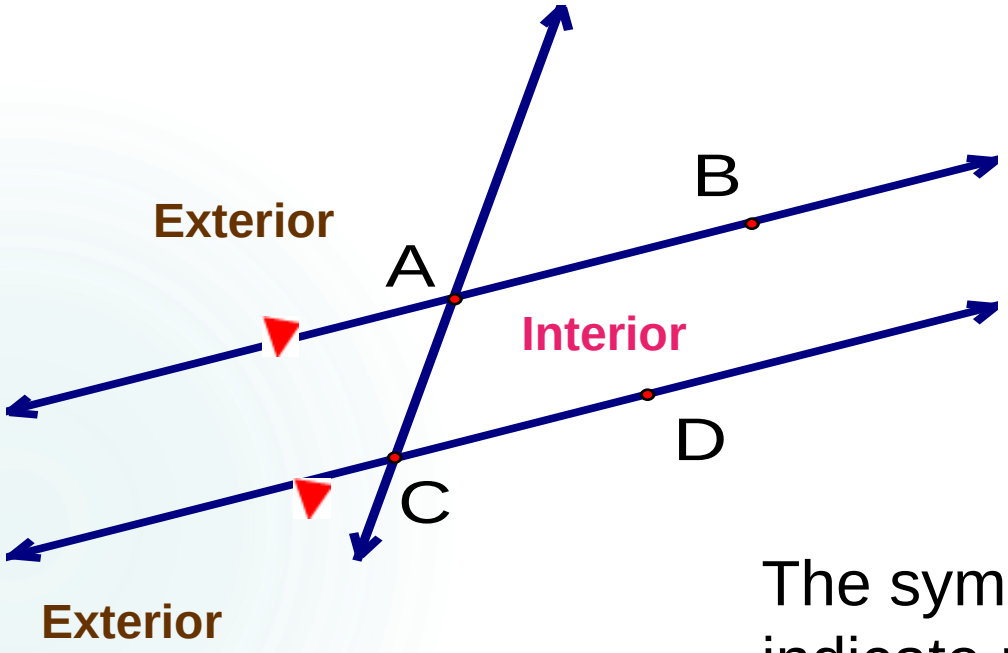
Parallel Lines and Transversals

UNIT 3 LESSON 2

Parallel Lines and Transversals

What would you call two lines which do not intersect?



Parallel

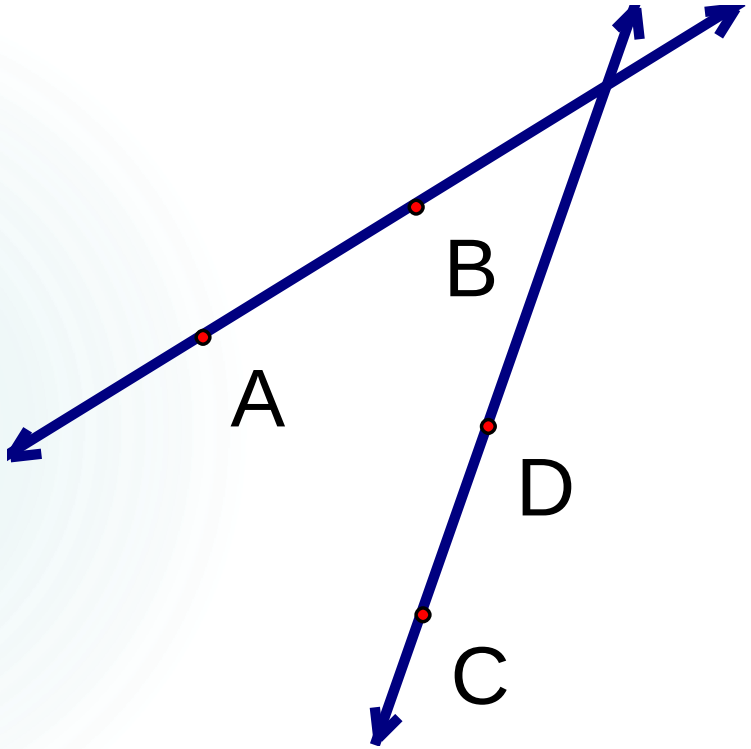
A solid arrow placed on two lines of a diagram indicate the lines are parallel.

