3-1 Lines and Angles

EL # 2

Objectives

Identify parallel, perpendicular, and skew lines.
Identify the angles formed by two lines and a transversal.

Vocabulary

parallel lines
perpendicular lines
skew lines
parallel planes
transversal
corresponding angles
alternate interior angles
alternate exterior angles
same-side interior angles

3-1 Lines and Angles

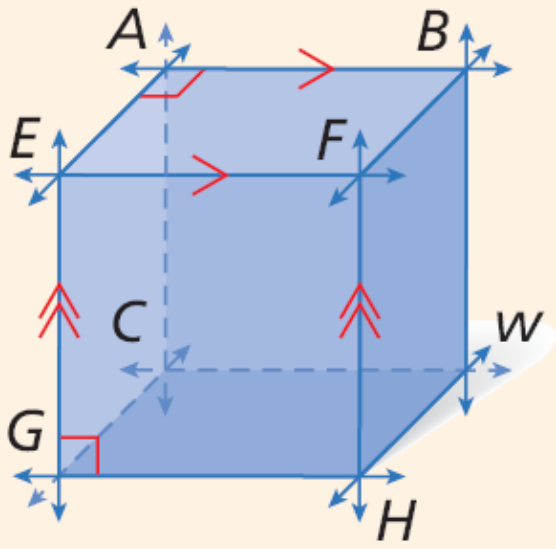
Parallel, Perpendicular, and Skew Lines

Parallel lines ($\parallel$) are coplanar and do not intersect. In the figure, $\overleftrightarrow{AB} \parallel \overleftrightarrow{EF}$, and $\overleftrightarrow{EG} \parallel \overleftrightarrow{FH}$.

Perpendicular lines ($\perp$) intersect at 90° angles. In the figure, $\overleftrightarrow{AB} \perp \overleftrightarrow{AE}$, and $\overleftrightarrow{EG} \perp \overleftrightarrow{GH}$.

Skew lines are not coplanar. Skew lines are not parallel and do not intersect. In the figure, $\overleftrightarrow{AB}$ and $\overleftrightarrow{EG}$ are skew.

Parallel planes are planes that do not intersect. In the figure, plane $ABE \parallel$ plane CDG.



Arrows are used to show that $\overleftrightarrow{AB} \parallel \overleftrightarrow{EF}$ and $\overleftrightarrow{EG} \parallel \overleftrightarrow{FH}$.

Helpful Hint

Segments or rays are parallel, perpendicular, or skew if the lines that contain them are parallel, perpendicular, or skew.

Example 1: Identifying Types of Lines and Planes

Identify each of the following.

A. a pair of parallel segments

$\overline{LM} \parallel \overline{QR}$

B. a pair of skew segments

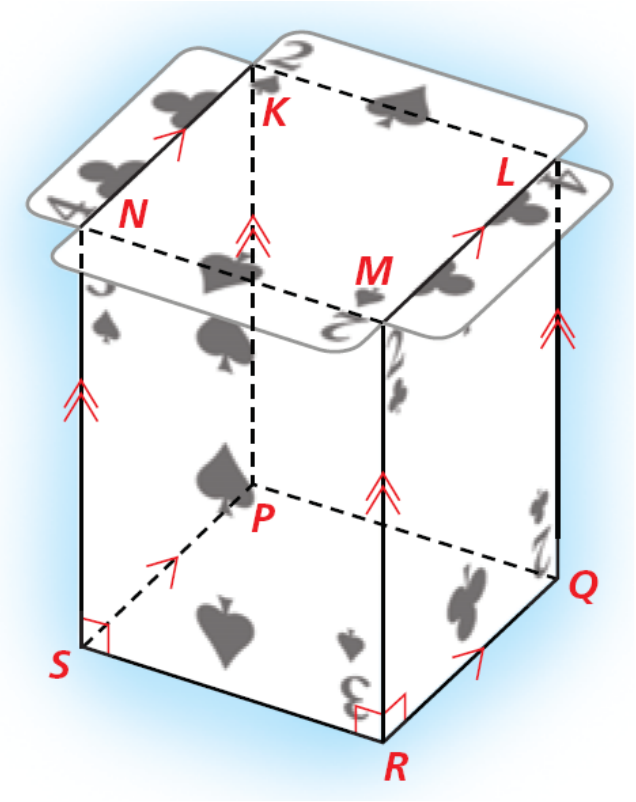
$\overline{KN}$ and $\overline{PQ}$

C. a pair of perpendicular segme

$\overline{NS} \perp \overline{SP}$

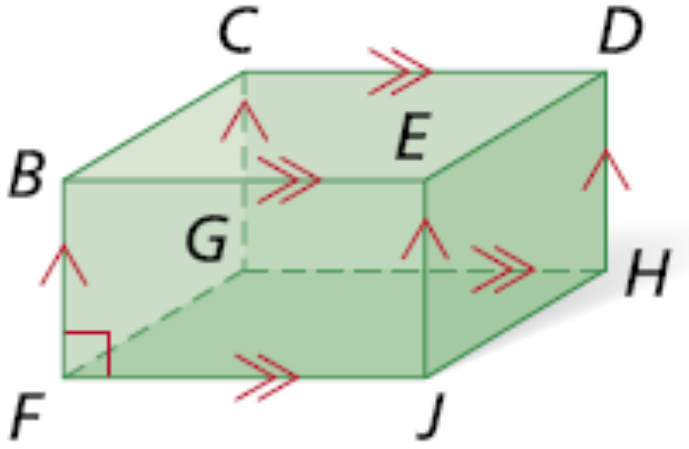
D. a pair of parallel planes

plane *NMR* || plane *KLQ*



Check It Out! Example 1

Identify each of the following.



