

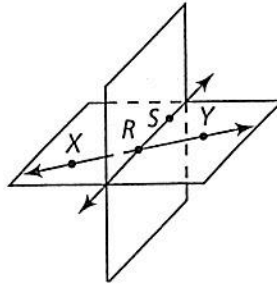


## Lesson Check

### Do you know HOW?

Use the figure at the right.

1. What are two other names for  $\overleftrightarrow{XY}$ ?
2. What are the opposite rays?
3. What is the intersection of the two planes?



### Do you UNDERSTAND?



4. **Vocabulary** A segment has endpoints  $R$  and  $S$ . What are two names for the segment?
5. Are  $\overrightarrow{AB}$  and  $\overrightarrow{BA}$  the same ray? Explain.
6. **Reasoning** Why do you use two arrowheads when drawing or naming a line such as  $\overleftrightarrow{EF}$ ?
7. **Compare and Contrast** How is naming a ray similar to naming a line? How is it different?



## Practice and Problem-Solving Exercises



### Practice

Use the figure at the right for Exercises 8–11.

8. What are two other ways to name  $\overleftrightarrow{EF}$ ?
9. What are two other ways to name plane  $C$ ?
10. Name three collinear points.
11. Name four coplanar points.

Use the figure at the right for Exercises 12–14.

12. Name the segments in the figure.
13. Name the rays in the figure.
14. a. Name the pair of opposite rays with endpoint  $T$ .  
b. Name another pair of opposite rays.

Use the figure at the right for Exercises 15–26.

Name the intersection of each pair of planes.

15. planes  $QRS$  and  $RSW$
16. planes  $UXV$  and  $WVS$
17. planes  $XWV$  and  $UVR$
18. planes  $TXW$  and  $TQU$

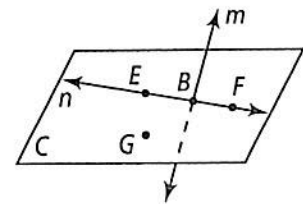
Name two planes that intersect in the given line.

19.  $\overleftrightarrow{QU}$
20.  $\overleftrightarrow{TS}$
21.  $\overleftrightarrow{XT}$
22.  $\overleftrightarrow{VW}$

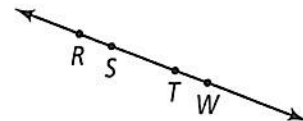
Copy the figure. Shade the plane that contains the given points.

23.  $R, V, W$
24.  $U, V, W$
25.  $U, X, S$
26.  $T, U, V$

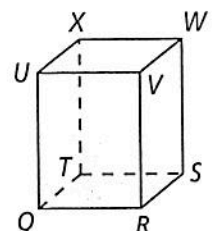
See Problem 1



See Problem 2



See Problem 3

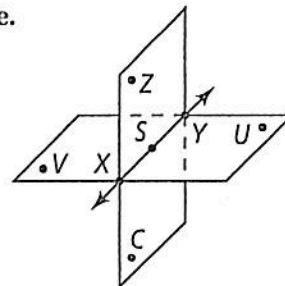


See Problem 4

**B** Apply

Postulate 1-4 states that any three noncollinear points lie in exactly one plane. Find the plane that contains the first three points listed. Then determine whether the fourth point is in that plane. Write *coplanar* or *noncoplanar* to describe the points.

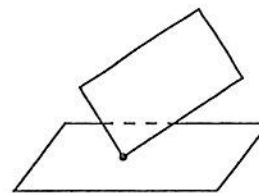
- |                |                |
|----------------|----------------|
| 27. Z, S, Y, C | 28. S, U, V, Y |
| 29. X, Y, Z, U | 30. X, S, V, U |
| 31. X, Z, S, V | 32. S, V, C, Y |



If possible, draw a figure to fit each description. Otherwise, write *not possible*.

- |  |                                       |
|--|---------------------------------------|
| 33. four points that are collinear     | 34. two points that are noncollinear  |
| 35. three points that are noncollinear | 36. three points that are noncoplanar |
- © 37. **Open-Ended** Draw a figure with points  $B, C, D, E, F,$  and  $G$  that shows  $\overleftrightarrow{CD}, \overleftrightarrow{BG},$  and  $\overleftrightarrow{EF},$  with one of the points on all three lines.

