**Proof Properties / Theorems / Reasons**

1. **Given** The first statement(s) you already know because the problem told you.
2. **Reflexive Property of Equality** $a=a$
3. **Symmetric Property of Equality** If $a=b$, then $b=a$.
4. **Transitive Property of Equality** If $a=b$ and $b=c$, then $a=c$.
5. **Addition Property of Equality** If $a=b$, then $a+c =b+c$.
6. **Subtraction Property of Equality** If $a=b$, then $a-c=b-c$.
7. **Multiplication Property of Equality** If $a=b$, then $a⋅c = b⋅c$.
8. **Division Property of Equality** If $a=b$ and $c \ne 0$, then $\frac{a}{c}=\frac{b}{c}$.
9. **Substitution** If $a=b$, then $a$ may be substituted for $b$ anywhere it appears.
10. **Simplify** When you do very simple math like when combining terms.
11. **Reflexive Property of Congruence** $A$$A$
12. **Symmetric Property of Congruence** If $A$$B$, then $B$$A$.
13. **Transitive Property of Congruence** If $A$$B$ and $B$$C$, then $A$$C$.
14. **Defn. of Congruent Angles** Angles are congruent if and only if they are equal in measure.
15. **Defn. of Right Angle** Right angles are angles with a measure of $90^{∘}$.
16. **Defn. of Perpendicular** Two lines are perpendicular if they intersect at a right angle.
17. **Defn. of Complementary Angle** Two angles that add up to $90^{∘}$. ($m∠A + m∠B =90^{∘}$)
18. **Defn. of Supplementary Angle** Two angles that add up to $180^{∘}$. ($m∠A + m∠B=180^{∘}$)
19. **Defn. of Adjacent Angle** A pair of angles which only share one side and do not overlap.
20. **Angle Addition Postulate** If B is in the interior of $∠ADC$, then $m∠ADB+m∠BDC=m∠ADC$.
21. **Defn. of Linear Pair** A pair of adjacent angles that form a straight line when combined.
22. **Linear Pair Postulate** Linear pair angles are supplementary.
23. **Vertical Angle Theorem (VAT)** Vertical angles are congruent.
24. **Corresponding Angles Postulate** Corresponding angles on parallel lines are congruent..
25. **Alternate Interior Angles Theorem** Alternate interior angles on parallel lines are congruent.
26. **Alternate Exterior Angles Theorem** Alternate exterior angles on parallel lines are congruent.
27. **Consecutive Interior Angles Theorem** Consecutive interior angles on parallel lines are supplementary..
28. **Consecutive Exterior Angles Theorem** Consecutive exterior angles on parallel lines are supplementary.
29. **Defn. of Angle Bisector** A line that bisects an angle, divides it into two congruent halves.
30. **Triangle Angle Sum Theorem** The sum of all the interior angles of a triangle is $180^{∘}$.
31. **Defn. of Congruent Segments** Segments are congruent if and only if they are equal in length.
32. **Segment Addition Postulate** If $B$is on $\overline{AC}$, then $AB+BC=AC$.
33. **Defn. of Midpoint** If $B$ is the midpoint of $\overline{AC}$, then $\overline{AB }$$\overline{BC}$.
34. **Defn. of Segment Bisector** A line that bisects a segment, divides it into two congruent halves.
35. **Defn. of Perpendicular Bisector** A perpendicular line that bisects a segment at a right angle.
36. **SSS Triangle Congruence Theorem** Triangles are congruent if all three corresponding sides are congruent.

37. **SAS Triangle Congruence Theorem** Triangles are congruent if two corresponding sides are congruent and
 their included angles are congruent.
38. **ASA Triangle Congruence Theorem** Triangles are congruent if two corresponding angles are congruent and
 their included sides are congruent.
39. **AAS Triangle Congruence Theorem** Triangles are congruent if two corresponding angles are congruent and
 one pair of corresponding non-included sides are congruent.
40. **HL Triangle Congruence Theorem** Right triangles are congruent if the hypotenuse of each is congruent
 and one of the corresponding legs is congruent.
41. **Corresponding Parts of Congruent** If two triangles are congruent, then all their corresponding parts are
**Triangles are Congruent (CPCTC)** congruent as well.

42. **AA Triangle Similarity Theorem** Triangles are similar if two corresponding angles are congruent.


43. **SSS Triangle Similarity Theorem** Triangles are similar if three corresponding sides are proportional.
 $\frac{a\_{1}}{a\_{2}}=\frac{b\_{1}}{b\_{2}}=\frac{c\_{1}}{c\_{2}}$
44. **SAS Triangle Similarity Theorem** Triangles are similar if two corresponding sides are proportional and
 their included angles are congruent.
 $\frac{a\_{1}}{a\_{2}}=\frac{b\_{1}}{b\_{2}}$

 