Lesson 3.7 Parallel Lines and Transversals

Sunday, November 27, 2022 4:47 PM

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ParallelLi... (1)

Parallel Lines and Transversals

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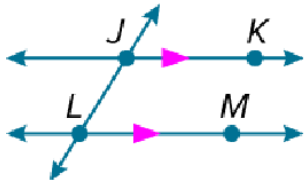
Parallel Lines and Transversals

If two lines do not intersect, then they are either parallel or skew.

Parallel and Skew	
Parallel lines are coplanar lines that do not intersect. **Example** $\overleftrightarrow{JK} \parallel \overleftrightarrow{LM}$	

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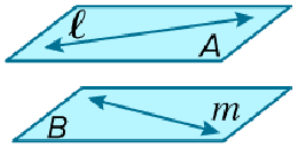
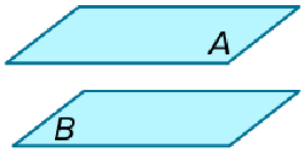
Parallel and Skew	
Skew lines are lines that do not intersect and are not coplanar. **Example** Lines ℓ and m are skew.	
Parallel planes are planes that do not intersect. **Example** Planes $\mathcal{A}$ and $\mathcal{B}$ are parallel.	

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A line that intersects two or more lines in a plane at different points is called a **transversal**. In the diagram below, line t is a transversal of lines q and r. Line t forms a total of eight angles with lines q and r. These angles and specific pairings of these angles are given special names.

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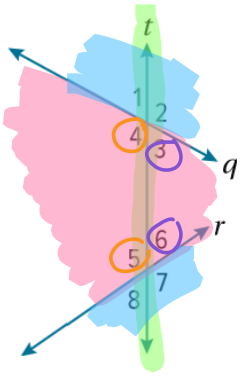
Transversal Angle Pair Relationships		
Four **interior angles** lie in the region between lines q and r.	$\angle 3, \angle 4, \angle 5, \angle 6$	
Four **exterior angles** lie in the two regions that are not between lines q and r.	$\angle 1, \angle 2, \angle 7, \angle 8$	
Consecutive interior angles are interior angles that lie on the same side of transversal t.	$\angle 4$ and $\angle 5$, $\angle 3$ and $\angle 6$	

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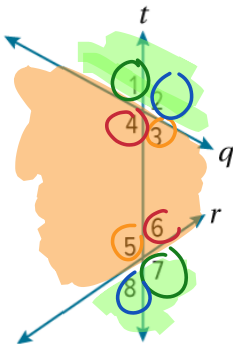
Transversal Angle Pair Relationships		
Alternate interior angles are nonadjacent interior angles that lie on opposite sides of transversal t.	$\angle 3$ and $\angle 5$, $\angle 4$ and $\angle 6$	
Alternate exterior angles are nonadjacent exterior angles that lie on opposite sides of transversal t.	$\angle 1$ and $\angle 7$, $\angle 2$ and $\angle 8$	

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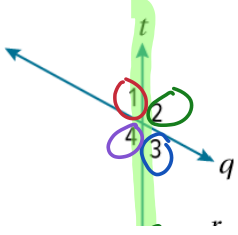
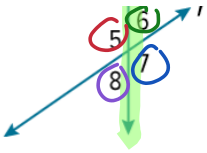
Transversal Angle Pair Relationships		
Corresponding angles lie on the same side of transversal t and on the same side of lines q and r.	$\angle 1$ and $\angle 5$, $\angle 2$ and $\angle 6$, $\angle 3$ and $\angle 7$, $\angle 4$ and $\angle 8$	



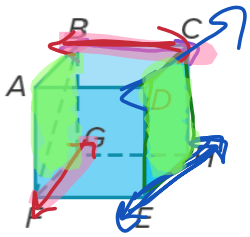
Example 1
Identify Parallel and Skew Relationships

Identify each of the following using the cube shown. Assume lines and planes that appear to be parallel or perpendicular are parallel or perpendicular, respectively.

a. all lines skew to $\overleftrightarrow{BC}$ One FG

b. all lines parallel to $\overleftrightarrow{EH}$ one CD

c. all planes parallel to plane *DCH* one Plane ABG



Example 1
Identify Parallel and Skew Relationships

a. all lines skew to $\overleftrightarrow{BC}$

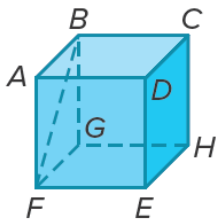
$\overleftrightarrow{AF}$, $\overleftrightarrow{DE}$, $\overleftrightarrow{FG}$, and $\overleftrightarrow{HE}$

b. all lines parallel to $\overleftrightarrow{EH}$

$\overleftrightarrow{AB}$, $\overleftrightarrow{CD}$, or $\overleftrightarrow{FG}$

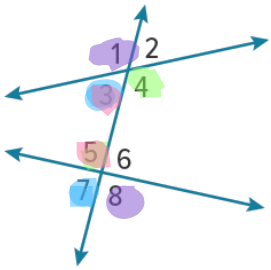
c. all planes parallel to plane *DCH*

Plane *ABG* is the only plane parallel to plane *DCH*.



Example 2
Classify Angle Pair Relationships

Classify the relationship between each pair of angles as *alternate interior*, *alternate exterior*, *corresponding*, or *consecutive interior angles*.



∠4 and ∠5 Alt. Interior ∠'s

∠3 and ∠7 corresponding

∠3 and ∠5 consecutive

∠1 and ∠8 Alt. exterior

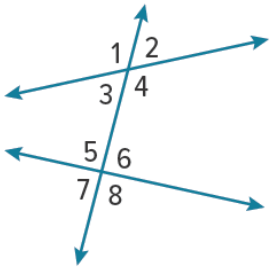
Example 2
Classify Angle Pair Relationships

∠4 and ∠5 are alternate interior angles.

∠3 and ∠7 are corresponding angles.

∠3 and ∠5 are consecutive interior angles.

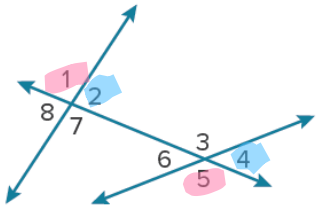
∠1 and ∠8 are alternate exterior angles.



Example 2
Classify Angle Pair Relationships

Check

Classify the relationship between each pair of angles as *alternate interior, alternate exterior, corresponding*, or *consecutive interior angles*.



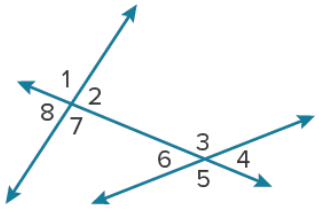
a. ∠1 and ∠5 ALT. EXTERIOR

b. ∠2 and ∠4 corresponding.

Example 2
Classify Angle Pair Relationships

Check

Classify the relationship between each pair of angles as *alternate interior, alternate exterior, corresponding*, or *consecutive interior angles*.



a. ∠1 and ∠5 alternate exterior angles

b. ∠2 and ∠4 corresponding angles

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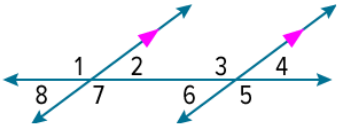
Angles and Parallel Lines

If two lines are parallel and cut by a transversal, then there are special relationships in the angle pairs formed by the lines.



Theorem 3.14: Corresponding Angles Theorem

If two parallel lines are cut by a transversal, then each pair of corresponding angles is congruent.

∠1 ≅ ∠3,
∠2 ≅ ∠4,