Name _____ Date _____

LESSON 2.4

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Study Guide

For use with pages 96–102

GOAL **Use postulates involving points, lines, and planes.**

Vocabulary

A line is a **line perpendicular to a plane** if and only if the line intersects the plane in a point and is perpendicular to every line in the plane that intersects it at that point.

Postulate 5 Through any two points there exists exactly one line.

Postulate 6 A line contains at least two points.

Postulate 7 If two lines intersect, then their intersection is exactly one point.

Postulate 8 Through any three noncollinear points there exists exactly one plane.

Postulate 9 A plane contains at least three noncollinear points.

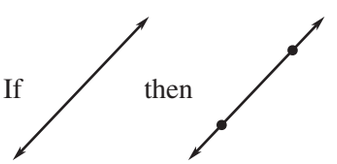
Postulate 10 If two points lie in a plane, then the line containing them lies in the plane.

Postulate 11 If two planes intersect, then their intersection is a line.

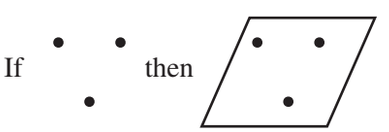
EXAMPLE 1 Identify a postulate illustrated by a diagram

State the postulate illustrated by the diagram.

a.



b.



Solution

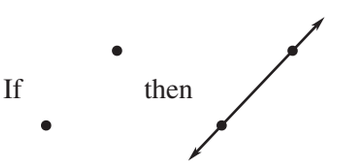
a. **Postulate 6** A line contains at least two points.

b. **Postulate 8** Through any three noncollinear points there exists exactly one plane.

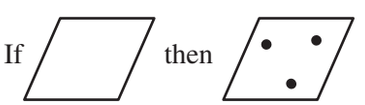
Exercises for Example 1

State the postulate illustrated by the diagram.

1.



2.



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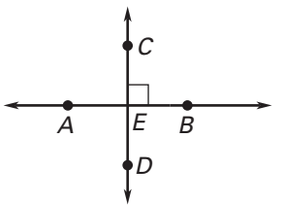
EXAMPLE 2 Use given information to sketch a diagram

Sketch a diagram showing $\overleftrightarrow{AB}$ intersecting $\overleftrightarrow{CD}$ at point E, so that $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$.

Solution



STEP 1 **Draw** $\overleftrightarrow{AB}$ and label points A and B.

STEP 2 **Draw** point E on $\overleftrightarrow{AB}$.

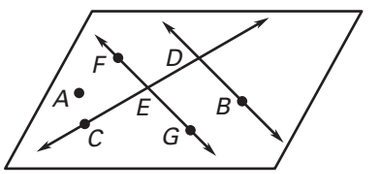
STEP 3 **Draw** $\overleftrightarrow{CD}$ through E perpendicular to $\overleftrightarrow{AB}$. Mark a right angle.

Exercise for Example 2

3. Redraw the diagram in Example 2 if the given information also states that $\overline{AE} \cong \overline{EB}$.

EXAMPLE 3 Interpret a diagram in three dimensions

Which of the following statements *cannot* be assumed from the diagram?



All points shown are coplanar.

$\overleftrightarrow{FG} \perp \overleftrightarrow{CD}$ or $m\angle CEF = 90°$.

C, E, and D are collinear.

Solution

When you interpret a diagram, you can only assume information about size or measure if it is marked.

With no right angle marked, you cannot assume $\overleftrightarrow{FG} \perp \overleftrightarrow{CD}$ or $m\angle CEF = 90°$.

Exercises for Example 3

Use the diagram in Example 3 to determine if the statement is *true* or *false*.

4. $\angle CEF$ and $\angle FED$ are a linear pair.

5. $\angle CEF \cong \angle FED$

6. $CD = BD$

7. $\overleftrightarrow{FG}$ and $\overleftrightarrow{CD}$ intersect at E.

8. $\angle CEF$ and $\angle GED$ are vertical angles.

9. $\overleftrightarrow{FG}$ and $\overleftrightarrow{BD}$ do not intersect.