3-1 Parallel Lines and Transversals

Objectives: Identify the relationships between two lines or two planes.
Name angles formed by a pair of lines and a transversal.

Master E.

Parallel lines are _Coplanar_ **lines that do not** _intersect_ .

Examples: $\overrightarrow{BC} \parallel \overrightarrow{AD} \parallel \overline{HE} \parallel \overline{GF}$
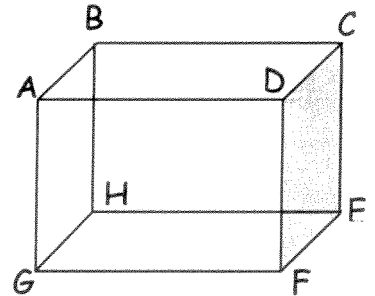
Skew Lines are lines that do not _intersect_ **and are not**
coplanar . Examples: _____

Intersecting Lines are lines that intersect at a _single_ _point_ .

Examples: $\overleftrightarrow{AB}$ & $\overleftrightarrow{BC}$ int. at B

Parallel planes are planes that do not _intersect_ .

Examples: _ABC_ $\parallel$ _GHF_

A Transversal is a line that intersects _2_ **or more coplanar lines**
at _2_ **different points. Example:** _line t_

The transversal, t, forms a total of 8 angles with lines l and m:

Four Interior angles: $\angle 3, \angle 4, \angle 5, \& \angle 6$

Four Exterior angles: $\angle 1, \angle 2, \angle 7, \& \angle 8$
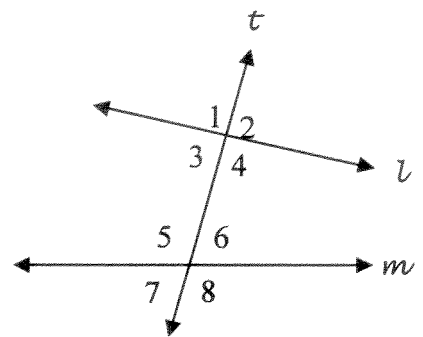
Consecutive interior: $\angle 3 \& \angle 5, \angle 4 \& \angle 6$

Alternate interior: $\angle 3 \& \angle 6, \angle 4 \& \angle 5$

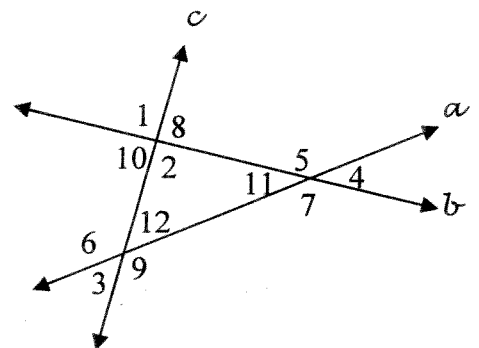*Consecutive exterior:* $\angle 1 \& \angle 7, \angle 2 \& \angle 8$

Alternate exterior: $\angle 1 \& \angle 8, \angle 2 \& \angle 7$

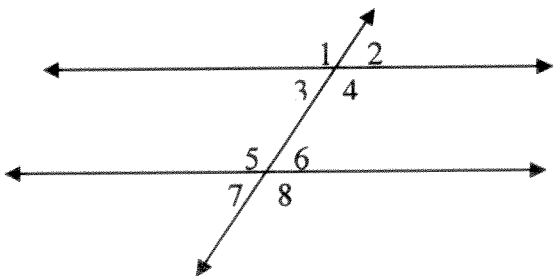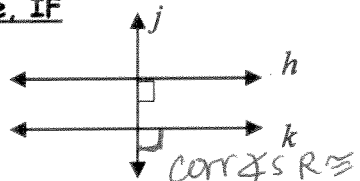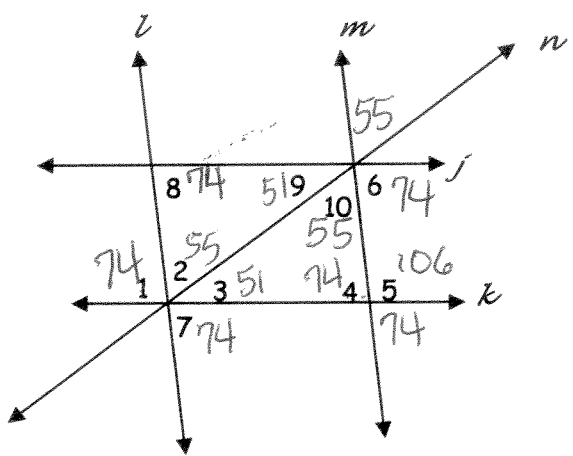*Corresponding angles:* $\angle 1 \& \angle 5, \angle 2 \& \angle 6, \angle 3 \& \angle 7, \angle 4 \& \angle 8$