The symbol || is used to indicate parallel lines.

$\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$

Parallel Lines and Transversals

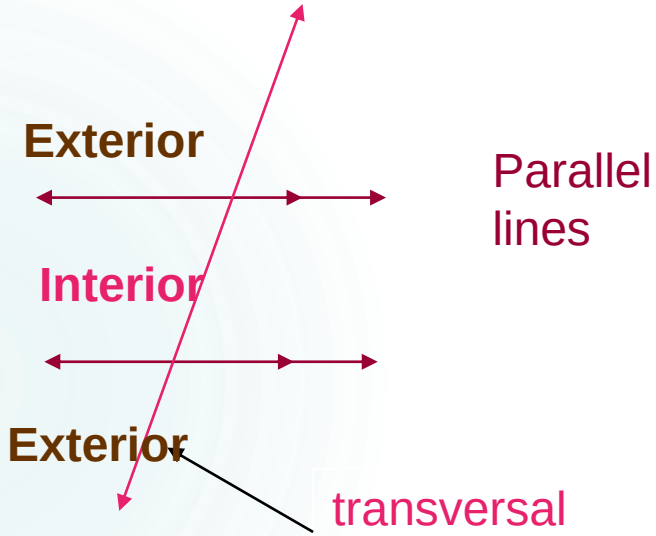
A slash through the parallel symbol ∦ indicates the lines are **not** parallel.



$\overleftrightarrow{AB} \nparallel \overleftrightarrow{CD}$

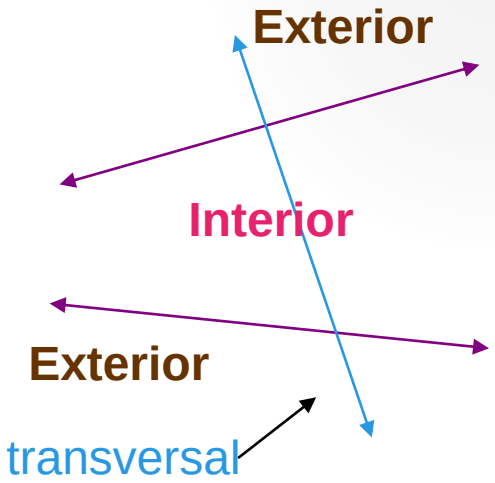
Transversal

A line, ray, or segment that intersects 2 or more COPLANAR lines, rays, or segments.



