Lesson 3.7 Parallel Lines & Transversals

Wednesday, November 1, 2023 9:48 PM

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Lesson 3.7 Parallel

Lesson 3.7 Parallel Lines and Transversals

Workbook pages 181-186

Florida's B.E.S.T. Standards for Mathematics

MA.912.GR.1.1

Prove relationships and theorems about lines and angles. Solve mathematical and real-world problems involving postulates, relationships and theorems of lines and angles.

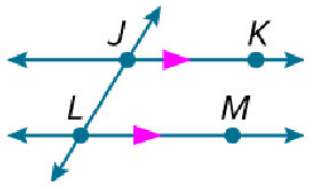
Content Objective

Students identify and use relationships

between parallel lines and transversals.

Learn
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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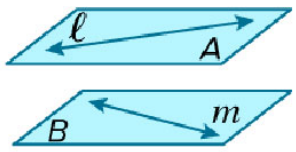
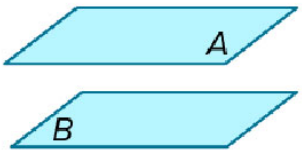
Parallel Lines and Transversals

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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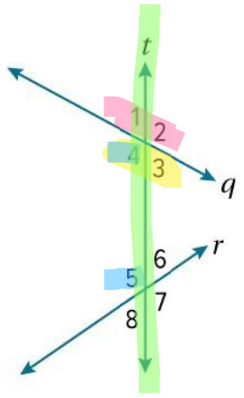
Parallel Lines and Transversals: A line that intersects two or more lin in a plane at different points is called a **transversal**.

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 $\angle 6$	

t is a trans of lines q,

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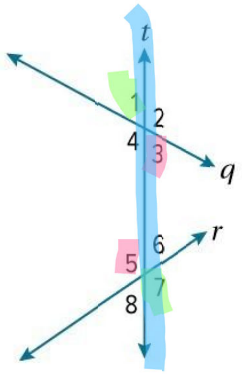
Parallel Lines and Transversals

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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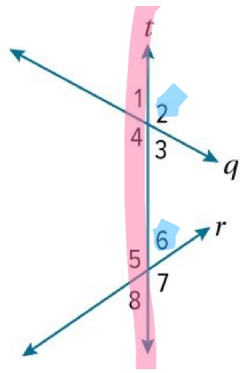
Parallel Lines and Transversals

Transversal Angle Pair Relationships		

Corresponding angles lie on the same side of transversal t and on the same side of lines q and r.	∠1 and ∠5, ∠2 and ∠6, ∠3 and ∠7, ∠4 and ∠8	

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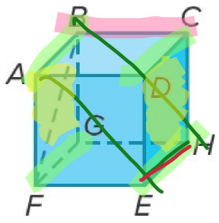
Example 1
Identify Parallel and Skew Relationships

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 $\overleftrightarrow{BC}$ $\overleftrightarrow{EH}$

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

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



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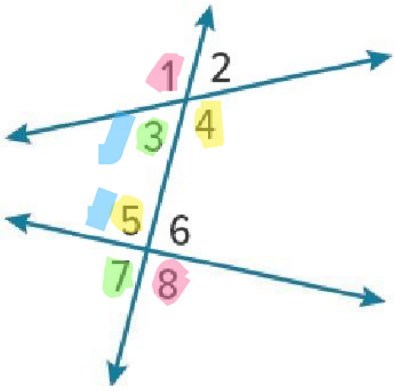
Example 2
Classify Angle Pair Relationships

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



∠4 and ∠5 ALA

∠3 and ∠7 CORRES.

∠3 and ∠5 CONSEC.

∠1 and ∠8 AEA

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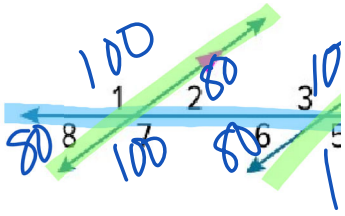
Angles and Parallel Lines

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,
∠5 ≅ ∠7,
∠6 ≅ ∠8

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Angles and Parallel Lines

Alternate Interior Angles Theorem

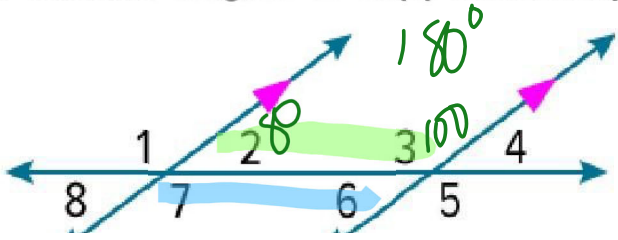
If two parallel lines are cut by a transversal, then each pair of alternate interior angles is congruent.

