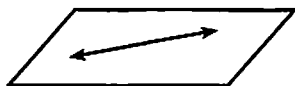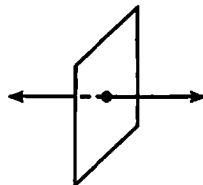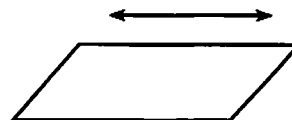# SKILL 13: Lines and Planes in Space

There are three possible relationships for a line and a plane in space.
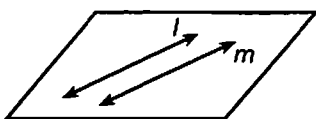
The line is in
the plane.

The line intersects
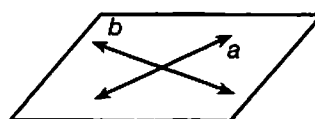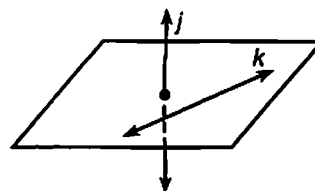the plane.

The line is parallel
to the plane.

There are three possible relationships for two lines in space.

Lines *l* and *m* are
in the same plane
and are **parallel**.
They never meet.

Lines *a* and *b* are
are in the same plane
and are **intersecting**.

Lines *j* and *k* are not
in the same plane.
They never meet.
They are **skew**.

Example

What is the relationship between $\overleftrightarrow{AX}$ and $\overleftrightarrow{CZ}$?
between $\overleftrightarrow{AX}$ and $\overleftrightarrow{AC}$? between $\overleftrightarrow{AB}$ and $\overleftrightarrow{CZ}$?

$\overleftrightarrow{AX}$ and $\overleftrightarrow{CZ}$ lie in the plane containing *ACZX*. Since the lines
never intersect, $\overleftrightarrow{AX}$ and $\overleftrightarrow{CZ}$ are parallel. $\overleftrightarrow{AX}$ and $\overleftrightarrow{AC}$ meet at
point *A*, so they are intersecting lines. $\overleftrightarrow{AB}$ and $\overleftrightarrow{CZ}$ do not lie
in the same plane. So, $\overleftrightarrow{AB}$ and $\overleftrightarrow{CZ}$ are skew.
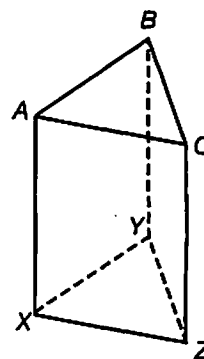
Guided Practice

What is the relationship between the figures?

1. $\overleftrightarrow{HG}$ and the plane containing *PQRS* _____

2. $\overleftrightarrow{PQ}$ and the plane containing *PSHE* _____

3. $\overleftrightarrow{QF}$ and $\overleftrightarrow{RG}$ _____

4. $\overleftrightarrow{PS}$ and $\overleftrightarrow{RG}$ _____

5. $\overleftrightarrow{RS}$ and $\overleftrightarrow{SH}$ _____
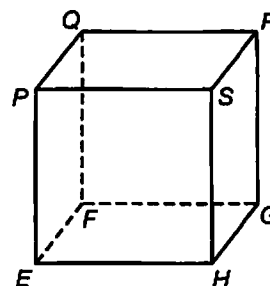
SKILL 13: Practice

What is the relationship between the figures?

1. $\overleftrightarrow{DC}$ and the plane containing *ABXW*

   _____

2. $\overleftrightarrow{BC}$ and the plane containing *DCYZ*

   _____

3. $\overleftrightarrow{WX}$ and $\overleftrightarrow{AB}$

   _____

4. $\overleftrightarrow{AD}$ and $\overleftrightarrow{BC}$

   _____
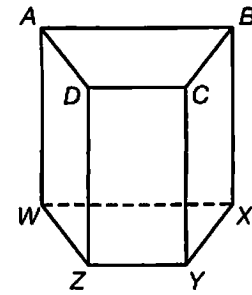
5. $\overleftrightarrow{BC}$ and $\overleftrightarrow{WZ}$

   _____

6. $\overleftrightarrow{DZ}$ and $\overleftrightarrow{AB}$

   _____

7. $\overleftrightarrow{DZ}$ and $\overleftrightarrow{BX}$

   _____

8. $\overleftrightarrow{AD}$ and $\overleftrightarrow{WZ}$

   _____

What is the relationship between the figures?

9. $\overleftrightarrow{FE}$ and $\overleftrightarrow{BC}$ _____

10. $\overleftrightarrow{ED}$ and the plane
    containing triangle *FDC*   _____

11. $\overleftrightarrow{AB}$ and $\overleftrightarrow{DC}$ _____

12. $\overleftrightarrow{FE}$ and the plane
    containing triangle *BCF*   _____
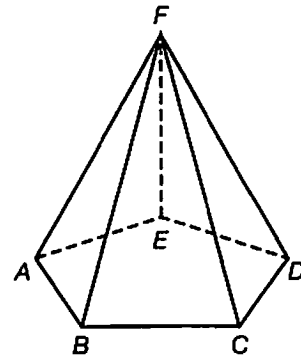
The diagram shows an L-shaped 3-D figure.

13. Name four lines
    parallel to $\overleftrightarrow{AB}$.   _____

14. Name five lines
    that are skew to $\overleftrightarrow{EF}$.   _____

TEST PREP
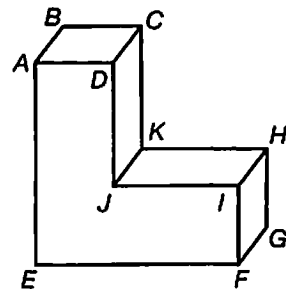
15. How many points do two
    skew lines have in common?
    Skill 13
    A 0   C 2
    B 1   D infinitely many

16. How many lines of
    symmetry does the
    figure have?

    Skill 12
    F 0   H 2
    G 1   J 3