Parallel lines

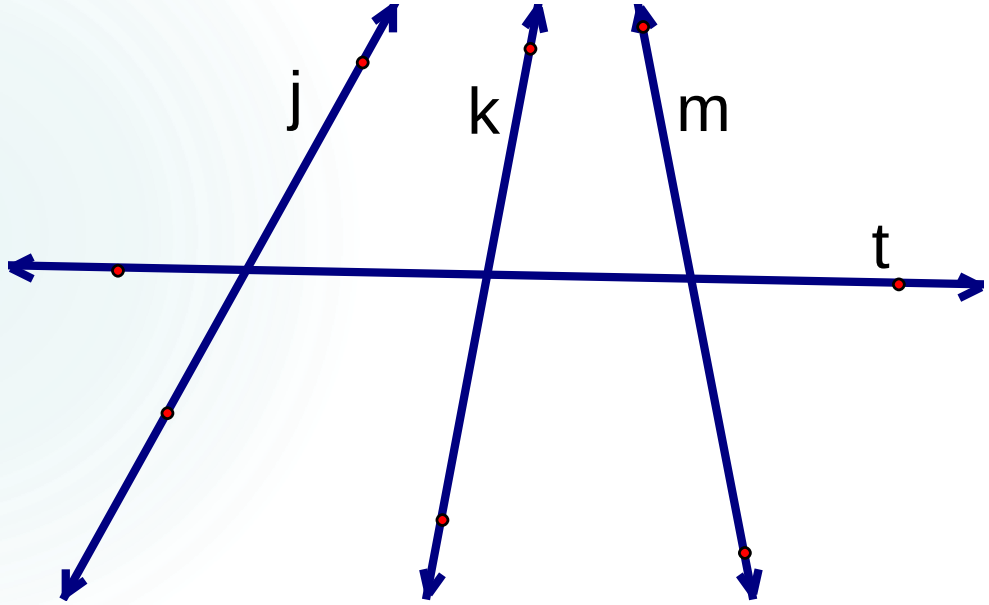
Non-Parallel lines



Parallel Lines and Transversals

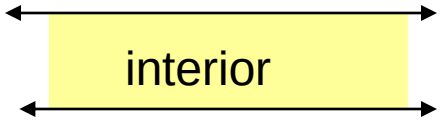
Transversal -

A transversal is a line which intersects two or more lines in a plane. The intersected lines do not have to be parallel.

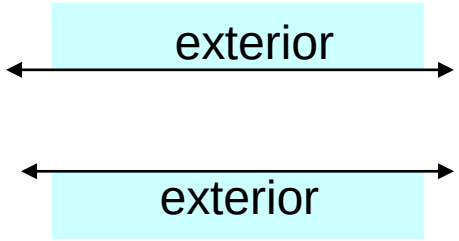


Lines j, k, and m are intersected by line t. Therefore, line t is a **transversal** of lines j, k, and m.

