Geometry Unit 4

Parallel Lines

Warmup

What I have been meaning to do for a while now.

https://www.youtube.com/watch?v=WckCw_-7e3M

Parallel Lines and Planes

- **Content Objective**: Students will be able to identify the properties of parallel lines and planes, using them to prove a theorem.

- **Language Objective**: Students will be able to complete statements and proofs using the properties of parallel lines.

Definitions

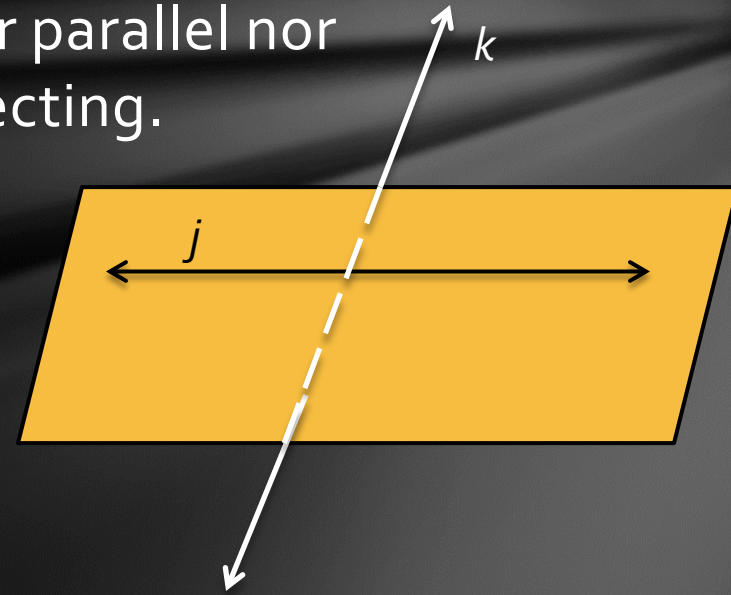Two that lines that do not intersect are either *parallel or skew*.

Parallel Lines (ll lines) are coplanar lines that do not intersect.
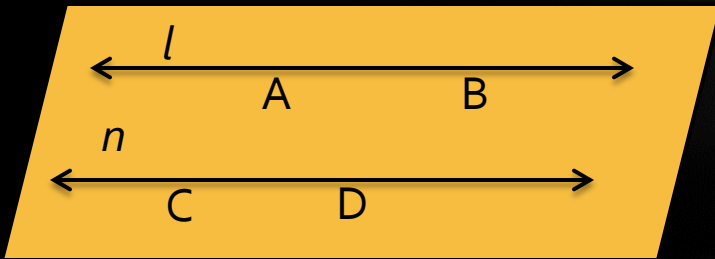
l and n are parallel lines

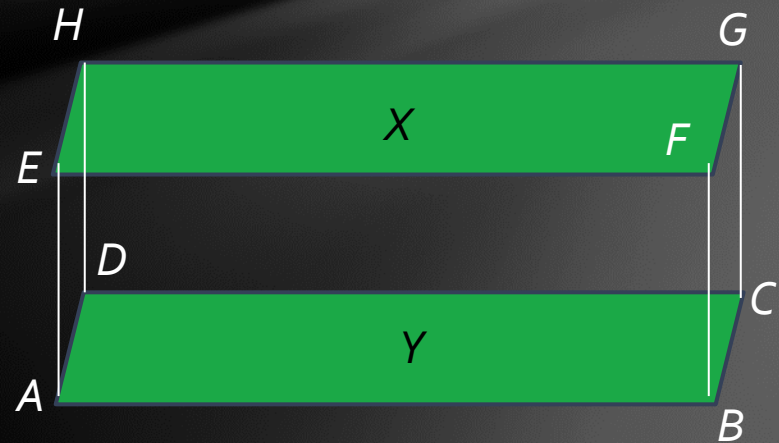l is parallel to n (l ll n)

Skew Lines are non-coplanar lines, making them neither parallel nor intersecting.

j and k are skew lines.

Parallel Planes

- **Parallel Planes** (ll planes) do not intersect.
  - Plane *X* is parallel to Plane *Y.*

- A line and a plane are parallel if they do not intersect.
  - $\overleftrightarrow{EF}$ ll *Y* and $\overleftrightarrow{FG}$ ll *Y*
  - Also, $\overleftrightarrow{AB}$ ll *X* and $\overleftrightarrow{BC}$ ll *X.*