∠2 ≅ ∠6,
∠3 ≅ ∠7

Consecutive Interior Angles Theorem

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

∠2 and ∠
∠6 and ∠



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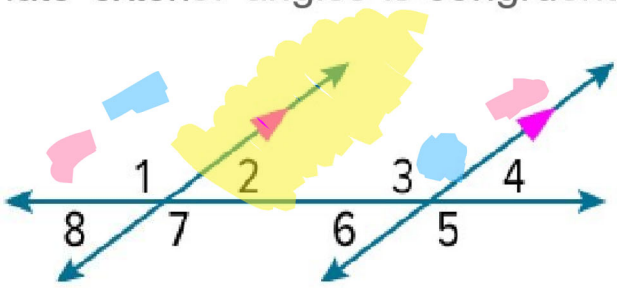
Angles and Parallel Lines

Alternate Exterior Angles Theorem

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

$\angle 1 \cong \angle 5$,
$\angle 4 \cong \angle 8$



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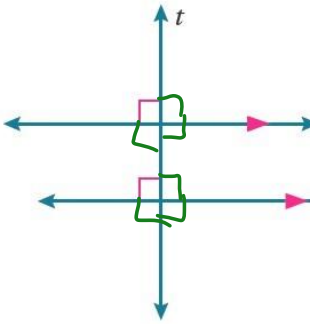
A special relationship also exists when the transversal of two parallel lines is a perpendicular line.

Perpendicular Transversal Theorem



In a plane, if a line is perpendicular to one of two parallel lines, then it is perpendicular to the other.

Example If $a \parallel b$ and $a \perp t$, then $b \perp t$.

parallel perp.

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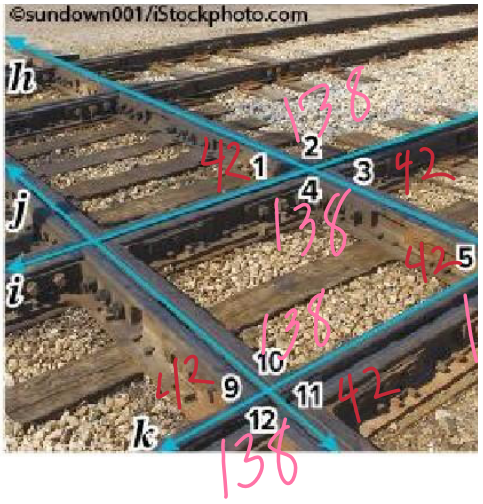
Example 4

Use Theorems About Parallel Lines

RAILROADS Lines i and k & j and h are parallel. If $m\angle 1 = 42°$. Find all 12 angles.



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Example 5
Find Values of Variables

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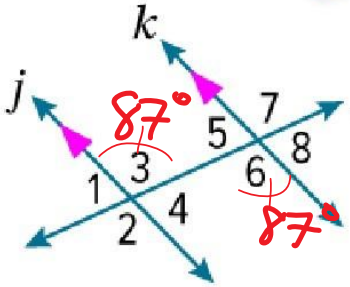
Use the figure to find the value of the indicated variable. Justify your reasoning.

a. If $m\angle 3 = (4x + 7)°$ and $m\angle 6 = (5x - 13)°$, find the value of x.



$4x + 7 = 5x - 13$

$+13 \quad +13$

$4x + 20 = 5x$

$-4x \quad -4x$

$20 = x$

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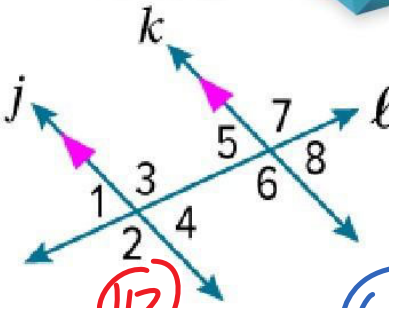
Example 5
Find Values of Variables

b. Find the value of y if $m\angle 8 = 68°$ and $m\angle 3 = (3y - 2)°$.



$$68 + 3y - 2 = 180$$
$$-68 \quad\quad -68$$
$$3y - 2 = 112$$
$$+2 \quad\quad +2$$
$$3y = 114$$
$$\frac{3y}{3} = \frac{114}{3}$$
$$y = 38$$

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