

3.1 Identify Pairs of Lines and Angles

Before You identified angle pairs formed by two intersecting lines.

Now You will identify angle pairs formed by three intersecting lines.

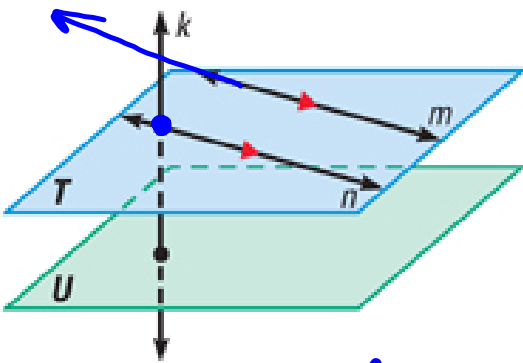
Why? So you can classify lines in a real-world situation.

G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

Two lines that do NOT intersect are:

- 1. Parallel Lines** - Lines that do NOT intersect and are coplanar.
- 2. Skew Lines** - Lines that do NOT intersect and are NOT coplanar.

Parallel Planes - Two planes that do NOT intersect.



Lines m and n are parallel lines ($m \parallel n$).

Lines m and k are skew lines.

Planes T and U are parallel planes ($T \parallel U$).

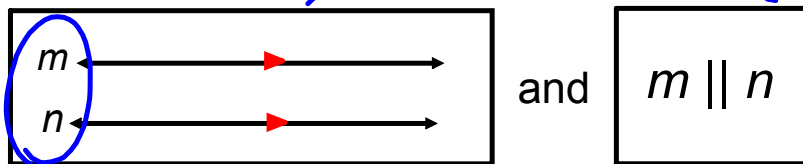
Lines k and n are intersecting lines, and there is a plane (not shown) containing them.

Script

lower case for a line name

NOTATION:

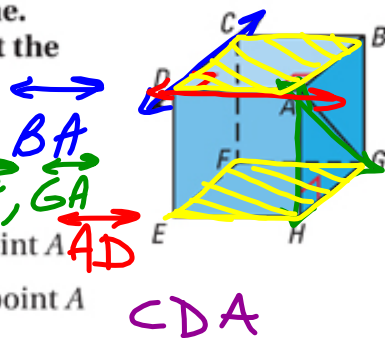
Parallel Lines :



EXAMPLE 1 Identify relationships in space

Think of each segment in the figure as part of a line. Which line(s) or plane(s) in the figure appear to fit the description?

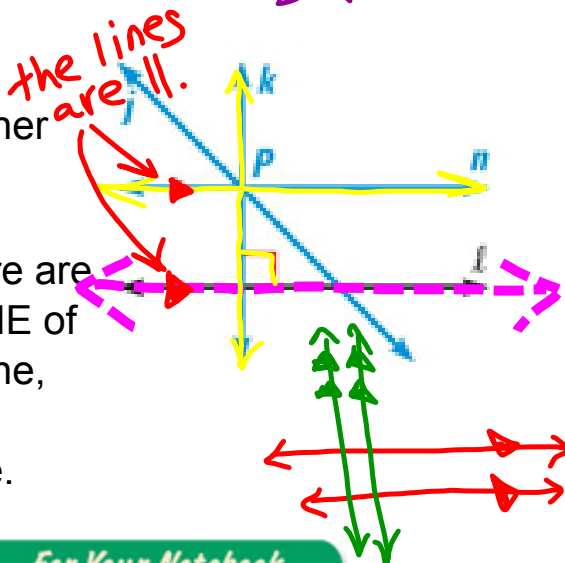
- a. Line(s) parallel to \overleftrightarrow{CD} and containing point A
- b. Line(s) skew to \overleftrightarrow{CD} and containing point A
- c. Line(s) perpendicular to \overleftrightarrow{CD} and containing point A
- d. Plane(s) parallel to plane EFG and containing point A



Parallel and Perpendicular Lines:

Two lines in the same plane are either parallel or intersect in a point.

Through a point NOT on a line, there are infinitely many lines. EXACTLY ONE of these lines is parallel to the given line, and EXACTLY ONE of them is PERPENDICULAR to the given line.

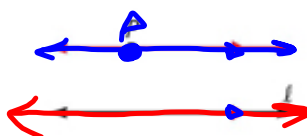


POSTULATES

For Your Notebook

POSTULATE 13 Parallel Postulate

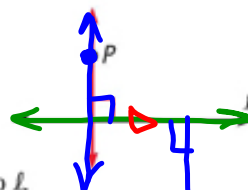
If there is a line and a point not on the line, then there is exactly one line through the point parallel to the given line.