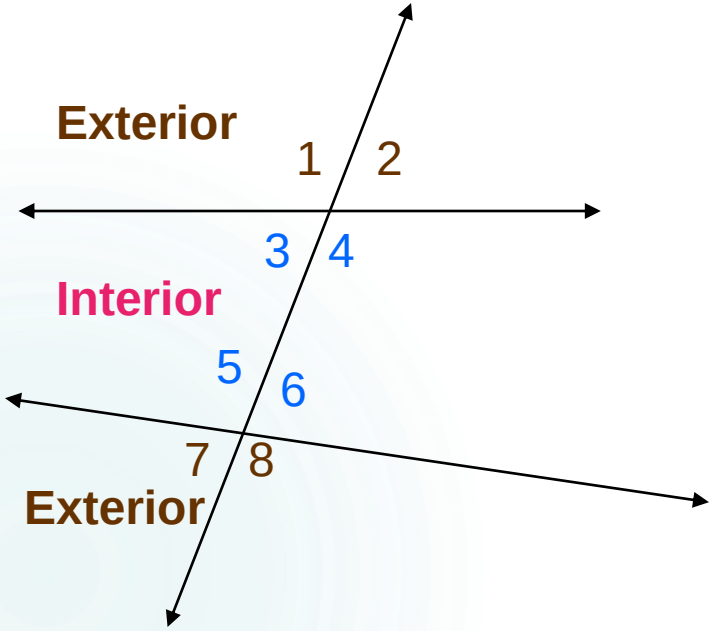
INTERIOR –The space INSIDE the 2 lines



EXTERIOR -The space OUTSIDE the 2 lines



Special Angle Relationships



Interior Angles

<3 & <6 are Alternate Interior angles

<4 & <5 are Alternate Interior angles

<3 & <5 are Same Side Interior angles

<4 & <6 are Same Side Interior angles

Exterior Angles

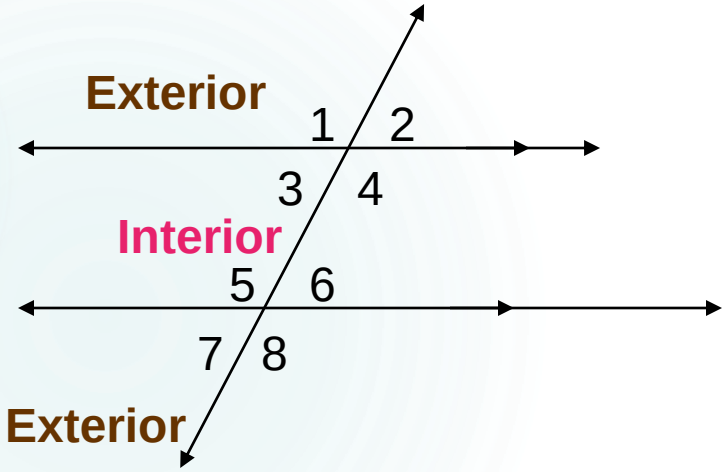
<1 & <8 are Alternate Exterior angles

<2 & <7 are Alternate Exterior angles

<1 & <7 are Same Side Exterior angles

<2 & <8 are Same Side Exterior angles

Special Angle Relationships WHEN THE LINES ARE PARALLEL



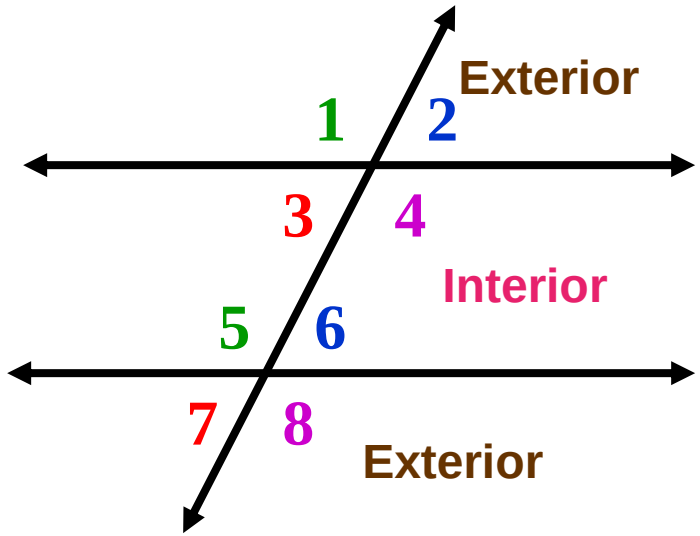
If the lines are not parallel, these angle relationships DO NOT EXIST.

- ***Alternate Interior Angles are CONGRUENT***
- ***Alternate Exterior Angles are CONGRUENT***
- ***Same Side Interior Angles are SUPPLEMENTARY***
- ***Same Side Exterior Angles are SUPPLEMENTARY***

Corresponding Angles & Consecutive Angles

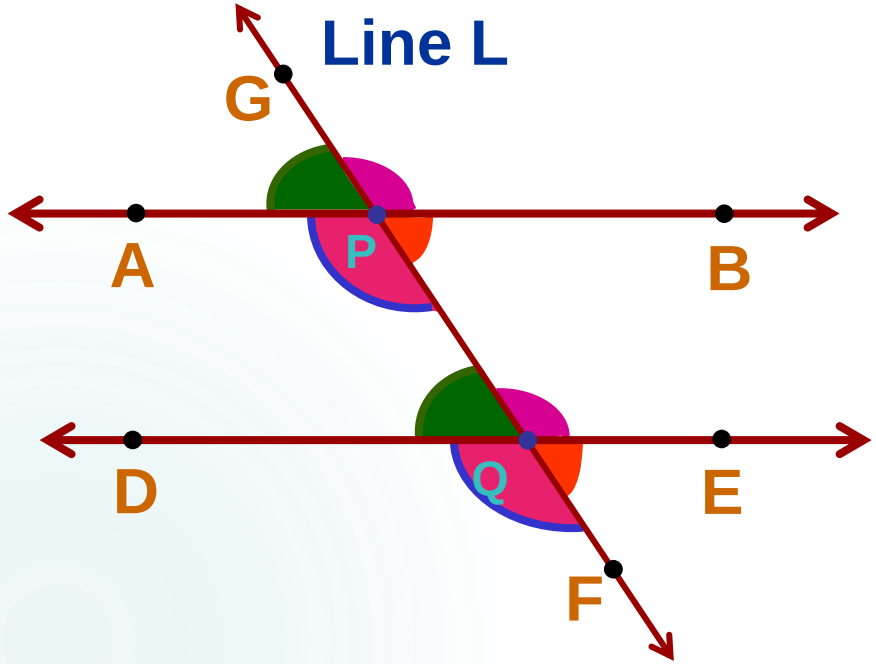
Corresponding Angles: Two angles that occupy corresponding positions.

