

**Lesson 3.1.1: Introduction to Mathematical System**

**Mathematical system:** a structure that consists of defined and undefined terms, axioms or postulates, and theorems.

**Components of a Mathematical System**

1. Undefined Terms: terms that can only be explained using representations and/or descriptions
2. Defined Terms: terms that include a category or are formed using other defined words or terms
3. Axioms or Postulates: statements that are assumed to be true without proof
4. Theorems: statements that are proved from definitions, postulates, or using operations and facts that were already known

**Undefined Terms in Geometry**

1. Point: has no length, no width (thickness), and no height
2. Line: a collection of points along a straight path that extends endlessly in both directions; has infinite length, zero width (no thickness), and zero height
3. Plane: has infinite length, infinite width and zero height (thickness); forms a flat surface extending indefinitely in all directions

**Some Defined Terms in Geometry**

1. Space: the set of all points
2. Collinear points: points all in one line
3. Coplanar points: points all in one plane
4. Line segment: consists of two points and all the points between them
5. Ray: a set of points consisting of a fixed point of a line and all the points of the line on the same side of the fixed point
6. Angle: a set of points consisting of the union of two rays with a common endpoint
7. Vertex: the shared endpoint
8. Adjacent angles: two angles in a plane that have a common vertex and a common side but no common interior points
9. Intersection: a point where two or more geometric figures meet
10. Parallel lines: two lines that always have the same distance apart and will never intersect

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**Practice Exercises 3.1.1**

Fill in the blanks with the correct words, or phrases to make the statements meaningfully correct.

1. Two lines that lie in the same plane and do not intersect are called \_\_\_\_.
2. A \_\_\_\_ is a part of a line having two endpoints.
3. A \_\_\_\_ extends infinitely in two dimensions. It has no thickness and is named by three points that do not lie on the same line.
4. Statements that are assumed to be true without proof are called \_\_\_\_.
5. An angle whose measure is exactly 90° is called a \_\_\_\_.
6. A \_\_\_\_ is a collection of points along a straight path that extends endlessly in both directions.
7. The set of all points is called \_\_\_\_.
8. Two lines that intersect which form right angles are called \_\_\_\_.
9. An \_\_\_\_ is a figure formed by two noncollinear rays with a common endpoint called the vertex.
10. A \_\_\_\_ has no dimension. It has an exact location in space.

**Activity 3.1.1**

Fill in the blanks with the correct words, or phrases to make the statements meaningfully correct.

1. A \_\_\_\_ forms a flat surface extending indefinitely in all directions.
2. Points all in one plane are called \_\_\_\_.
3. A \_\_\_\_ is a point where two or more geometric figures meet.
4. A \_\_\_\_ is a set of points consisting of a fixed point of a line and all the points of the line on the same side of the fixed point.
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