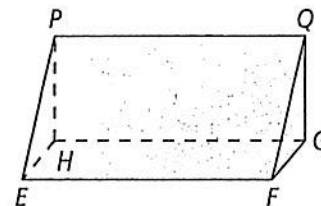
- © 38. **Think About a Plan** Your friend drew the diagram at the right to prove to you that two planes can intersect in exactly one point. Describe your friend's error.
- How do you describe a plane?
  - What does it mean for two planes to intersect each other?
  - Can you define an endpoint of a plane?



- © 39. **Reasoning** If one ray contains another ray, are they the same ray? Explain.

For Exercises 40–45, determine whether each statement is *always, sometimes,* or *never* true.

40.  $\overleftrightarrow{TQ}$  and  $\overleftrightarrow{QT}$  are the same line.
41.  $\overrightarrow{JK}$  and  $\overrightarrow{JL}$  are the same ray.
42. Intersecting lines are coplanar.
43. Four points are coplanar.
44. A plane containing two points of a line contains the entire line.
45. Two distinct lines intersect in more than one point.
- © 46. Use the diagram at the right. How many planes contain each line and point?
- |  |  |
|--|--|
| a. $\overleftrightarrow{EF}$ and point $G$ | b. $\overleftrightarrow{PH}$ and point $E$ |
| c. $\overleftrightarrow{FG}$ and point $P$ | d. $\overleftrightarrow{EP}$ and point $G$ |
- e. **Reasoning** What do you think is true of a line and a point not on the line? Explain. (*Hint:* Use two of the postulates you learned in this lesson.)



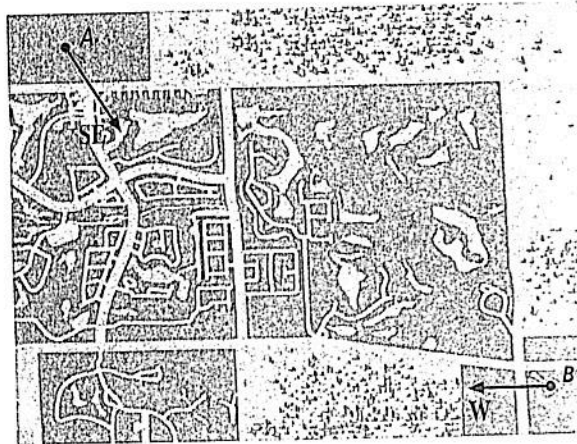
In Exercises 47–49, sketch a figure for the given information. Then state the postulate that your figure illustrates.

47.  $\overleftrightarrow{AB}$  and  $\overleftrightarrow{EF}$  intersect in point  $C$ .

48. The noncollinear points  $A$ ,  $B$ , and  $C$  are all contained in plane  $N$ .

49. Planes  $LNP$  and  $MVK$  intersect in  $\overleftrightarrow{NM}$ .

**STEM** 50. **Telecommunications** A cell phone tower at point  $A$  receives a cell phone signal from the southeast. A cell phone tower at point  $B$  receives a signal from the same cell phone from due west. Trace the diagram at the right and find the location of the cell phone. Describe how Postulates 1-1 and 1-2 help you locate the phone.



51. **Estimation** You can represent the hands on a clock at 6:00 as opposite rays. Estimate the other 11 times on a clock that you can represent as opposite rays.

52. **Open-Ended** What are some basic words in English that are difficult to define?

**Coordinate Geometry** Graph the points and state whether they are collinear.

53.  $(1, 1)$ ,  $(4, 4)$ ,  $(-3, -3)$

54.  $(2, 4)$ ,  $(4, 6)$ ,  $(0, 2)$

55.  $(0, 0)$ ,  $(-5, 1)$ ,  $(6, -2)$

56.  $(0, 0)$ ,  $(8, 10)$ ,  $(4, 6)$

57.  $(0, 0)$ ,  $(0, 3)$ ,  $(0, -10)$

58.  $(-2, -6)$ ,  $(1, -2)$ ,  $(4, 1)$

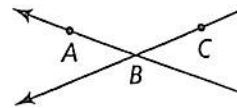


**Challenge** 59. How many planes contain the same three collinear points? Explain.

60. How many planes contain a given line? Explain.

61. a. **Writing** Suppose two points are in plane  $P$ . Explain why the line containing the points is also in plane  $P$ .

b. **Reasoning** Suppose two lines intersect. How many planes do you think contain both lines? Use the diagram at the right and your answer to part (a) to explain your answer.



**Probability** Suppose you pick points at random from  $A$ ,  $B$ ,  $C$ , and  $D$  shown below. Find the probability that the number of points given meets the condition stated.

62. 2 points, collinear

63. 3 points, collinear

64. 3 points, coplanar

