EXERCISES

For more practice, see *Extra Practice.*

Practice and Problem Solving

A Practice by Example

Example 1 (page 11)

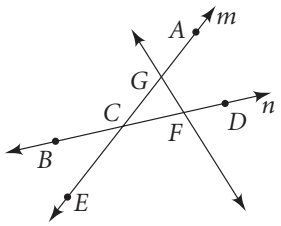
Are the three points collinear? If so, name the line on which they lie.

1. A, D, E NO **2.** B, C, D

3. B, C, F line n, $\overleftrightarrow{BC}$, $\overleftrightarrow{CF}$, ... **4.** A, E, C

5. F, B, D **6.** F, A, E

7. G, F, C **8.** A, G, C



9. Name line m in three other ways. $\overleftrightarrow{AG}$, $\overleftrightarrow{GC}$, $\overleftrightarrow{AE}$, ...

10. Name line n in three other ways.

Example 2 (page 11)

Name the plane represented by each surface of the box.

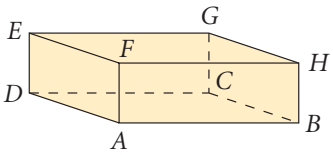
11. the bottom **12.** the top

Plane ABCD or ABC...

13. the front **14.** the back

Plane AFH, HBA, ABHF...

15. the left side **16.** the right side



Example 3 (page 13)

Use the figure at the right for Exercises 17–37.

First, name the intersection of each pair of planes.

$\overleftrightarrow{RS}$

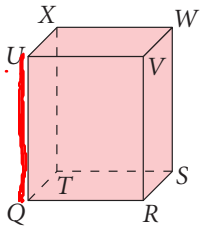
17. planes QRS and RSW **18.** planes UXV and WVS

19. planes XWU and UVR **20.** planes TXW and TQU

$\overleftrightarrow{UV}$

Name two planes that intersect in the given line.

21. $\overleftrightarrow{QU}$ **22.** $\overleftrightarrow{TS}$ **23.** $\overleftrightarrow{XT}$ **24.** $\overleftrightarrow{VW}$



Exercises 17–37

Planes QUX & QUV

Example 4 (page 13)

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

25. R, V, W **26.** U, V, W **27.** U, X, S **28.** T, U, X **29.** T, V, R

Name another point in each plane.

30. plane RVW **31.** plane UVW **32.** plane UXS **33.** plane TUX **34.** plane TVR

Is the given point coplanar with the other three points?

35. point Q with V, W, S **36.** point U with T, V, S **37.** point W with X, V, R

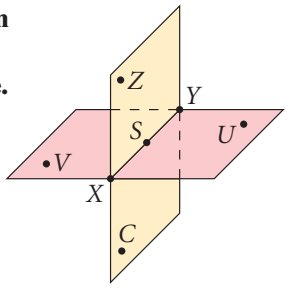
B Apply Your Skills

Postulate 1-4 states that any three noncollinear points lie in one plane. Find the plane containing the first three points listed, then decide whether the fourth point is in that plane. Write *coplanar* or *noncoplanar* to describe the points.

38. Z, S, Y, C **39.** S, U, V, Y

40. X, Y, Z, U **41.** X, S, V, U

42. X, Z, S, V **43.** S, V, C, Y



44. Describe two intersecting planes in your classroom. Describe their intersection.

45. Photography Photographers and surveyors use a tripod, or three-legged stand, for their instruments. Use one of the postulates to explain why.

46. Which postulate is sometimes stated as "Two points determine a line"?

47. 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.

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

48. four points that are collinear

49. two points that are noncollinear

50. three points that are noncollinear

51. three points that are noncoplanar

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

52. $(0, 0), (0, 2), (0, 4)$

53. $(0, 0), (3, 0), (5, 0)$

54. $(0, 0), (0, 2), (3, 0)$

55. $(2, -2), (2, 2), (2, 3)$

56. $(3, -3), (2, -3), (-3, 1)$

57. $(2, 2), (-2, -2), (3, 2)$

58. $(2, -2), (-2, -2), (3, -2)$

59. $(-3, 3), (-3, 2), (-3, -1)$

Use *always, sometimes,* or *never* to make a true statement.

60. Intersecting lines are _?_ coplanar.

61. Two planes _?_ intersect in exactly one point.

62. Three points are _?_ coplanar.

63. A plane containing two points of a line _?_ contains the entire line.

64. Four points are _?_ coplanar.

65. Two lines _?_ meet in more than one point.

Need Help?
In Exercise 66, segments of the given lines are shown in the diagram.

66. How many planes contain each line and point?

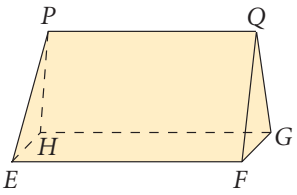
a. $\overleftrightarrow{EF}$ and point G

b. $\overleftrightarrow{PH}$ and point E

c. $\overleftrightarrow{FG}$ and point P

d. $\overleftrightarrow{EP}$ and point G

e. Make a Conjecture What do you think is true of a line and a point not on the line?

