

1-2

Points, Lines, and Planes



Undefined Geometry Terms: Basic ideas that you can use to build the definitions of all other figures

Term Description

A **point** indicates a location and has no size.

How to Name It

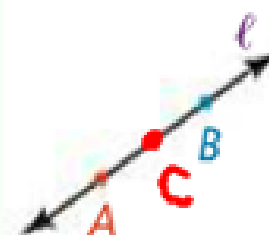
You can represent a point by a dot and name it by a capital letter, such as A .

Diagram



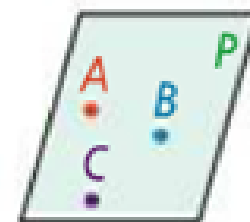
A **line** is represented by a straight path that extends in two opposite directions without end and has no thickness. A line contains infinitely many points.

You can name a line by any two points on the line, such as \overleftrightarrow{AB} (read "line AB ") or \overleftrightarrow{BA} , or by a single lowercase letter, such as line ℓ .



A **plane** is represented by a flat surface that extends without end and has no thickness. A plane contains infinitely many lines.

You can name a plane by a capital letter, such as plane P , or by at least three points in the plane that do not all lie on the same line, such as plane ABC .



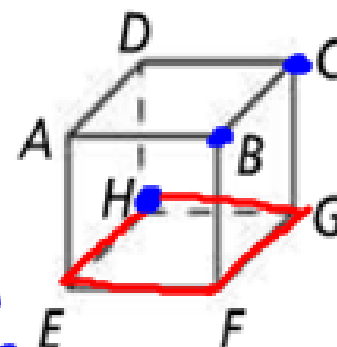
Defined Geometry Terms

Collinear Points - points that lie on the same line

Ex:



A, B, C
noncollinear: D, B, C



Coplanar Points - points that lie on the same plane

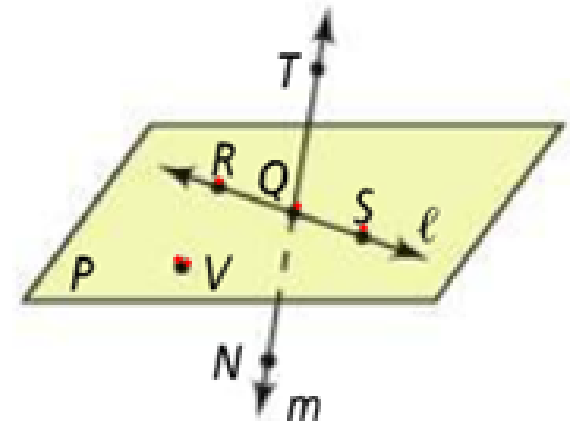
plane

Ex: H, E, F
E, G, H

noncoplanar: C, H, B

Space - the set of all points in three dimensions

Naming Points, Lines and Planes



A What are two other ways to name \overleftrightarrow{QT} ?

\overleftrightarrow{TN} \overleftrightarrow{QN} line m

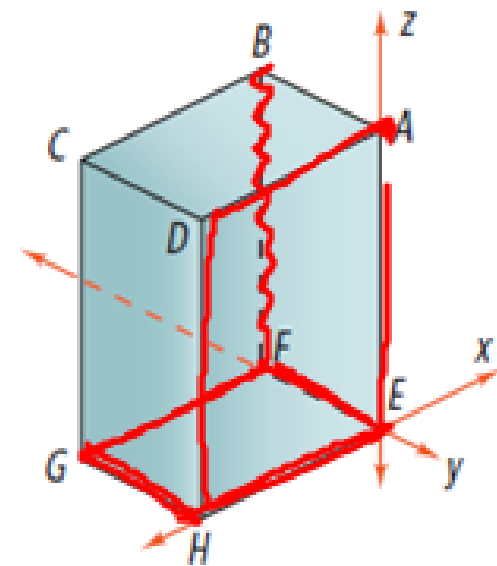
B What are two other ways to name plane P ?

$\square VSQ$ $\square RQV$

C What are the names of three collinear points? What are the names of four coplanar points?

V, R, Q, S

R, Q, S
 T, Q, N



Draw a line from each item in Column A to its description in Column B.

Column A

Column B

13. plane HGE

14. \overline{BF}

15. plane DAE

16. line y

17. point A

intersection of \overline{AB} and line z

plane AEH

line through points F and E

intersection of planes ABF and CGF

plane containing points E , F , and G

Space:

Definition

A **segment** is part of a line that consists of two endpoints and all points between them.

How to Name It

You can name a segment by its two endpoints, such as \overline{AB} (read "segment AB ") or \overline{BA} .

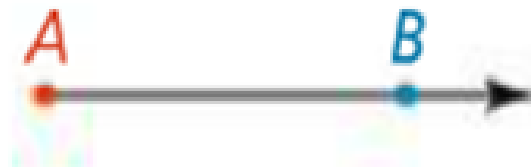
Diagram



A **ray** is part of a line that consists of one endpoint and all the points of the line on one side of the endpoint.

goes on forever
in one direction

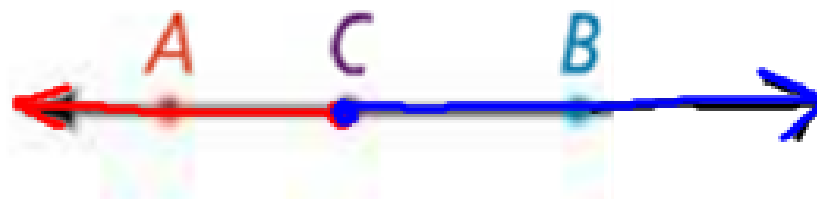
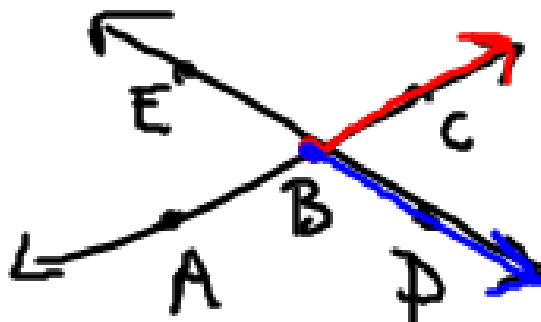
You can name a ray by its endpoint and another point on the ray, such as \overrightarrow{AB} (read "ray AB "). The order of points indicates the ray's direction.



