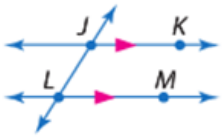
Parallel Lines: **Coplanar lines that do not intersect.**

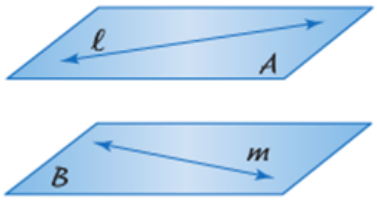


Arrows are used to indicate that lines are parallel.

example: $\overleftrightarrow{JK} \parallel \overleftrightarrow{LM}$

read: line JK is parallel to line LM.

Skew Lines: lines that do not intersect and are not coplanar.



example: Plane A is parallel to Plane B.

example: lines ℓ and m are skew.

Parallel Planes: planes that do not intersect.

**note: if segments or rays are contained within lines that are parallel or skew, then the segments or rays are parallel or skew.

If 2 lines are parallel, their parts are parallel.

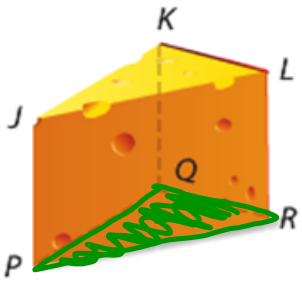
If 2 lines are skew, their parts are skew.

Identify each of the following using the wedge of cheese below.

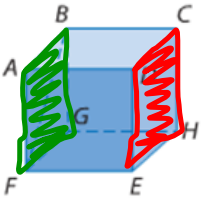
a. all segments parallel to $\overline{JP}$. $\overline{KQ}, \overline{LR}$

b. all segments skew to $\overline{KL}$. $\overline{JP}, \overline{PR}, \overline{QP}$

c. a plane parallel to plane PQR. Plane JKL



Identify each of the following using the cube shown.



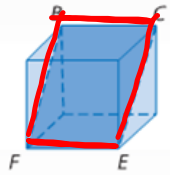
1A. all segments skew to $\overline{BC}$. $\overline{DE}, \overline{AF}, \overline{EH}, \overline{FG}$

1B. all segments parallel to $\overleftrightarrow{EH}$. $\overline{AB}, \overline{CD}, \overline{FG}$

1C. all planes parallel to plane DCH. Plane ABG

Parallel vs. Skew

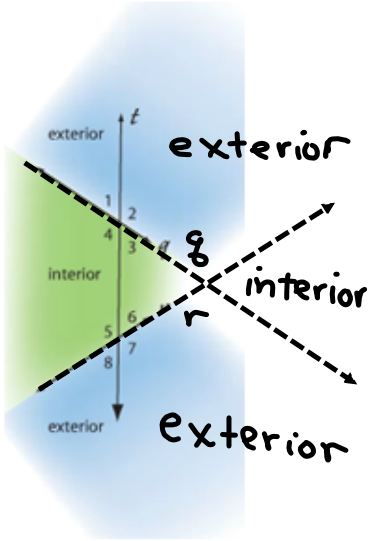
In Guided Practice 1A, $\overleftrightarrow{FE}$ is *not* skew to $\overleftrightarrow{BC}$. Instead, these lines are parallel in plane *BCF*.



Transversal: a line that intersects two or more coplanar lines at two different points

TRANSVERSAL ANGLE PAIR RELATIONSHIPS

Four **interior angles** lie in the region between lines *q* and *r*.	∠4, ∠3, ∠5, ∠6
Four **exterior angles** lie in the two regions that are not between lines *q* and *r*.	∠1, ∠2, ∠7, ∠8
consecutive interior angles, also known as **same-side interior angles**, are interior angles that lie on the same side of transversal *t*.	∠4 and ∠5 ∠3 and ∠6
alternate interior angles are nonadjacent interior angles that lie on opposite sides of transversal *t*.	∠4 and ∠6 ∠3 and ∠5
alternate exterior angles are nonadjacent exterior angles that lie on opposite sides of transversal *t*.	∠1 and ∠7 ∠2 and ∠8
corresponding angles lie on the same side of transversal *t* and on the same side of lines *q* and *r*.	∠1 and ∠5, ∠2 and ∠6 ∠4 and ∠8, ∠3 and ∠7



Refer to the figure below. Classify the relationship between each pair of angles as *alternate interior*, *alternate exterior*, *corresponding*, or *same-side interior* angles.

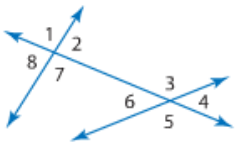
alt. ext. csp. ss int. alt. int.

a. ∠1 and ∠5

alt. ext.

b. ∠6 and ∠7

ss int



c. ∠2 and ∠4

csp.

d. ∠2 and ∠6

alt int

e. ∠3 and ∠7

alt. int

f. ∠7 and ∠5

csp.

g. ∠4 and ∠8

alt. ext.

h. ∠2 and ∠3

ss. int

When more than one line can be considered a transversal, first identify the transversal for a given angle pair by locating the line that connects the vertices of the angles.

Identify the transversal connecting each pair of angles in the photo. Then classify the relationship between each pair of angles.

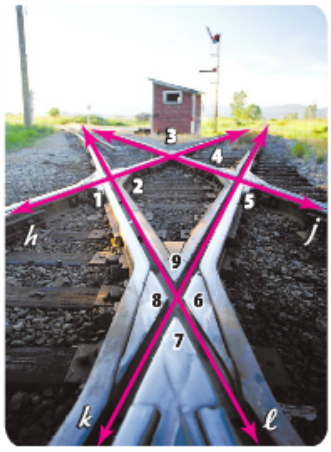
a. ∠1 and ∠3 transv = h
alt. ext.

b. ∠5 and ∠6 transv. = k
ss int.

c. ∠2 and ∠6 transv. = ℓ
csp.

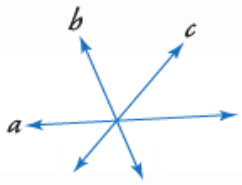
d. ∠3 and ∠5 transv. = j
alt. ext.

e. ∠2 and ∠8 transv. = ℓ
alt. int.



f. ∠5 and ∠7 k
csp

g. ∠2 and ∠9 ℓ
ss int

StudyTip

Nonexample In the figure below, line c is *not* a transversal of lines a and b, since line c intersects lines a and b in only one point.