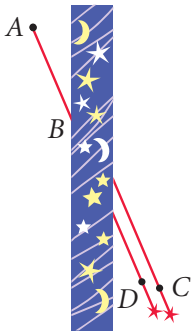


In Exercise 67 and 68, sketch a figure for the given information. Then name the postulate that your figure illustrates.

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

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

69. Optical Illusions The diagram (right) is an optical illusion. Which three points are collinear: A, B, and C or A, B, and D? Are you sure? Use a straightedge to check your answer.



Writing Use postulates to explain each situation.

70. A land surveyor can always find a straight line from the point where she stands to any other point she can see.

71. A carpenter knows that a line can represent the intersection of two flat walls.

72. A furniture maker knows that a three-legged table is always steady, but a four-legged table will sometimes wobble.

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

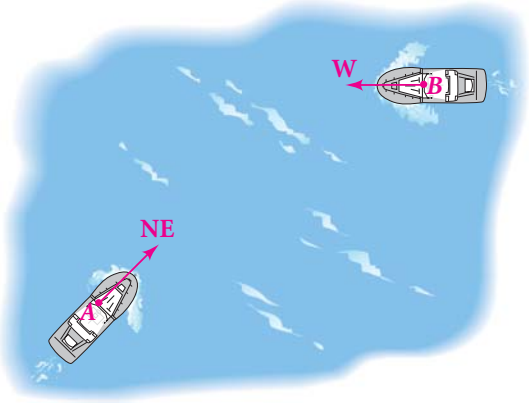
73. $(1, 1), (4, 4), (-3, -3)$ **74.** $(2, 4), (4, 6), (0, 2)$ **75.** $(0, 0), (-5, 1), (6, -2)$

76. $(0, 0), (8, 10), (4, 6)$ **77.** $(0, 0), (0, 3), (0, -10)$ **78.** $(-2, -6), (1, -2), (4, 1)$

Challenge

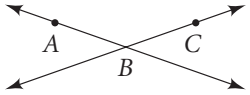
79. How many planes contain the same three collinear points? Explain.

80. Navigation Rescue teams use Postulates 1-1 and 1-2 to determine the location of a distress signal. In the diagram, a ship at point A receives a signal from the northeast. A ship at point B receives the same signal from due west. Trace the diagram and find the location of the distress signal. Explain how the two postulates help locate the distress signal.

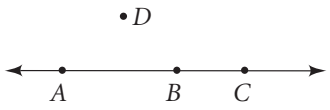


81. a. Open-Ended Suppose two points are in plane P. Explain why it makes sense that the line containing the points would be in the same plane.

b. Suppose two lines intersect. How many planes do you think contain both lines? You may use the diagram and your answer in part (a) to explain your answer.



Probability **Points are picked at random from A, B, C, and D, which are arranged as shown. Find the probability that the indicated number of points meet the given condition.**



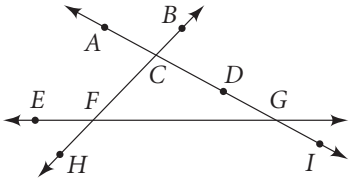
82. 2 points, collinear **83.** 3 points, collinear **84.** 3 points, coplanar

Standardized Test Prep

Multiple Choice

85. In the figure at the right, which points are collinear with *C* and *H*?

A. *B*, *F*
B. *E*, *F*, *G*
C. *A*, *D*, *G*, *I*
D. *A*, *D*, *E*, *H*



86. A solid chunk of cheese is to be cut into 4 pieces. What is the least number of slices needed?

F. 5 **G.** 4 **H.** 3 **I.** 2

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87. Ronald is making a table. What is the least number of legs that the table should have so that it will not wobble?

A. 4 **B.** 3 **C.** 2 **D.** 1

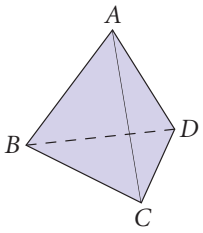
88. At most, how many lines can contain pairs of the points *P*, *Q*, and *R*?

F. 1 **G.** 2
H. 3 **I.** 4

Short Response

89. Use the figure at the right.

a. Name all the planes that form the figure.
b. Name all the lines that intersect at *D*.



Exercise 89

Mixed Review

Lesson 1-1

90. Reasoning What is the last digit of 3^{45}? To answer, make a table, look for a pattern, and use inductive reasoning. Explain the pattern.

Find a pattern for each sequence. Use the pattern to show the next two terms.

91. A, C, E, G, . . .

92. 2, 6, 12, 20, 30, . . .

93. 4, 16, 64, 256, . . .

94. 100, 95, 85, 70, 50, . . .

Previous Course **Algebra** **Evaluate each expression for the given values.**

95. $a^2 + b^2$ for $a = 3$ and $b = -5$

96. $\frac{1}{2}bh$ for $b = 8$ and $h = 11$