a. a pair of parallel segments

$\overline{BF} \parallel \overline{EJ}$

b. a pair of skew segments

$\overline{BF}$ and $\overline{DE}$ are skew.

c. a pair of perpendicular segments

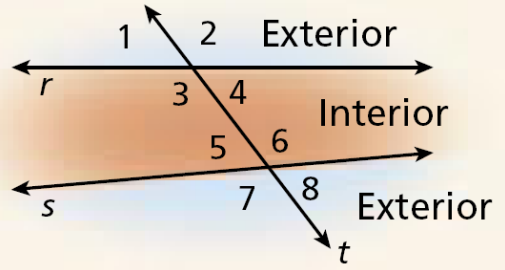
$\overline{BF} \perp \overline{FJ}$

d. a pair of parallel planes

plane *FJH* || plane *BCD*

3-1 Lines and Angles

Angle Pairs Formed by a Transversal

TERM	EXAMPLE
A **transversal** is a line that intersects two coplanar lines at two different points. The transversal *t* and the other two lines *r* and *s* form eight angles.	
Corresponding angles lie on the same side of the transversal *t*, on the same sides of lines *r* and *s*.	∠1 and ∠5
Alternate interior angles are nonadjacent angles that lie on opposite sides of the transversal *t*, between lines *r* and *s*.	∠3 and ∠6
Alternate exterior angles lie on opposite sides of the transversal *t*, outside lines *r* and *s*.	∠1 and ∠8
Same-side interior angles or *consecutive interior angles* lie on the same side of the transversal *t*, between lines *r* and *s*.	∠3 and ∠5

Example 2: Classifying Pairs of Angles

Give an example of each angle pair.

A. corresponding angles

∠1 and ∠5

B. alternate interior angles

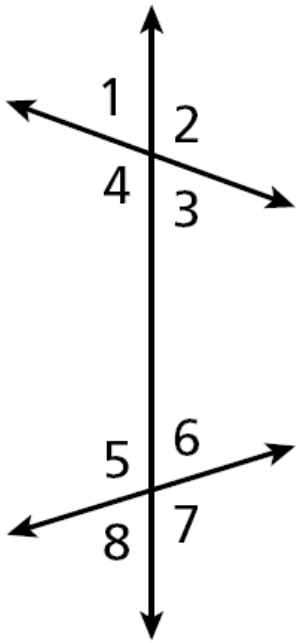
∠3 and ∠5

C. alternate exterior angles

∠1 and ∠7

D. same-side interior angles

∠3 and ∠6



Check It Out! Example 2

Give an example of each angle pair.

A. corresponding angles

∠1 and ∠3

B. alternate interior angles

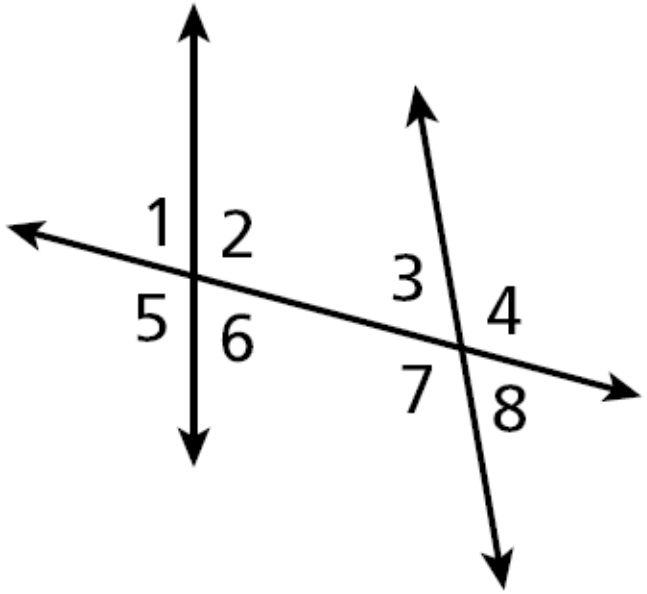
∠2 and ∠7

C. alternate exterior angles

∠1 and ∠8

D. same-side interior angles

∠2 and ∠3



Example 3: Identifying Angle Pairs and Transversals

Identify the transversal and classify each angle pair. To determine which line is the transversal for a given angle pair, locate the line that connects the vertices.

A. ∠1 and ∠3

transversal ℓ

corr. ∠s

B. ∠2 and ∠6

transversal n

alt. int ∠s

C. ∠4 and ∠6

transversal m

alt. ext ∠s