$\angle 2 \cong \angle 6, \angle 1 \cong \angle 5, \angle 3 \cong \angle 7, \angle 4 \cong \angle 8$



Corresponding Angles

When two parallel lines are cut by a **transversal**, pairs of **corresponding angles** are formed.



$\angle GPB = \angle PQE$

$\angle GPA = \angle PQD$

$\angle BPQ = \angle EQF$

$\angle APQ = \angle DQF$

Four pairs of corresponding angles are formed.

Corresponding pairs of angles are **congruent**.

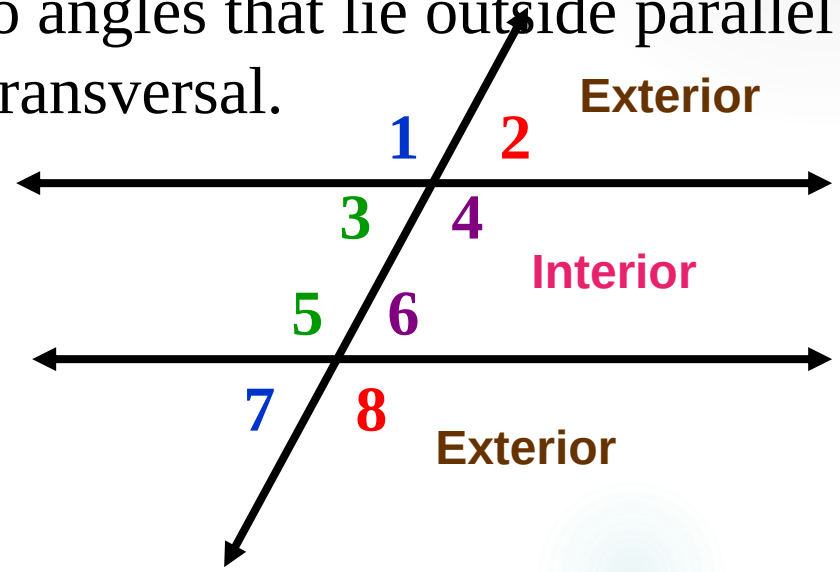
Same Side Interior/Exterior Angles

Same Side Interior Angles: Two angles that lie between parallel lines on the same sides of the transversal.

