# **Parallel lines and transversal**

### **Understanding: Parallel Lines and Transversal**

• Parallel lines are lines that are always the same distance apart and never meet, even if extended



• A transversal is a line that cuts two or more lines at distinct points



- When a transversal crosses parallel lines, it forms special pairs of angles
- Angles Made by a Transversal: It When a transversal cuts two or more straight lines, the angles formed are identified by different names by virtue of their position. In Figure transversal I intersects straight lines m and n at P and Q, respectively. There eight angles marked 1 to 8 have their special names.

Name	Angles
Interior angles	∠3, ∠4, ∠5, ∠6
Exterior angles	∠1, ∠2, ∠7, ∠8
Pairs of corresponding	$\angle 1$ and $\angle 5$ , $\angle 2$ and $\angle 6$
angles	$\angle 3$ and $\angle 7$ , $\angle 4$ and $\angle 8$
Pairs of alternate	$\angle 3$ and $\angle 5$ , $\angle 4$ and $\angle 6$
interior angles	
Pairs of alternate	$\angle 1$ and $\angle 7$ , $\angle 2$ and $\angle 8$
exterior angles	
Pairs of interior angles	$\angle 3$ and $\angle 6$ , $\angle 4$ and $\angle 5$
on the same side of the	
transversal	



# **Examples with Solutions**

#### Example

Two parallel lines are cut by a transversal. One corresponding angle is 75°. Find its matching angle

• Corresponding angles are equal → angle = 75°

#### Example

If one alternate interior angle is 60°, find the other alternate interior angle

• Alternate interior angles are equal  $\rightarrow$  angle = 60°

#### Example

One interior angle on the same side of the transversal is 110°. Find the other interior angle on the same side

Other angle =  $180^{\circ} - 110^{\circ} = 70^{\circ}$ 

• Consecutive interior angles add to  $180^\circ \rightarrow angle = 70^\circ$ 

#### Example

In the figure, one angle formed by the transversal is 85°. What is the vertically opposite angle?

• Vertically opposite angles are equal → angle = 85°

#### Example

Two parallel lines are cut by a transversal. One exterior angle is 120°. What is the corresponding interior angle on the same side?

• Corresponding angles are equal  $\rightarrow$  angle = 120°

## **Summary Points**

- Parallel lines never meet and stay the same distance apart.
- A transversal crosses two or more lines at different points.
- Corresponding, alternate, and vertically opposite angles are equal.
- Co-interior angles add up to 180°.
- These angle rules help solve many geometry problems.