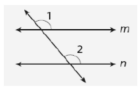
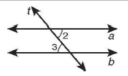
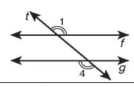
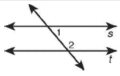
Geometry Notes Section 3-3

Oct 17

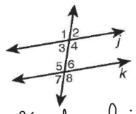
Proving Lines Parallel

The following postulate and theorems can be used to prove lines parallel.

Converse of the Corresponding Angles Postulate If corresponding angles are congruent, then lines are parallel.		If $\angle 1 \cong \angle 2$, then $m \parallel n$
Converse of the Alternate Interior Angles Theorem If alternate interior angles are congruent, then lines are parallel.		If $\angle 2 \cong \angle 3$, then $a \parallel b$.
Converse of the Alternate Exterior Angles Theorem If alternate exterior angles are congruent, then lines are parallel.		If $\angle 1 \cong \angle 4$, then $f \parallel g$.
Converse of the Same-Side Interior Angles Theorem If same-side interior angles are supplementary, then lines are parallel.		If $m\angle 1 + m\angle 2 = 180$, then $s \parallel t$.

1. Use the given information and the postulate and theorems to show that $j \parallel k$. Write a sentence that explains why the lines are parallel.

Given: $m\angle 2 = 8x°$, $m\angle 7 = (7x + 9)°$, $x = 9$



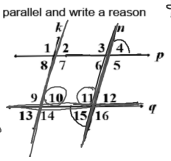
$m\angle 2 = 8 \cdot 9 = 72$

$m\angle 7 = 7 \cdot 9 + 9 = 72$

$m\angle 2 = m\angle 7$. If alt. ext. $\angle$s are $\cong$, then lines are parallel.

2. Use the given information. Name the lines that could be proved parallel and write a reason for your choice.

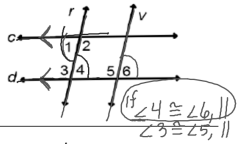
a) $\angle 4 \cong \angle 15$ $p \parallel q$, if alt. ext $\angle$s are $\cong$, then lines $\parallel$.



b) $m\angle 10 + m\angle 11 = 180$

$k \parallel m$, if same-side int $\angle$s are supp., then lines $\parallel$

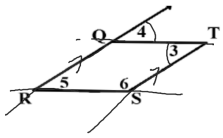
3. Given: $c \parallel d$, $\angle 1 \cong \angle 6$
Prove: $r \parallel v$



(if $\angle 4 \cong \angle 6$, $\parallel$ $\angle 3 \cong \angle 5$, $\parallel$)

Statements	Reasons
① $c \parallel d$, $\angle 1 \cong \angle 6$	① given
② $\angle 1 \cong \angle 4$	② if lines $\parallel$, alt. int $\angle$s $\cong$
③ $\angle 4 \cong \angle 6$	③ transitive
④ $r \parallel v$	④ if corr $\angle$s $\cong$, then lines $\parallel$

4. Given: $m\angle 6 + m\angle 4 = 180$, $\overline{QR} \parallel \overline{TS}$
Prove: $\overline{QT} \parallel \overline{RS}$



Statements	Reasons
① $m\angle 6 + m\angle 4 = 180$ ($\overline{QR} \parallel \overline{TS}$)	① given
② $m\angle 4 = m\angle 3$	② if lines $\parallel$, then alt. int $\angle$s $=$
③ $m\angle 6 + m\angle 3 = 180$	③ Substitution
④ $\overline{QT} \parallel \overline{RS}$	④ if same-side int $\angle$s are supp, then lines $\parallel$