$m\angle 3 + m\angle 5 = 180^o$, $m\angle 4 + m\angle 6 = 180^o$

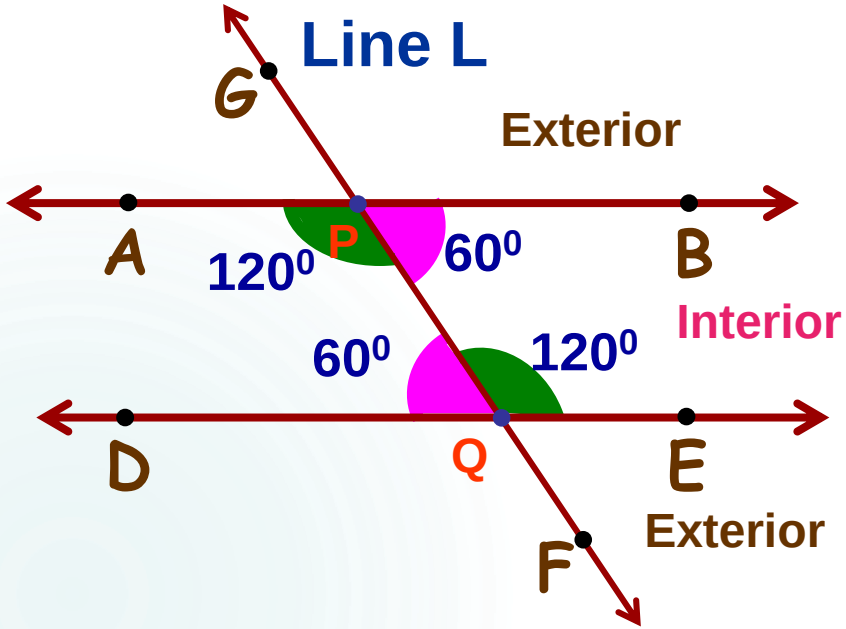
Same Side Exterior Angles: Two angles that lie outside parallel lines on the same sides of the transversal.

$m\angle 1 + m\angle 7 = 180^o$, $m\angle 2 + m\angle 8 = 180^o$



Interior Angles

The angles that lie in the area between the two parallel lines that are cut by a transversal, are called **interior angles.**



$\angle BPQ + \angle EQP = 180^0$

$\angle APQ + \angle DQP = 180^0$

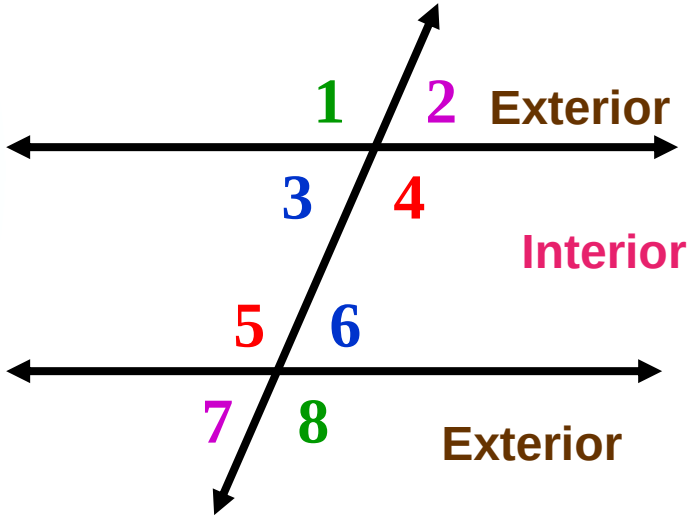
The measures of interior angles in each pair **add up to 180^0.**

A pair of interior angles lie on the **same side** of the transversal.