Proving Theorem 3-1
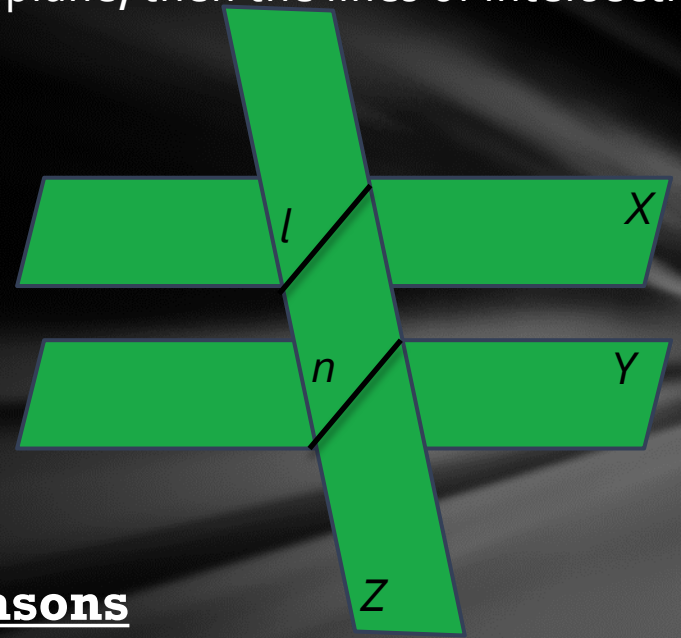
Theorem 3-1: If two parallel planes are cut by a third plane, then the lines of intersection are parallel.

Given: Plane *X* ll Plane *Y*;

      plane *Z* intersects *X* in line *l*;

      plane *Z* intersects *Y* in line *n*.

Prove: *l* ll *n*

Statements	Reasons
1. *l* is in *Z*; *n* is in *Z*	1. Given
2. *l* and *n* are coplanar	2. Def. of Coplanar
3. *l* is in *X*; *n* is in *Y*; *X* ll *Y*	3. Given
4. *l* and *n* do not intersect.	4. Parallel planes do not intersect (Def. of ll planes)
5. *l* ll *n*	5. Def. of ll lines.

Key Terms

The following terms will be needed for future theorems about parallel lines. These only apply to coplanar lines.

Transversal: A line that intersects two or more coplanar lines in different points.

Interior Angles: angles 3, 4, 5, and 6

Exterior Angles: angles 1, 2, 7, and 8
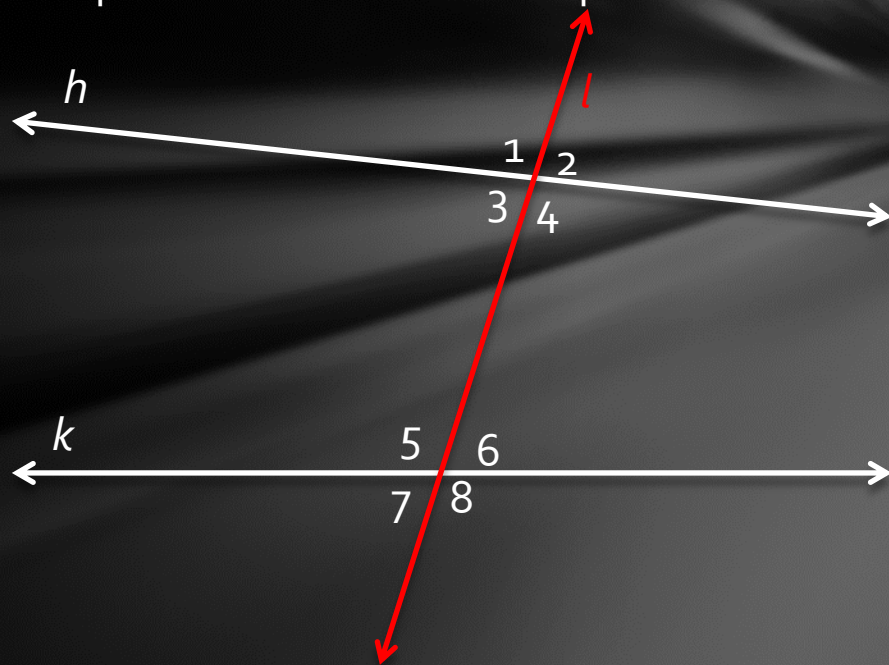
Alternate Interior Angles (alt. int. <'s)
- Two non-adjacent interior angles on the opposite sides of the transversal

Ex: < 3 and <6   < 4 and <5

Same-side interior angles (s-s int. <'s)
- Two interior angles on the same side of the transversal.

Ex: < 3 and <5   < 4 and < 6

h

l

1 2
3 4

k

5 6
7 8

Key Terms

The following terms will be needed for future theorems about parallel lines. These only apply to coplanar lines.

Corresponding Angles (corr. <'s)
- Two angles in corresponding positions relative to the two lines.

Ex: < 1 and <5   < 2 and <6

   < 3 and <7   < 4 and <8

Alternate Exterior Angles (alt. ext. <'s)
- Two non-adjacent exterior angles on the opposite sides of the transversal.

Ex: < 1 and <8   < 2 and < 7

h

l

1 2
3 4

k

5 6
7 8