

Lesson 3.2.1: Postulates and Theorems

Postulates

- 1. Supplement Postulate: If two angles form a linear pair, then they are supplementary.
- 2. Segment Addition Postulate: If B lies on \overline{AC} , then $AC = AB + BC$.
- 3. Angle Addition Postulate: If B is in the interior of $\angle AOC$, then $m\angle AOC = m\angle AOB + m\angle BOC$.
- 4. PCAC Postulate: If two parallel lines are cut by a transversal, then corresponding angles are congruent.

Theorems

- 1. Vertical Angle Theorem: If two angles are vertical, then they are congruent.
- 2. Complement Theorem: If two angles are complement of the same (or congruent) angles, then they are congruent.
- 3. Supplement Theorem: If two angles are supplement of the same (or congruent) angles, then they are congruent.
- 4. PAIC Theorem: If two parallel lines are cut by a transversal, then alternate interior angles are congruent.
- 5. PAEC Theorem: If two parallel lines are cut by a transversal, then alternate exterior angles are congruent.
- 6. PSSIAS Theorem: If two parallel lines are cut by a transversal, then same-side interior angles are supplementary.
- 7. Triangle Interior Angle Theorem (TIAT): The sum of the degree measures of the angles of a triangle is 180° .
- 8. Third Angles Theorem: If two angles of one triangle are congruent to two angles of another, then the third angles are congruent.
- 9. Exterior Angles Theorem (EAT): The measure of an exterior angle of a triangle is equal to the sum of the measures of its two remote interior angles.
- 10. Quadrilateral Interior Angle Theorem (QIAT): The sum of the measures of the angles of a convex quadrilateral is 360° .
- 11. Polygon Interior Angle Theorem (PIAT): The sum of the measures of the angles of a convex polygon with n sides is $(n-2)180^\circ$.

- 7. Regular Polygon Interior Angle Theorem (RPIA): The measure of each angle of a regular n -gon is $\frac{(n-2)180^\circ}{n}$.
- 8. Right Angles Congruency Theorem: Any two right angles are congruent.

Practice Exercises 3.2.1

- A. Determine the property, postulate, or theorem being described in each statement.
- 1. If B is in the interior of $\angle AOC$, then $m\angle AOC = m\angle AOB + m\angle BOC$.
 - 2. If two angles are supplement of the same (or congruent) angles, then they are congruent.
 - 3. If a is any real number, then $a = a$.
 - 4. If two parallel lines are cut by a transversal, then alternate interior angles are congruent.
 - 5. Any two right angles are congruent.
- B. Provide the reason for each statement.
- 1. If $\angle C$ is a right angle, then $m\angle C = 90^\circ$.
 - 2. If $\angle 3$ and $\angle 4$ are supplementary, then $m\angle 3 + m\angle 4 = 180^\circ$.
 - 3. If A is the midpoint of \overline{EF} then $AE = AF$.
 - 4. If $\overline{HO} \cong \overline{PE}$, then $HO = PE$.
 - 5. If $4x = 9$ then $\frac{4x}{4} = \frac{9}{4}$.

Activity 3.2.1

- A. Determine the property, postulate, or theorem being described in each statement.
- 1. If $a = b$, then $a - c = b - c$.
 - 2. If two parallel lines are cut by a transversal, then corresponding angles are congruent.
 - 3. If two parallel lines are cut by a transversal, then same-side interior angles are supplementary.
 - 4. If $a = b$ and $c \neq 0$, then $\frac{a}{c} = \frac{b}{c}$.
 - 5. If B lies on \overline{AC} , then $AC = AB + BC$.
- B. Provide the reason for each statement.
- 1. If $2x + 3 = 5$, then $2x + 3 - 3 = 5 - 3$.
 - 2. If \overline{CV} bisects \overline{FG} at C , then $\overline{CF} \cong \overline{CG}$.
 - 3. If $3x + y = 7$ and $y = 8$, then $3x + 8 = 7$.
 - 4. If $LM + MN = 2LM$ and $2LM = LN$, then $LM + MN = LN$.
 - 5. If $\angle G \cong \angle T$, then $m\angle G = m\angle T$.

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