Alternate Interior/Exterior Angles

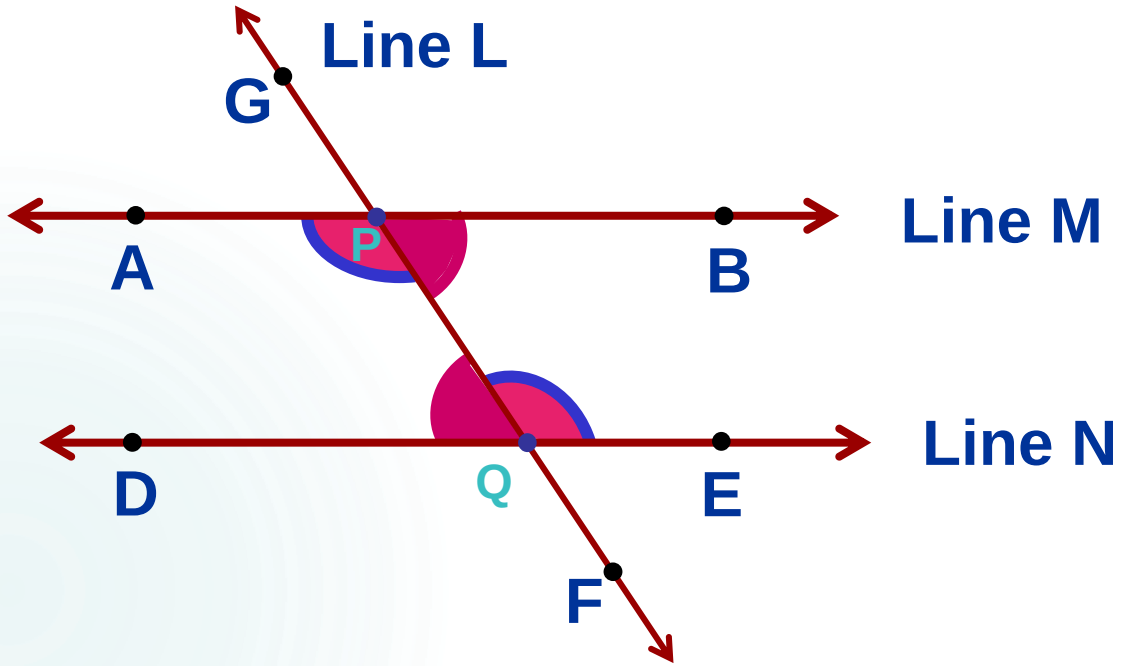
- **Alternate Interior Angles:** Two angles that lie between parallel lines on opposite sides of the transversal (but not a linear pair). $\angle 3 \cong \angle 6, \angle 4 \cong \angle 5$

Alternate Exterior Angles: Two angles that lie outside parallel lines on opposite sides of the transversal. $\angle 2 \cong \angle 7, \angle 1 \cong \angle 8$



Alternate Interior Angles

Alternate angles are formed on opposite sides of the transversal and at different intersecting points.



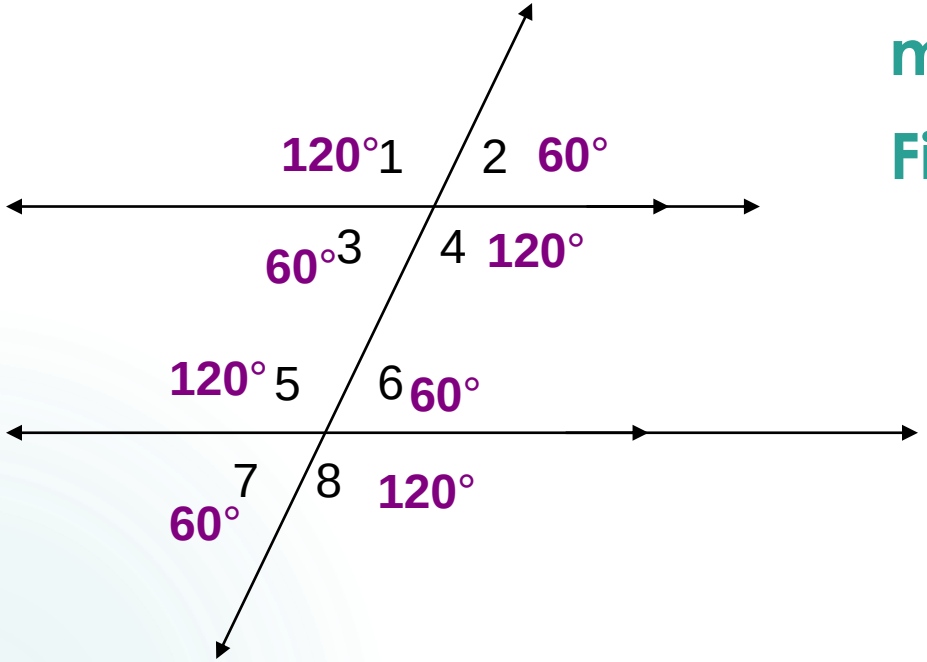
$\angle BPQ = \angle DQP$

$\angle APQ = \angle EQP$

Two pairs of alternate angles are formed.

