

Proving Parallel Lines
2.3

State Theorems 2.1.2 through 2.1.4 and Postulate 11 :

All of the above theorems start with start with the hypothesis “If two parallel lines are cut by a transversal”

Postulate 11:

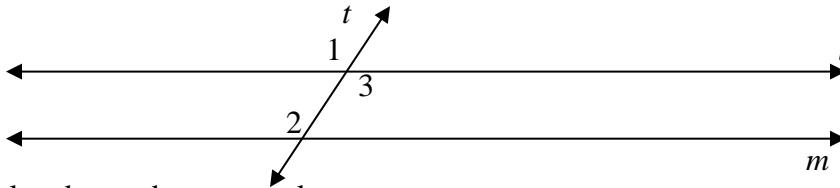
Theorem 2.1.2

Theorem 2.1.3

Theorem 2.1.4

Theorem 2.1.5

Theorem 2.3.2: If two lines are cut by a transversal so that interior angles are congruent, then these lines are parallel.



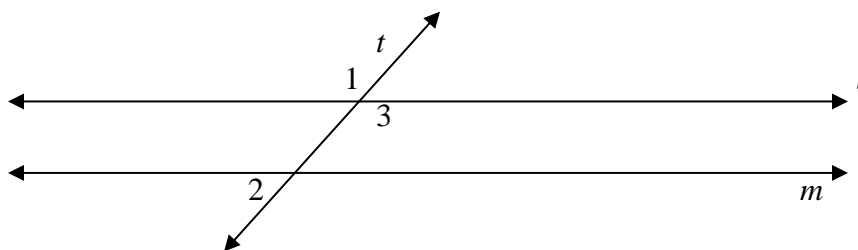
Given: lines l and m and transversal t

$$\angle 2 \cong \angle 3$$

Prove: $l \parallel m$

Statements	Reasons
1. lines l and m and transversal t	
$\angle 2 \cong \angle 3$	1. Given
2. $\angle 1 \cong \angle 3$ then vertical angles	2. If two lines intersect then vertical angles are \cong
3. $\angle 1 \cong \angle 2$	3. Transitive property
4. $l \parallel m$	4. If two lines are cut by a transversal so that corres. angles are \cong so lines are parallel

Theorem 2.3.3: If two lines are cut by a transversal so that alternate exterior angles are congruent



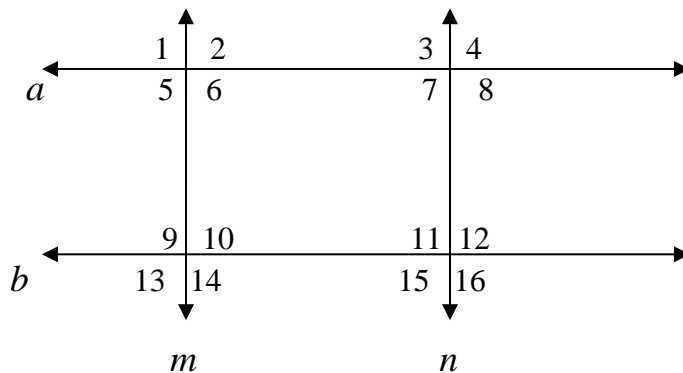
Given: lines l and m and transversal t

$$\angle 1 \cong \angle 2$$

Prove: $l \parallel m$

Statements	Reasons
1. lines l and m and transversal t $\angle 1 \cong \angle 2$	1.
2. $\angle 1 \cong \angle 3$	2.
3. $\angle 2 \cong \angle 3$	3.
4. $l \parallel m$	4.

Example 1: Name the lines (if any) that must be parallel under the given conditions.



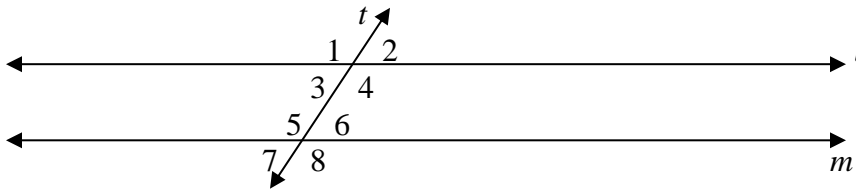
a. $\angle 1 \cong \angle 3$

b. $\angle 4 \cong \angle 15$

c. $\angle 10 \cong \angle 13$

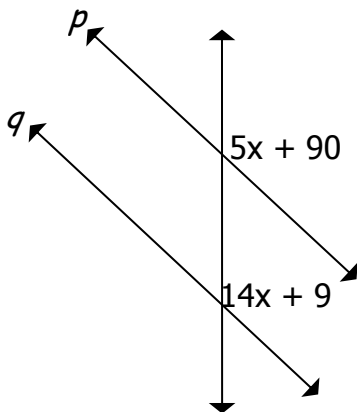
d. $a \perp m$ and $b \perp m$

Example 2: Determine the values of x or the angle so that the line l will be parallel to m .

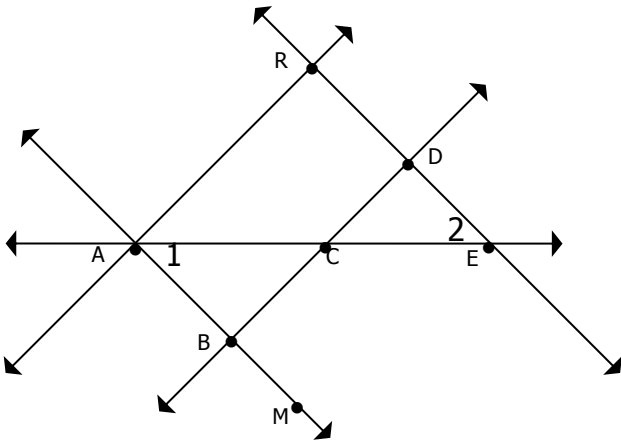


- If $m\angle 1 = 107^\circ$, find $m\angle 5$
- If $m\angle 4 = 106^\circ$, find $m\angle 6$
- If $m\angle 2 = 72^\circ$, find $m\angle 7 = 4x + 20$
- If $m\angle 3 = 2x + 26$, $m\angle 5 = 6(x - 1)$

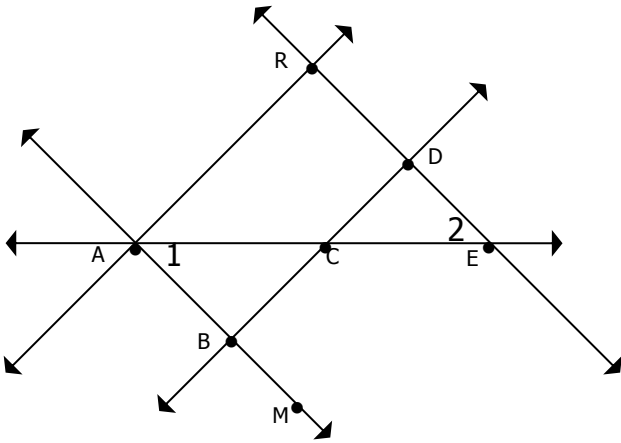
Example 3: Find the value of x and the measure of each angle that will make $p \parallel q$



Example 4: a. If $\angle 1 \cong \angle 2$ which lines must be parallel?



b. If $\angle RAB \cong \angle CBM$, which lines must be parallel?



OK, TRY: p. 87 #s 19 and 21