Opposite rays are two rays that share the same endpoint and form a line.

go in complete opp. directions

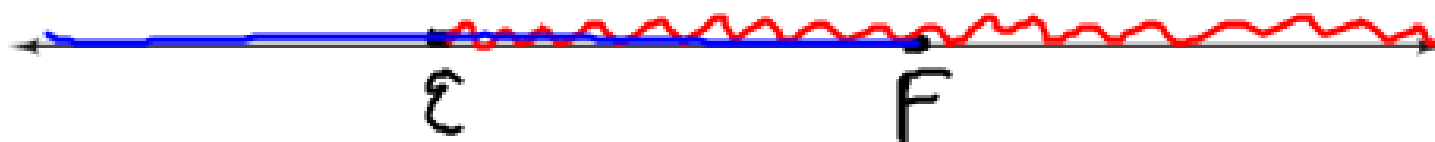
You can name opposite rays by their shared endpoint and any other point on each ray, such as \overrightarrow{CA} and \overrightarrow{CB} .



Problem 2 Naming Segments and Rays

Got It? Reasoning \overrightarrow{EF} and \overrightarrow{FE} form a line. Are they opposite rays? Explain.

For Exercises 25–29, use the line below.



25. Draw and label points E and F . Then draw \overrightarrow{EF} in one color and \overrightarrow{FE} in another color.

26. Do \overrightarrow{EF} and \overrightarrow{FE} share an endpoint?

Yes / **No**

27. Do \overrightarrow{EF} and \overrightarrow{FE} form a line?

Yes / No

28. Are \overrightarrow{EF} and \overrightarrow{FE} opposite rays?

Yes / **No**

No; not opp. rays b/c they do not share the same end pt.

A **postulate** or **axiom** is an accepted statement of fact. Postulates, like undefined terms, are basic building blocks of the logical system in geometry. You will use logical reasoning to prove general concepts in this book.

take note

Postulates 1-1, 1-2, 1-3, and 1-4

18. Complete each postulate with *line*, *plane*, or *point*.

Postulate 1-1 Through any two points there is exactly one ?.



line

Postulate 1-2 If two distinct lines intersect, then they intersect in exactly one ?.

point

Postulate 1-3 If two distinct planes intersect, then they intersect in exactly one ?.

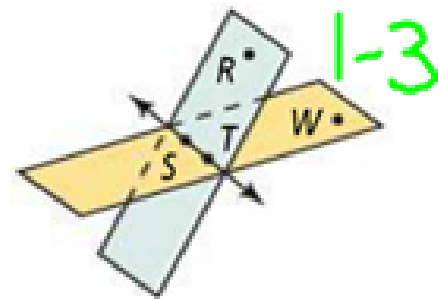
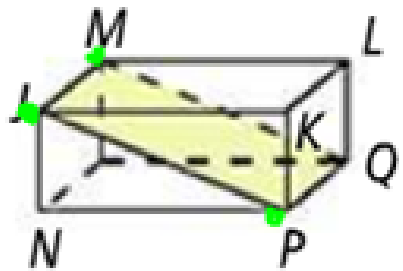
line

Postulate 1-4 Through any three noncollinear points there is exactly one ?.

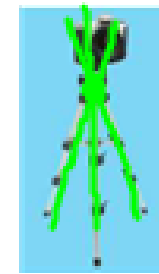
plane



1-4

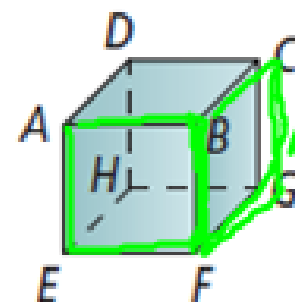


1-2



Problem 3 Finding the Intersection of Two Planes

Got It? Each surface of the box at the right represents part of a plane. What are the names of two planes that intersect in \overleftrightarrow{BF} ?



30. Circle the points that are on \overleftrightarrow{BF} or in one of the two planes.

A B C D E F G H

31. Circle another name for plane BFG . Underline another name for plane BFE .

ABF BCD BCG CDH FGH

32. Now name two planes that intersect in \overleftrightarrow{BF} .

AEBF

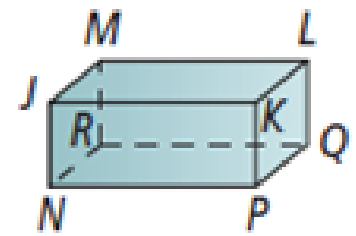
CGBF



Problem 4 Using Postulate 1-4

Got It? What plane contains points L , M , and N ? Shade the plane.

33. Use the figure below. Draw \overline{LM} , \overline{LN} , and \overline{MN} as dashed segments. Then shade plane LMN .



Underline the correct word to complete the sentence.

34. \overline{LM} , \overline{LN} , and \overline{MN} form a triangle / rectangle

35. Name the plane.

□LMNP

H/W: 1-2 Worksheet
(front and back)