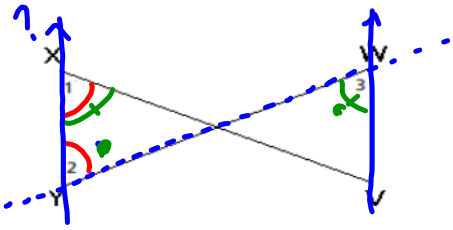
Geometry 1-2: 3.3 Proofs – parallel lines and converse – day 1 Name _____

Date _____ Per _____

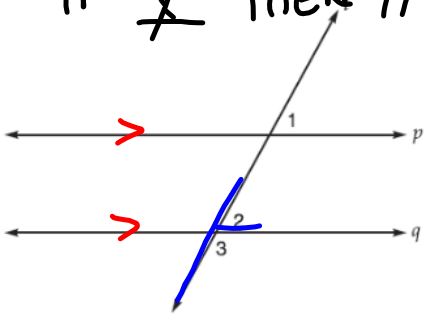
1. Given: $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 1$
Prove: $XY \parallel WV$
Proof:



Statements	Reasons
① $\angle 1 \cong \angle 2$ $\angle 1 \cong \angle 3$	① GIVEN
② $\angle 2 \cong \angle 3$	② TRANSITIVE PROP
③ $\overline{XY} \parallel \overline{WV}$	③ ALT. INT $\angle$ CONVERSE IF $\angle$ THEN $\parallel$

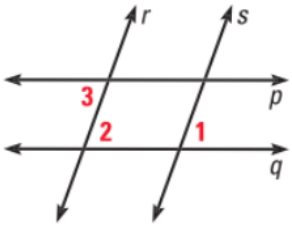
2. Given: p//q

Prove: $\angle 1$ and $\angle 3$ are supplementary



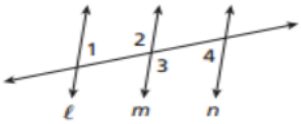
Statements	Reasons
① p ∥ q	① given
② $\angle 1 \cong \angle 2$	② CORR. $\angle$ POST.
③ $\angle 2$ AND $\angle 3$ ARE SUPPLEMENTS	③ LINEAR PAIR
④ $\angle 1$ & $\angle 3$ ARE SUPP	④ SUBSTITUTION

3. In the figure, $r \parallel s$ and $\angle 1$ is congruent to $\angle 3$. Prove $p \parallel q$.



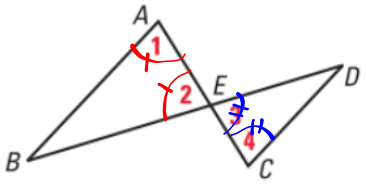
Statements	Reasons
1. $r \parallel s$	1. Given
2. $\angle 1 \cong \angle 2$	2. Corresponding Angles Postulate
3. $\angle 1 \cong \angle 3$	3. Given
4. $\angle 2 \cong \angle 3$	4. Substitution
5. $p \parallel q$	5. Alternate Interior Angle Converse

4. Given: $\angle 1 \cong \angle 4$, $\angle 3$ and $\angle 4$ are supplementary.
Prove: $\ell \parallel m$



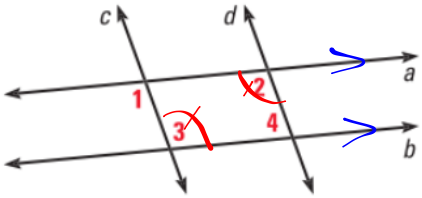
Statements	Reasons
1. $\angle 1 \cong \angle 4$	1. Given
2. $l \parallel n$	2. Alternate Interior Angle Converse
3. $\angle 3$ is supplementary to $\angle 4$	3. Given
4. $\angle 3 + \angle 4 = 180$	4. Definition of Supplementary
5. $\angle 3 + \angle 1 = 180$	5. Substitution
6. $\angle 3$ is supplementary to $\angle 1$	6. Definition of Supplementary
7. $\angle 3 \cong \angle 2$	7. Vertical Angles are congruent
8. $\angle 2$ is supplementary to $\angle 1$	8. Substitution
9. $l \parallel m$	9. Same Side Interior Angles Converse

5. **GIVEN** ▶ $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$
PROVE ▶ $\overline{AB} \parallel \overline{CD}$



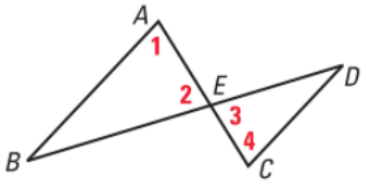
Statements	Reasons
1. <1 ≅ <2	1.
2.	2. Vertical Angles are congruent
3.	3. Given
4. <1 ≅ <4	4.
5.	5. Alternate Interior Angles Postulate

