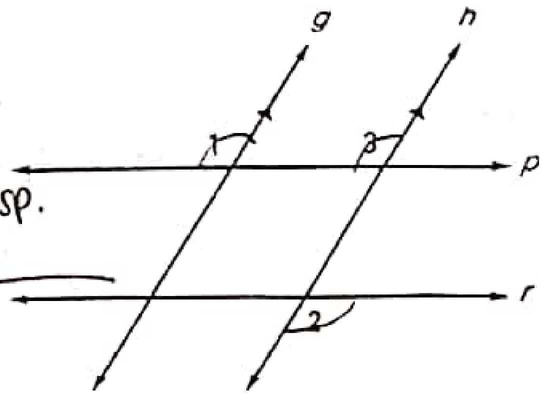
Prove: $\angle 7 \cong \angle 4$



Statements	Reasons
AB ∥ EC, BC ∥ EF	Given
∠4 ≅ ∠5	If lines ∥, Alt int ∠s ≅
∠5 ≅ ∠7	" " Corresponding ∠s ≅
∠4 ≅ ∠7	Substitution / Transitive

9. **GIVEN:** $g \parallel h$, $\angle 1 \cong \angle 2$

PROVE: $p \parallel r$

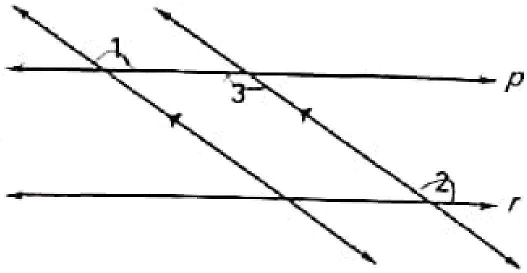


Statements	Reasons
g ∥ h, ∠1 ≅ ∠2	Given
∠1 ≅ ∠3	If lines ∥, Corresp. ∠s are ≅
∠2 ≅ ∠3	Substitution
p ∥ r	If alternate exterior ∠s ≅, lines are parallel

10. **GIVEN:** $n \parallel m$, $\angle 1 \cong \angle 2$

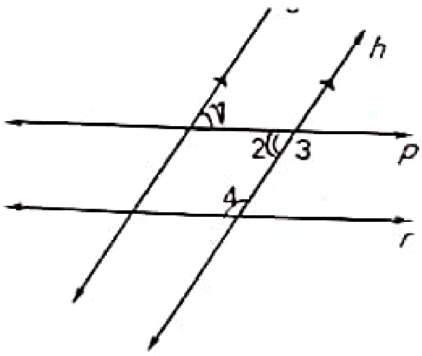
PROVE: $p \parallel r$

Statements	Reasons
$n \parallel m$, $\angle 1 \cong \angle 2$	Given
$\angle 1 \cong \angle 3$	If lines $\parallel$, alt int $\angle$s are $\cong$
$\angle 2 \cong \angle 3$	Substitution
$p \parallel r$	If alt. int. angles are $\cong$, lines are $\parallel$



11. **GIVEN:** $g \parallel h$, $\angle 1$ and $\angle 4$ are supplementary
PROVE: $p \parallel r$

Statements	Reasons
$g \parallel h$, $\angle 1$ and $\angle 4$ are supp	Given
$\angle 1 \cong \angle 2$	If lines $\parallel$, alt int $\angle$s are $\cong$
$\angle 2$ and $\angle 4$ are supp	Substitution
$p \parallel r$	If consecutive interior angles are $\cong$, lines are $\cong$



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