In geometry, some words, such as point, line, and plane, are **undefined terms**. Although these words are not formally defined, it is important to have general agreement about what each word means.

**A point** has no dimension. It is usually represented by a small dot and named by a capital letter.

**A line** extends in one dimension. It is usually represented by a straight line with two arrowheads to indicate that the line extends without end in two directions. It is named by two points on the line, or by a lowercase script letter.

**A plane** extends in two dimensions. It is usually represented by a shape that looks like a tabletop or wall. You must imagine that the plane extends without end, even though the drawing of a plane appears to have edges. It is named by a capital script letter or 3 non-collinear points.

**A line segment** is a set of points and has a specific length, i.e., it does not extend indefinitely. It has no thickness or width and is usually represented by a straight line with no arrowheads to indicate that it has a fixed length. It is and is named by two points on the line segment with a line segment symbol above the letters.

**A ray** is a set of points and extends in one dimension in one direction (not in two directions). It has no thickness or width and is usually represented by a straight line with one arrowhead to indicate that it extends without end in the direction of the arrowhead. It is named by two points on the ray with a ray symbol above the letters.

**Collinear points** are points that lie on the same line.

**Coplanar points** are points that lie on the same plane.

**Sample Problem 1**: **Use the figure to name each of the following.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **a.** |  | **b.** |  | **c.** |  |
|  | Line  Points  Collinear points  Non collinear points |  | Line segment  Points |  | Plane  Ray  Points  Coplanar points  Non coplanar points |

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.

**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 non collinear points, there is exactly one plane.

**Sample Problem 2:** **Refer to each figure.**

|  |  |  |  |
| --- | --- | --- | --- |
| **a.** |  | Name the intersection of line and segment |  |
| Name the intersection of plane and line |  |
| Name the two opposite rays at point |  |
| What is another name for plane |  |
| **b.** |  | Name the intersection of plane and plane |  |
| What is another name for plane |  |
| Name the intersection of line and line |  |
| Name a point that is collinearwith **.** |  |
| **c.** |  | Name the intersection of plane and line |  |
| Name the intersection of plane and line |  |
| Name a point that is coplanarwith **.** |  |
| Name the opposite ray of ray |  |

**Sample Problem 3:** **Draw and label the figure for each relationship.**

|  |  |  |
| --- | --- | --- |
| **a.** | Plane contains lines **, ,** and **.**  Lines and intersect at point  Lines and intersect at point  Lines and intersect at point **.** |  |
| **b.** | Plane  contains lineand point  Plane  contains lineand point **.**  Lines and intersect at point  The intersection of plane and plane isline |  |
| **c.** | Plane and planedo not intersect.  Plane intersects planeat line **.**  Plane intersects planeat line **.** |  |