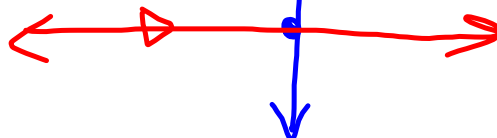
There is exactly one line through P parallel to l .

POSTULATE 14 Perpendicular Postulate

If there is a line and a point not on the line, then there is exactly one line through the point perpendicular to the given line.

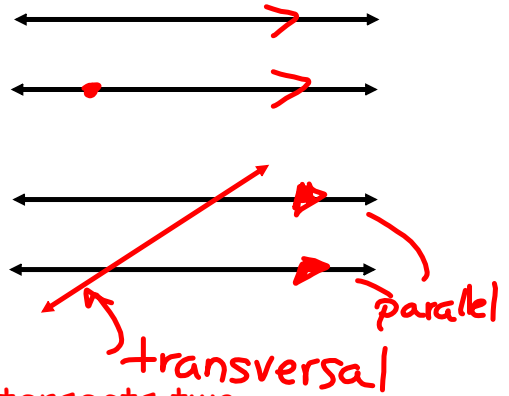


There is exactly one line through P perpendicular to l .



How much is there to study about the two parallel lines?

A third line intersecting the parallel lines leads to many discoveries.



Transversal: A line, ray or segment that intersects two or more coplanar lines, rays, or segments, each at a different point.

on each side of the transversal

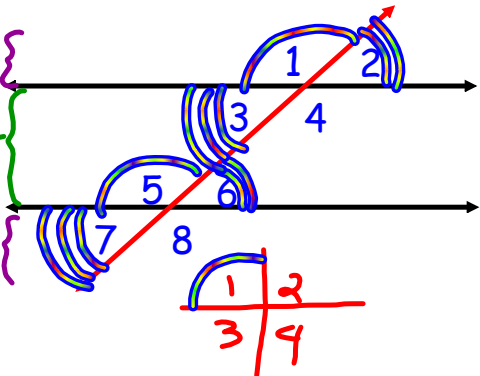
Alternate Interior Angles - $\angle 4 \angle 5, \angle 3 \angle 6$ exterior

Alternate Exterior Angles - $\angle 1 \angle 8, \angle 2 \angle 7$ interior

Same-side Interior Angles - $\angle 5 \angle 3, \angle 6 \angle 4$

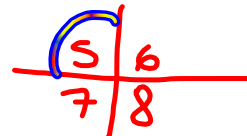
Corresponding Angles - $\angle 1 \angle 5, \angle 2 \angle 6$

Same location as the other \angle . $\angle 3 \angle 7, \angle 4 \angle 8$ exterior



Conjectures:

For two parallel lines cut by a transversal.



Alternate Interior Angles are congruent

Alternate Exterior Angles are congruent

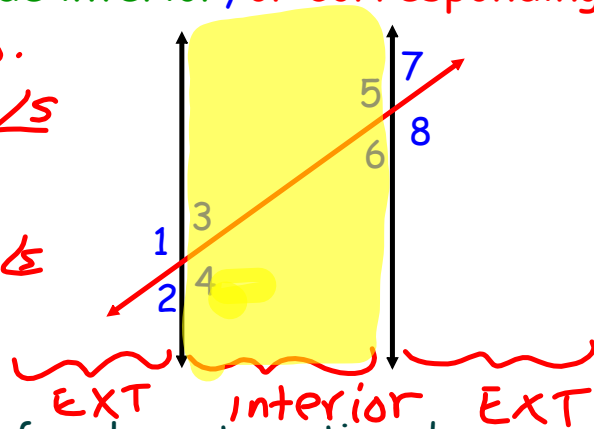
Same Side Interior Angles are Supplementary

Consecutive Interior Angles are Supplementary

Corresponding angles are congruent

Indicate whether the pairs of angles are alternate interior, alternate exterior, same-side interior, or corresponding.

1. $\angle 1$ and $\angle 5$ *Corresp.*
2. $\angle 3$ and $\angle 6$ *Alt. Int. \sphericalangle s*
3. $\angle 4$ and $\angle 8$ *corresp.*
4. $\angle 2$ and $\angle 7$ *Alt. Ext \sphericalangle s*
5. $\angle 4$ and $\angle 6$ *S.S. Int*



Name five other special pairs of angles not mentioned.

1. $\angle 3$ and $\angle 7$ *Corresp.*
2. $\angle 3$ and $\angle 5$ *S.S. I.*
3. $\angle 2$ and $\angle 6$ *Corresp.*
4. $\angle 4$ and $\angle 5$ *A.I. \sphericalangle s*
5. $\angle 1$ and $\angle 8$ *A.E. \sphericalangle s*