Theorems and Postulates

| **Postulate 1-A**
Protractor Postulate | Given $\overrightarrow{AB}$ and a number r between 0 and 180, there is exactly one ray with endpoint A, extending on either side of $\overrightarrow{AB}$, 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. |

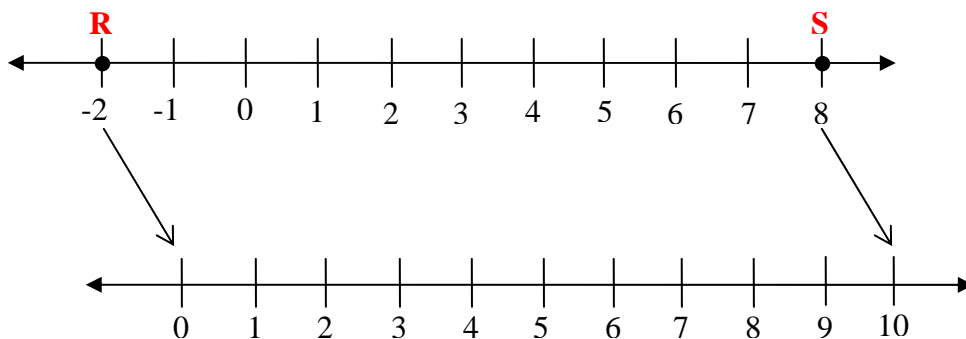| **Postulate 1-B**
Angle Addition | If R is in the interior of $\angle PQS$, then $m\angle PQR + m\angle RQS = m\angle PQS$.
If $m\angle PQR + m\angle RQS = m\angle PQS$, then R is in the interior of $\angle PQS$. |

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 2-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 2-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 2-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 $\dfrac{A+B}{2}$.
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 $(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2})$.
Theorem 2-B Midpoint Theorem	If M is the midpoint of $\overline{PQ}$, then $\overline{PM} \cong \overline{MQ}$.
Postulate 3-A Law of Detachment	If $p \Rightarrow q$ is true, and p is true, then q is true.
Postulate 3-B Law of Syllogism	If $p \Rightarrow q$ is true and $q \Rightarrow r$ is true, then $p \Rightarrow r$ is true.
Postulate 4-A Reflexive Property	Any segment or angle is congruent to itself. $\overline{QS} \cong \overline{QS}$
Postulate 4-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 4-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 4-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 4-A.)
Theorem 5-A **Addition** **Property**	If a segment is added to two congruent segments, then the sums are congruent.
Theorem 5-B **Addition** **Property**	If an angle is added to two congruent angles, then the sums are congruent.
Theorem 5-C **Addition** **Property**	If congruent segments are added to congruent segments, then the sums are congruent.
Theorem 5-D **Addition** **Property**	If congruent angles are added to congruent angles, then the sums are congruent.
Theorem 5-E **Subtraction** **Property**	If a segment is subtracted from congruent segments, then the differences are congruent.
Theorem 5-F **Subtraction** **Property**	If an angle is subtracted from congruent angles, then the differences are congruent.
Theorem 5-G **Subtraction** **Property**	If congruent segments are subtracted from congruent segments, then the differences are congruent.

Theorem 5-H Subtraction Property	**If congruent angles are subtracted from congruent angles, then the differences are congruent.**
Theorem 5-I Multiplication Property	**If segments are congruent, then their like multiples are congruent.**
Theorem 5-J Multiplication Property	**If angles are congruent, then their like multiples are congruent.**
Theorem 5-K Division Property	**If segments are congruent, then their like divisions are congruent.**
Theorem 5-L Division Property	**If angles are congruent, then their like divisions are congruent.**