6. **GIVEN** ▶ $a \parallel b$, $\angle 2 \cong \angle 3$
PROVE ▶ $c \parallel d$



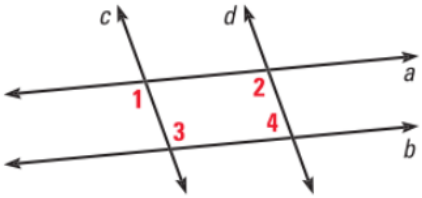
Statements	Reasons
1. *a* || *b*	1.
2.	2. Same Side Interior Angle Converse
3.	3. Definition of Supplementary
4. <2 ≅ <3	4.
5. <3 + <4 = 180	5.
6. < 3 is supplementary to <4	6.
7.	7. Same Side Interior Angle Postulate

5. **GIVEN** ▶ $\angle 1 \cong \angle 2, \angle 3 \cong \angle 4$
PROVE ▶ $\overline{AB} \parallel \overline{CD}$



Statements	Reasons
1. <1 ≅ <2	1. Given
2. <1 ≅ <2	2. Vertical Angles are congruent
3. <3 ≅ <4	3. Given
4. <1 ≅ <4	4. Transitive Property
5. *AB* || *CD*	5. Alternate Interior Angles Postulate

6. **GIVEN** ▶ $a \parallel b, \angle 2 \cong \angle 3$
PROVE ▶ $c \parallel d$



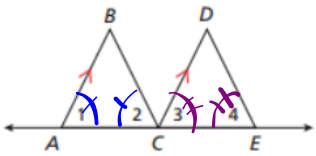
Statements	Reasons
1. *a* || *b*	1. Given
2. < 2 is supplementary to <4	2. Same Side Interior Angle Converse
3. <2 + <4 = 180	3. Definition of Supplementary
4. <2 ≅ <3	4. Given
5. <3 + <4 = 180	5. Substitution
6. < 3 is supplementary to <4	6. Definition of Supplementary
7. *c* || *d*	7. Same Side Interior Angle Postulate

7. Complete the following two-column proof.

Given: $\overline{AB} \parallel \overline{CD}$, $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$

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

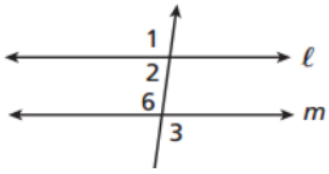
Proof:



Statements	Reasons
1.	1. Given
2. <1 ≅ <3	2.
3. <1 ≅ <2	3.
4.	4. Substitution (or) Transitive Property
5. <3 ≅ <4	5.
6. <4 ≅ <2	6.
7. *BC* ‖ *DE*	7.

8. **Given:** $m\angle 2 + m\angle 3 = 180°$

Prove: $\ell \parallel m$



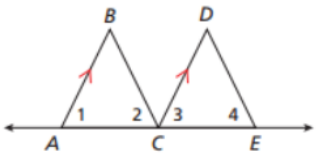
Statements	Reasons
1. *m*<1 + *m*<2 = 180	1.
2. <3 ≅ <6	2.
3.	3. Substitution
4. <2 is supplementary to <6	4.
5. *l* ‖ *m*	5.

7. Complete the following two-column proof.

Given: $\overline{AB} \parallel \overline{CD}$, $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$

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

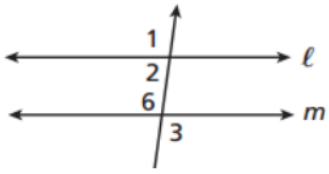
Proof:



Statements	Reasons
1. *AB* || *CD*	1. Given
2. <1 ≅ <3	2. Corresponding Angles Postulate
3. <1 ≅ <2	3. Given
4. <1 ≅ <3	4. Substitution (or) Transitive Property
5. <1 ≅ <2	5. Given
6. <4 ≅ <2	6. Substitution (or) Transitive Property
7. *BC* || *DE*	7. Corresponding Angles Converse

8. **Given:** $m\angle 2 + m\angle 3 = 180°$

Prove: $\ell \parallel m$



Statements	Reasons
1. *m*<1 + *m*<2 = 180	1. Given
2. <3 ≅ <6	2. Vertical Angles are congruent
3. <2 + <6 = 180	3. Substitution
4. <2 is supplementary to <6	4. Definition of Supplementary
5. *l* || *m*	5. Same Side Angle Converse