

Chapter 3 § 5

Proving Lines Parallel

Postulates :

(3-4) – If two lines in a plane are cut by a transversal so that corresponding angles are congruent, then the lines are parallel.

Parallel Postulate (3-5) – If there is a line and a point not on the line, then there exists exactly one line through the point that is parallel to the given line.

Theorems :

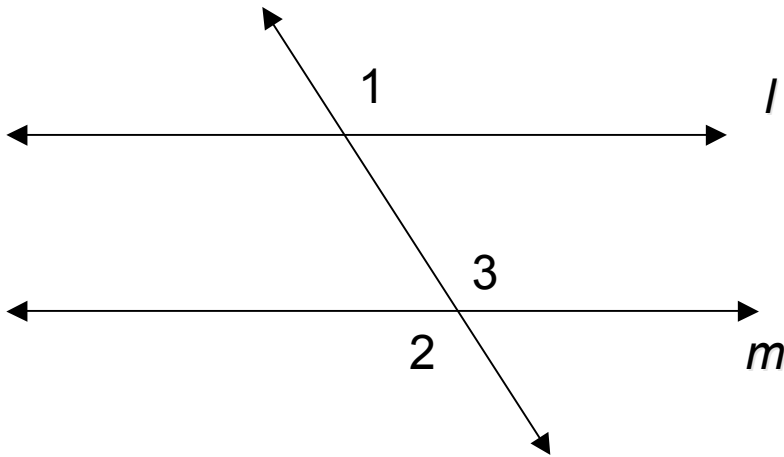
(3-5) – If two lines in a plane are cut by a transversal so that a pair of alternate exterior angles are congruent, then the two lines are parallel.

(3-6) – If two lines in a plane are cut by a transversal so that each pair of consecutive interior angles is supplementary, then the lines are parallel.

(3-7) – If two lines in a plane are cut by a transversal so that a pair of alternate interior angles is congruent, then the lines are parallel.

(3-8) – In a plane, if two lines are perpendicular to the same line, then they are parallel.

Proof of Theorem 3-5



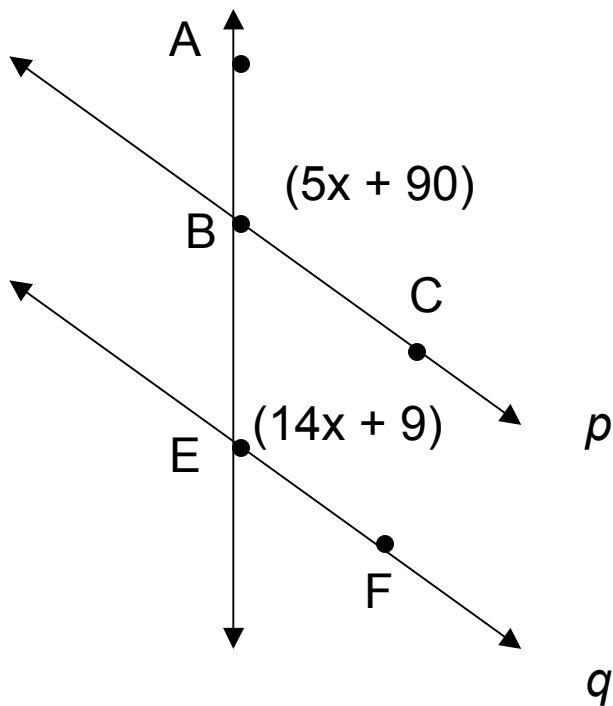
Given:

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

Prove:

$$l \parallel m$$

<u>Statements</u>	<u>Reasons</u>
1. $\angle 1 \cong \angle 2$	1. Given
2. $\angle 2 \cong \angle 3$	2. Vertical angles are congruent
3. $\angle 1 \cong \angle 3$	3. Congruence of angles is transitive
4. $l \parallel m$	4. If two lines in a plane are cut by a transversal so that corresponding angles are congruent, then the lines are parallel.