Examples: Identify each pair of angles:

1. $\angle 6$ and $\angle 10$ - _consec. int._ (trans. c)

2. $\angle 9$ and $\angle 11$ - _alt. int._ (trans a)

3. $\angle 1$ and $\angle 5$ - _corresponding_ (trans b)

4. $\angle 3$ and $\angle 8$ - _alt. ext._ (trans c)

5. $\angle 7$ and $\angle 12$ - _alt. int._ (trans a)

6. $\angle 4$ and $\angle 8$ - _Corresponding_ (trans. b)

3-2 Angles and Parallel Lines

SOL Objective G.3: The student will solve practical problems involving complementary, supplementary, and congruent angles that include vertical angles, angles formed when parallel lines are cut by a transversal, and angles in polygons.

IF	THEN
two parallel lines are cut by a transversal,	their corresponding angles are ___$\cong$___.
	their alternate interior angles are ___$\cong$___.
	their alternate exterior angles are ___$\cong$___.
	their consecutive interior angles are _supp_.
	their consecutive exterior angles are _supp_.

Diagram: two parallel horizontal lines cut by a transversal with angles labeled 1 2 / 3 4 (top intersection) and 5 6 / 7 8 (bottom intersection).

In a plane, IF	THEN
a line (transversal j) is $\perp$ to one of two parallel lines (h), $(j \perp h)$	it is also $\perp$ to the other parallel line. $j \perp$ _k_

corr $\angle$s R $\cong$

Practice: If $l \parallel m$, $j \parallel k$, m$\angle 8$ = 74°, and m$\angle 10$ = 55°, find the following angle measures.

1. m$\angle 1$ = _74_

2. m$\angle 2$ = _55_

3. m$\angle 2$ + m$\angle 3$ = _106_

4. m$\angle 2$ + m$\angle 3$ + m$\angle 8$ = _180_

5. m$\angle 4$ = _74_

6. m$\angle 5$ = _106_

7. m$\angle 6$ = _74_

8. m$\angle 7$ = _74_

9. m$\angle 3$ + m$\angle 7$ = _125_

10. m$\angle 9$ = _51_

Diagram with lines l, m, n, j, k and angle labels: 8 74, 5 19, 6 74, 10, 55, 74, 55, 55, 74, 106, 1 2, 3 51, 4 5, 7 74, 74.

$\angle 9 + 55 + 74 = 180$

Practice proofs: Use the picture above.

11. Given: $l \parallel m$, $j \parallel k$
Prove: $\angle 6 \cong \angle 1$

Statements	Reasons
1. $l \parallel m$, $j \parallel k$	1. Given
2. $\angle 6 \cong \angle 4$	2. 2 $\parallel$ CBT make alt. int $\angle$s $\cong$
3. $\angle 4 \cong \angle 1$	3. 2 $\parallel$ CBT make corr. $\angle$s $\cong$
4. $\angle 6 \cong \angle 1$	4. Transitive POC

12. Given: $j \parallel k$, $l \parallel m$, $\angle 1 \cong \angle 2$
Prove: $\angle 1 \cong \angle 10$

Statements	Reasons
1. $j \parallel k$, $l \parallel m$, $\angle 1 \cong \angle 2$	1. Given
2. $\angle 2 \cong \angle 10$	2. 2 $\parallel$ CBT make alt. int. $\angle$s $\cong$
3. $\angle 1 \cong \angle 10$	3. Transitive POC