# Chapter 3
# Parallel and Perpendicular Lines

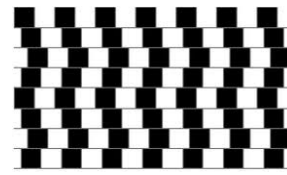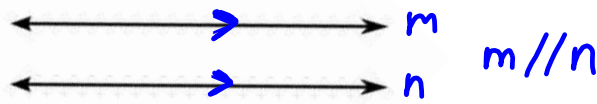3.3 Prove Lines are Parallel

3.6 Prove Theorems About Perpendicular Lines

3.4 Find and Use Slopes of Lines

3.2 Use Parallel Lines and Transversals

3.1 Identify Pairs of Lines and Angles

3.5 Write and Graph Equations of Lines

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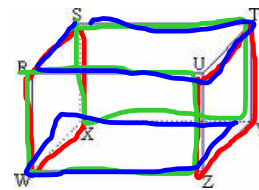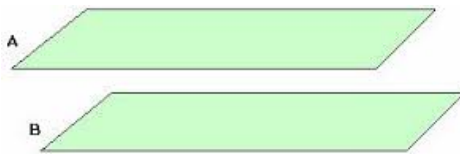
## 3.1  Identify Pairs of Lines and Angles

Goal: Identify angle pairs formed by three intersecting lines.
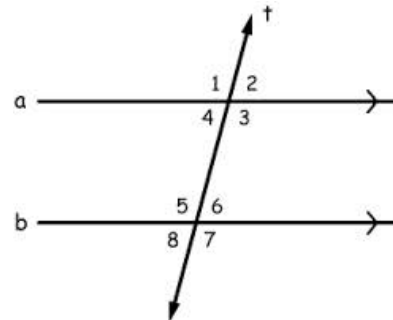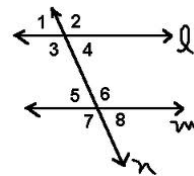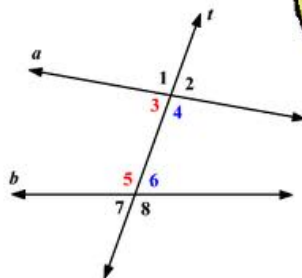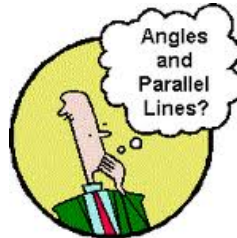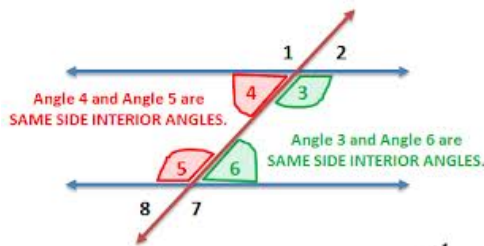
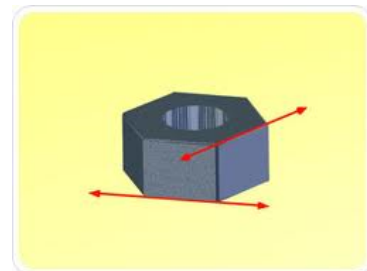Parallel Lines - lines in the same plane that do not intersect
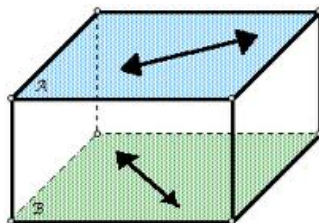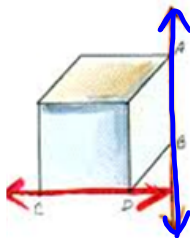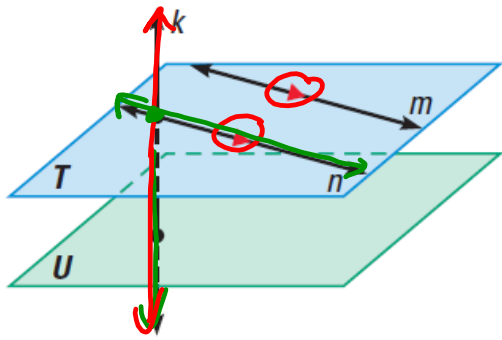
m

n

m // n

Parallel Planes - two planes that do not intersect

Skew Lines - lines that are not coplanar

Skew lines are in different planes,
and never intersect

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

Lines *m* and *k* are skew lines.

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

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

Small directed triangles, as shown on lines *m* and *n* above, are used to show that lines are parallel.

The symbol $\|$ means "is parallel to," as in *m* $\|$ *n*.   m//n

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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.
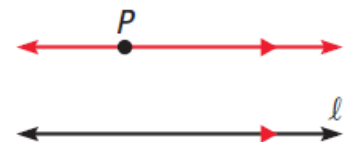
There is exactly one line through *P* parallel to $\ell$.

