

# Geometry Postulates (Axioms)

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Postulates (or axioms) are accepted as true without proof; these are very much like the “rules” of a game. The game is then to prove or disprove statements using these postulates. Such proved statements are called theorems.

## Postulate 1 (Ruler Postulate)

1. The points on a line can be paired with the real numbers in such a way that any two points can have coordinates 0 and 1.
2. Once a coordinate system has been chosen in this way, the distance between any two points equals the absolute value of the difference of their coordinates.

## Postulate 2 (Segment Addition Postulate)

If B is between A and C, then  $AB + BC = AC$ .

## Postulate 3 (Protractor Postulate)

On  $\overline{AB}$  in a given plane, choose any point O between A and B. Consider  $\overrightarrow{OA}$  and  $\overrightarrow{OB}$  and all the rays that can be drawn from O on one side of AB. These rays can be paired with the real numbers from 0 to 180 in such a way that:

- a.  $\overrightarrow{OA}$  is paired with 0, and  $\overrightarrow{OB}$  with 180.
- b. If  $\overrightarrow{OP}$  is paired with  $x$ , and  $\overrightarrow{OQ}$  with  $y$ , then  $m\angle POQ = |x - y|$ .

## Postulate 4 (Angle Addition Postulate)

If point B lies in the interior of  $\angle AOC$ , then  $m\angle AOB + m\angle BOC = m\angle AOC$ .  
If  $\angle AOC$  is a straight angle and B is any point not on AC, then  $m\angle AOB + m\angle BOC = 180$ .

## Postulate 5

A line contains at least two points; a plane contains at least three points not all in one line; space contains at least four points not all in one plane.

## Postulate 6

Through any two points there is exactly one line.

## Postulate 7

Through any three points there is at least one plane, and through any three noncollinear points there is exactly one plane.

## Postulate 8

If two points are in a plane, then the line that contains the points is in that plane.

## Postulate 9

If two planes intersect, then their intersection is a line.

**Postulate 10**

If two lines are cut by a transversal and corresponding angles are congruent, then the lines are parallel.

**Postulate 11 (SSS Postulate)**

If three sides of one triangle are congruent to three sides of another triangle, then the triangles are congruent.

**Postulate 12 (SAS Postulate)**

If two sides and the included angle of one triangle are congruent to two sides and the included angle of another triangle, then the triangles are congruent.

**Postulate 13 (ASA Postulate)**

If two angles and the included side of one triangle are congruent to two angles and the included side of another triangle, then the triangles are congruent.

**Postulate 14 (AA Similarity Postulate)**

If two angles of one triangle are congruent to two angles of another triangle, then the triangles are similar.

**Postulate 15 (Arc Addition Postulate)**

The measure of the arc formed by two adjacent arcs is the sum of the measure of those two arcs.

**Postulate 16**

The area of a square is the square of a length of a side. ( $A = s^2$ )

**Postulate 17 (Area Congruence Postulate)**

If two figures are congruent, then they have the same area.

**Postulate 18 (Area Addition Postulate)**

The area of a region is the sum of the areas of its non-overlapping parts.