Pairs of alternate angles are congruent.

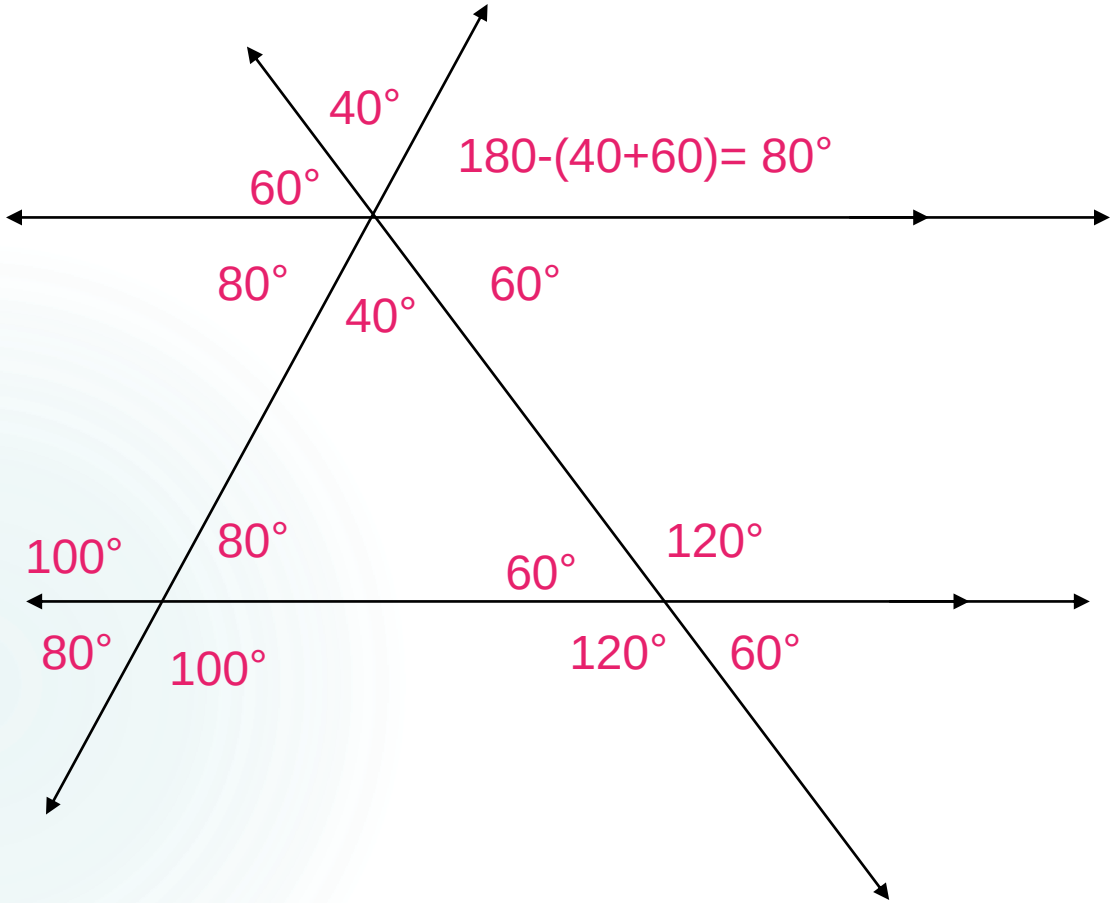
Practice



m<1=120°

Find all the remaining angle measures.

Another practice problem



Find all the missing angle measures, and name the postulate or theorem that gives us permission to make our statements.