P

$\ell$

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.

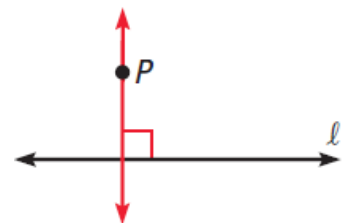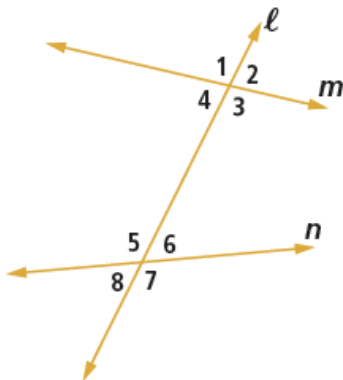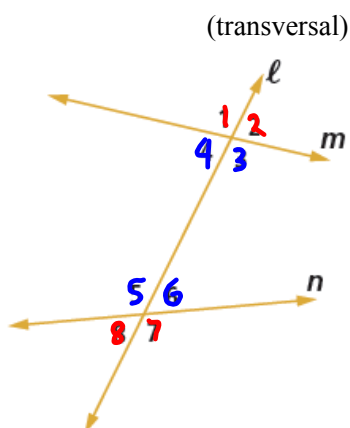There is exactly one line through *P* perpendicular to $\ell$.

P

$\ell$

Transversal - a line that intersects two lines at different
points

- $\ell$ ("cuts") lines m and n          $\ell$ - transversal



two lines intersected by a third line
8 angles are formed

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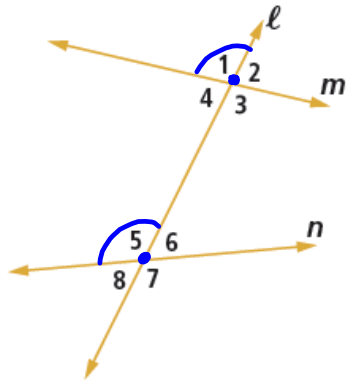# Angles Formed by a Transversal

(transversal)



Interior Angles - the angles between the
two lines when cut by
a transversal

$\angle 3$    $\angle 4$    $\angle 5$    $\angle 6$
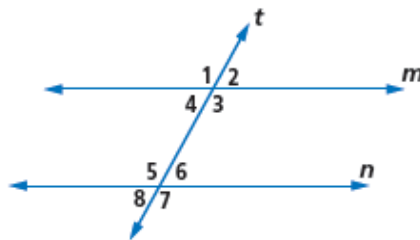
Exterior Angles - the angles outside the
two lines when cut by
a transversal

$\angle 1$    $\angle 2$    $\angle 7$    $\angle 8$

Corresponding Angles - any pair of angles in similar locations
                          with respect to the transversal and each line

ex)   $\angle 1$ and $\angle 5$

$\angle 2$ and $\angle 6$

$\angle 3$ and $\angle 7$

$\angle 4$ and $\angle 8$

alternate interior angles - a pair of angles that are on opposite sides of
                             the transversal and between the other two lines

$\angle 4$ and $\angle 6$          $\angle 3$ and $\angle 5$

alternate exterior angles - a pair of angles that are on opposite sides of
                             the transversal and outside the other two lines
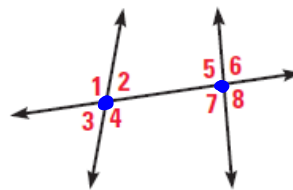
$\angle 1$ and $\angle 7$          $\angle 2$ and $\angle 8$

consecutive interior angles - a pair of angles that are on the same side of the
   "same side interior"        transversal and between the two lines

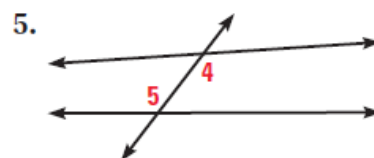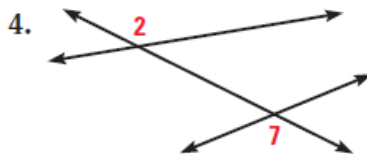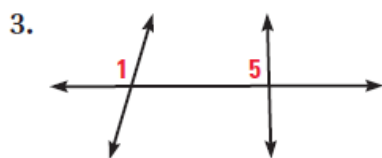$\angle 4$ and $\angle 5$          $\angle 3$ and $\angle 6$

## Identify angle relationships

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

**a.** Corresponding
**b.** Alternate interior
**c.** Alternate exterior
**d.** Consecutive interior

*"SAME SIDE"*

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**Classify the pair of numbered angles.**

3.

4.

5.

HW: Pg 142 #'s 1, 3-27, 29-32, 34-38

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