Find the value of x and the $m\angle ABC$ so that $p \parallel q$.

$$\begin{array}{r}
 5x + 90 = 14x + 9 \\
 -5x \quad \quad -5x \\
 \hline
 90 = 9x + 9 \\
 -9 \quad \quad -9 \\
 \hline
 81 = 9x \\
 \frac{81}{9} = \frac{9x}{9} \\
 9 = x
 \end{array}$$

$$\begin{aligned}
 m\angle ABC &= (5x + 90) \\
 &= 5(9) + 90 \\
 &= 45 + 90 \\
 &= 135
 \end{aligned}$$

Justifying Parallel Lines

IF

Two lines in a plane are cut by a transversal - - - -
(\neq)

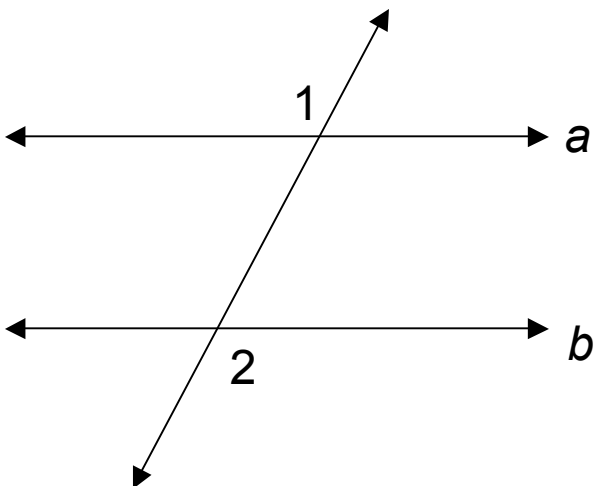
AND (“so that”)

Corresponding angles are congruent,
Alternating interior angles are congruent,
Alternating exterior angles are congruent,
Consecutive interior angles are supplementary,
The lines are perpendicular to the same line,

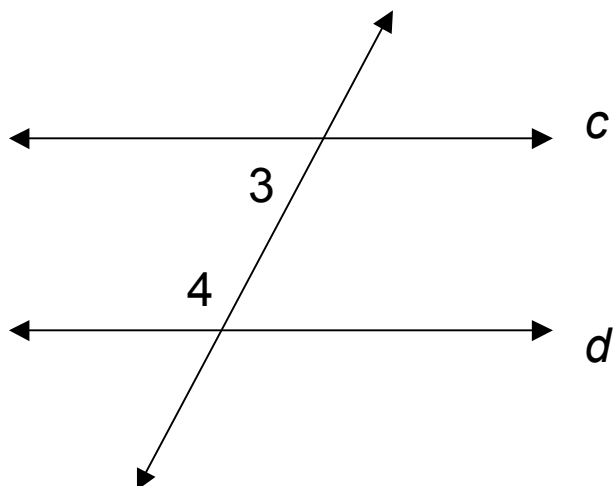
THEN

the lines are parallel. (\parallel)

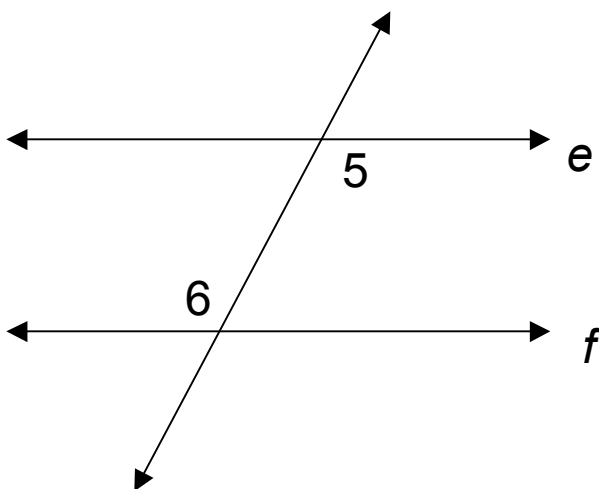
Determine if the lines are parallel and justify your answer.



If two lines in a plane are cut by a transversal so that a pair of alternate exterior angles are congruent, then the two lines are parallel.



If two lines in a plane are cut by a transversal so that each pair of consecutive interior angles is supplementary, then the lines are parallel.



If two lines in a plane are cut by a transversal so that a pair of alternate interior angles is congruent, then the lines are parallel.