

Theorems and Postulates

Postulate 2-A Protractor Postulate

Given \overline{AB} and a number r between 0 and 180, there is exactly one ray with endpoint A , extending on either side of \overline{AB} , such that the measure of the angle formed is r .

Definition of Right, Acute and Obtuse Angles

$\angle A$ is a right angle if $m\angle A$ is 90.

$\angle A$ is an acute angle if $m\angle A$ is less than 90.

$\angle A$ is an obtuse angle if $m\angle A$ is greater than 90 and less than 180.

Postulate 2-B Angle Addition

If R is in the interior of $\angle PQS$, then $m\angle PQR + m\angle RQS = m\angle PQS$.

If $m\angle PQR + m\angle RQS = m\angle PQS$, then R is in the interior of $\angle PQS$.

Vertical angles are congruent.

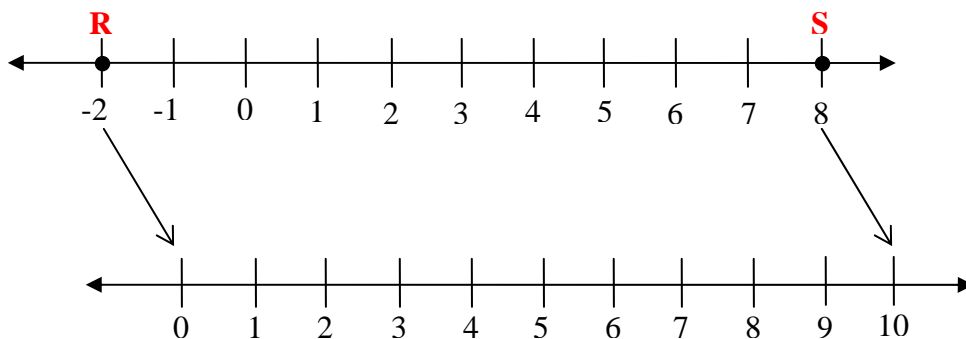
The sum of the measures of the angles in a linear pair is 180° .

The sum of the measures of complementary angles is 90° .

Postulate 3-A Ruler

Two points on a line can be paired with real numbers so that, given any two points R and S on the line, R corresponds to zero, and S corresponds to a positive number.

Point R could be paired with 0, and S could be paired with 10.



Postulate 3-B Segment Addition

If N is between M and P , then $MN + NP = MP$.

Conversely, if $MN + NP = MP$, then N is between M and P .

**Theorem 4-A
Pythagorean
Theorem**

In a right triangle, the sum of the squares of the measures of the legs equals the square of the measure of the hypotenuse.

Distance Formula

The distance d between any two points with coordinates (x_1, y_1) and (x_2, y_2) is given by the formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}.$$

**Midpoint
Definition**

The midpoint, M , of \overline{AB} is the point between A and B such that $AM = MB$.

**Midpoint Formula
Number Line**

With endpoints of A and B on a number line, the midpoint of \overline{AB} is $\frac{A+B}{2}$.

**Midpoint Formula
Coordinate Plane**

In the coordinate plane, the coordinates of the midpoint of a segment whose endpoints have coordinates (x_1, y_1) and (x_2, y_2) are $(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$.

**Theorem 4-B
Midpoint Theorem**

If M is the midpoint of \overline{PQ} , then $\overline{PM} \cong \overline{MQ}$.

**Postulate 5-A
Law of
Detachment**

If $p \Rightarrow q$ is true, and p is true, then q is true.

**Postulate 5-B
Law of Syllogism**

If $p \Rightarrow q$ is true and $q \Rightarrow r$ is true, then $p \Rightarrow r$ is true.

**Postulate 6-A
Reflexive
Property**

Any segment or angle is congruent to itself.

$$\overline{QS} \cong \overline{QS}$$

**Postulate 6-B
Symmetric
Property**

If $\overline{AB} \cong \overline{CD}$, then $\overline{CD} \cong \overline{AB}$.
If $\angle CAB \cong \angle DOE$, then $\angle DOE \cong \angle CAB$.

**Theorem 6-A
Transitive
Property**

If any segments or angles are congruent to the same angle, then they are congruent to each other.

If $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$, then $\overline{AB} \cong \overline{EF}$.
If $\angle 1 \cong \angle 2$ and $\angle 2 \cong \angle 3$, then $\angle 1 \cong \angle 3$.

**Theorem 6-B
Transitive
Property**

If any segments or angles are congruent to each other, then they are congruent to the same angle. (This statement is the converse of Theorem 6-A.)

**Theorem 7-A
Addition
Property**

If a segment is added to two congruent segments, then the sums are congruent.

**Theorem 7-B
Addition
Property**

If an angle is added to two congruent angles, then the sums are congruent.

**Theorem 7-C
Addition
Property**

If congruent segments are added to congruent segments, then the sums are congruent.

**Theorem 7-D
Addition
Property**

If congruent angles are added to congruent angles, then the sums are congruent.

**Theorem 7-E
Subtraction
Property**

If a segment is subtracted from congruent segments, then the differences are congruent.

**Theorem 7-F
Subtraction
Property**

If an angle is subtracted from congruent angles, then the differences are congruent.

**Theorem 7-G
Subtraction
Property**

If congruent segments are subtracted from congruent segments, then the differences are congruent.

**Theorem 7-H
Subtraction
Property**

If congruent angles are subtracted from congruent angles, then the differences are congruent.

**Theorem 7-I
Multiplication
Property**

If segments are congruent, then their like multiples are congruent.

**Theorem 7-J
Multiplication
Property**

If angles are congruent, then their like multiples are congruent.

**Theorem 7-K
Division
Property**

If segments are congruent, then their like divisions are congruent.

**Theorem 7-L
Division
Property**

If angles are congruent, then their like divisions are congruent.