

Practice with Examples

For use with pages 10–16

GOAL

Understand and use the basic undefined terms and defined terms of geometry and sketch intersections of lines and planes

VOCABULARY

A **point** has no dimension, a **line** extends in one dimension, and a **plane** extends in two dimensions.

Collinear points are points that lie on the same line.

Coplanar points are points that lie on the same plane.

On a line passing through points A and B , **segment AB** consists of all points between A and B and **endpoints A and B** .

On a line passing through points A and B , **ray AB** consists of the **initial point A** and all points on the same side of A as point B .

If point C is between A and B , then ray CA and ray CB are **opposite rays**.

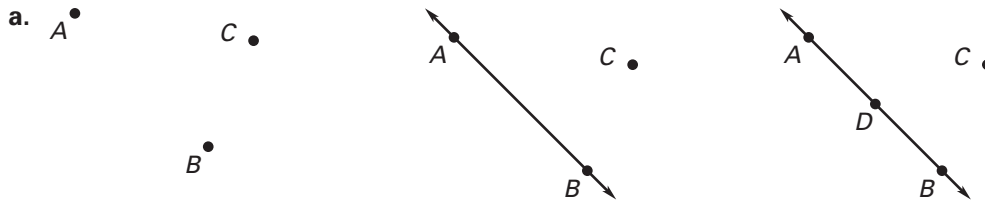
Two or more geometric figures **intersect** if they have one or more points in common. The **intersection** of the figures is the set of points the figures have in common.

EXAMPLE 1

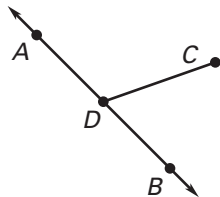
Drawing and Naming Lines, Segments, and Rays

- Draw three noncollinear points, A , B , and C . Then draw point D on line AB between points A and B . Draw segment CD . Draw ray CA and ray CB .
- Are points A , B , and D collinear? Are points B , C , and D collinear?
- Are ray CA and ray CB opposite rays? Are ray DA and ray DB opposite rays?

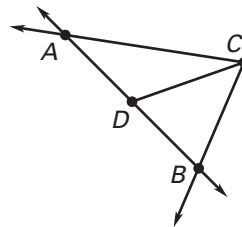
SOLUTION



- First, draw A , B , and C .
- Draw line AB .
- Draw D .



- Draw segment CD .



- Draw ray CA and ray CB .

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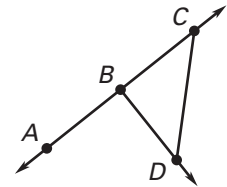
- b. Yes, points A , B , and D are collinear because they lie on line AB . No, points B , C , and D are noncollinear because a straight line cannot be drawn through all three points.
- c. No, ray CA and ray CB are not opposite rays. Point C is not between A and B . Yes, ray DA and ray DB are opposite rays. Point D is between A and B .

Exercise for Example 1

1. Draw collinear points A , B , and C , with point B between A and C . Draw point D not on line AC . Draw line AD . Draw point E on line AD between point A and point D . Draw segment EC . Draw ray BD . Draw ray EB .

Use the diagram to name the figures.

- 2. Three noncollinear points
- 3. Two opposite rays
- 4. One line segment
- 5. Three collinear points
- 6. Two rays which are *not* opposite rays
- 7. Two line segments that are on the same line



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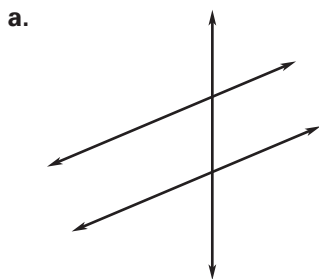
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EXAMPLE 2 Sketching Intersections

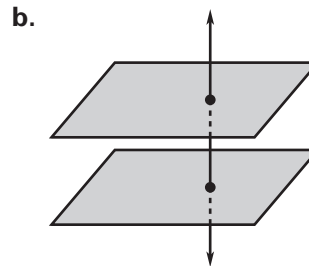
Sketch the figure described.

- Three lines that lie in the same plane, but two of the lines do not intersect with each other and the third line intersects with each of the other lines in a point.
- Two planes which do not intersect, and a line which intersects each plane in a point.

SOLUTION



Draw two lines which do not intersect. Draw a third line, crossing each of the other lines.



Draw two planes which do not intersect. Draw a line through both planes. Emphasize the points where the line intersects.

Exercises for Example 2

Sketch the figure described.

- Three planes which intersect in a line
- Two planes which intersect in a line, and a third plane which intersects each of the other two planes in a line, but not the same line