

Pairs of Lines and Angles

Lesson Objective

INBAT identify parallel, perpendicular, and skew lines; identify pairs of angles formed by transversals.

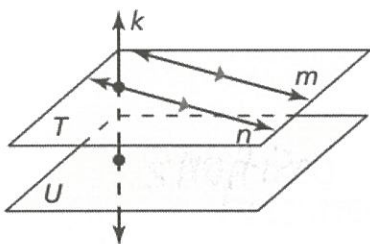
Two lines that do NOT intersect are either parallel lines or skew lines.

Parallel Lines: two lines are parallel lines when they do NOT intersect and are coplanar

Skew Lines: two lines are skew lines when they do NOT intersect and are not coplanar.

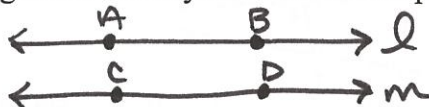
Parallel Planes: two planes are parallel planes if they do NOT intersect.

Example:



- Which lines are parallel? $\rightarrow m$ and n are parallel
 $\rightarrow$ Small directed arrows (usually red in color) are used to show lines are parallel.
 $\rightarrow$ The symbol $\parallel$ means "is parallel to" $\rightarrow m \parallel n$
- Which lines are skew? m and k are skew
- Which planes are parallel? plane $T \parallel$ plane U
- Name the line(s) parallel to plane U . lines m and n

Think About It... Are segments and rays that are within parallel lines also parallel? Why or why not?



yes!

Example:

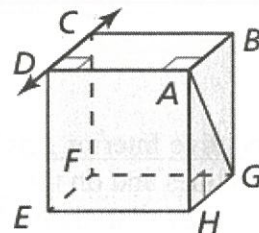
5. Think of each segment in the figure as part of a line. Which line(s) or plane(s) appear to fit the description?

a. Line(s) parallel to $\overleftrightarrow{CD}$ and containing point A $\overleftrightarrow{BA}$ (line AB)

b. Line(s) skew to $\overleftrightarrow{CD}$ and containing point A $\overleftrightarrow{AH}, \overleftrightarrow{AG}$

c. Line(s) perpendicular to $\overleftrightarrow{CD}$ and containing point A $\overleftrightarrow{DA}$

d. Plane(s) parallel to plane EFG and containing point A plane CBA

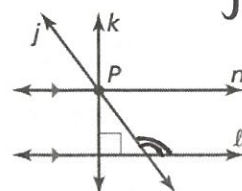


- $\rightarrow$ Two distinct lines in the same plane are either parallel (like ℓ and n) or intersect in a point (like j and k).

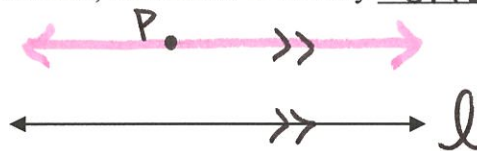
Think About It...

$\rightarrow$ How many through point P are parallel to line ℓ ? ONE

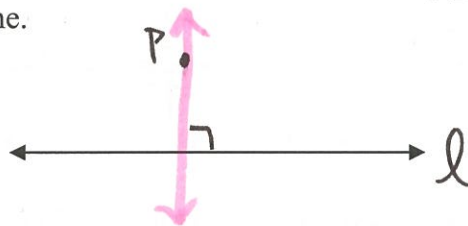
$\rightarrow$ How many through point P are perpendicular to line ℓ ? ONE



Parallel Postulate: If there is a line and a point not on the line, then there is exactly ONE line through the point that is parallel to the given line.

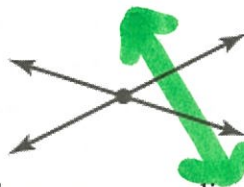
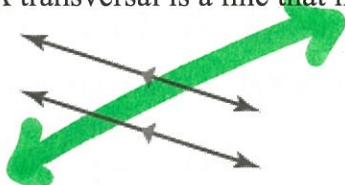


Perpendicular Postulate: If there is a line and a point not on the line, then there is exactly ONE line through the point that is perpendicular to the given line.



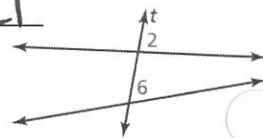
Identifying Pairs of Angles

Transversal: A transversal is a line that intersects 2 or more coplanar lines at different points.

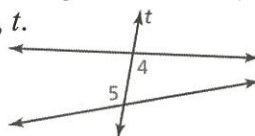


Corresponding Angles: two angles are corresponding when they have corresponding positions.

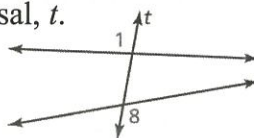
→ $\angle 2$ and $\angle 6$ are above the lines and to the right of the transversal (same)



Alternate Interior Angles: two angles are alternate interior angles when they lie between the two lines and on opposite sides of the transversal, t .

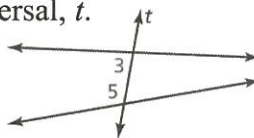


Alternate Exterior Angles: two angles are alternate exterior angles when they lie outside the two lines and on opposite sides of the transversal, t .



Consecutive Interior Angles: two angles are consecutive interior angles when they lie between the two lines and on the same side of the transversal, t .

→ Also called Same-Side Interior Angles



Example:

6. Identify all pairs of angles of the given type.

a. Corresponding

$\angle 1$ and $\angle 5$; $\angle 4$ and $\angle 8$; $\angle 2$ and $\angle 6$; $\angle 3$ and $\angle 7$

b. Alternate Interior

$\angle 2$ and $\angle 7$; $\angle 4$ and $\angle 5$

c. Alternate Exterior

$\angle 1$ and $\angle 8$; $\angle 3$ and $\angle 6$

d. Consecutive Interior

~~$\angle 1$ and $\angle 4$~~ $\angle 4$ and $\angle 7$; $\angle 2$ and $\angle 5$

