List of Reasons for Geometric Statement/Reason Proofs

CONGRUENT TRIANGLE REASONS:

1. Two intersecting lines form congruent **vertical angles** OR **vertical angles are congruent**.
2. Defn. of **midpoint**- A midpoint divides a line segment into two congruent line segments.
3. Defn of **segment bisector**- A segment bisector is a line segment or ray that divides a line segment into two congruent line segments.
4. Defn of **angle bisector**- An angle bisector divides an angle into two congruent angles.
5. Defn. of $\perp$ **lines-** Perpendicular lines intersect to form right angles.
6. All **right angles** are congruent.
7. A **right triangle** contains a right angle.
8. **Symmetric Property** (Ex. If a=b, then b=a)
9. **Reflexive Property** (Ex. $\overline{AB} \cong \overline{AB}$)
10. **Substitution/ Transitive Postulate** (Ex. If a=b and b=c, then a=c)
11. **Addition Postulate** (Ex. If a=b, then a+c = b+c)
12. **A whole quantity** is equal to the **sum of its parts**
13. **Subtraction Postulate** (Ex. If a=b, then a-c = b-c)
14. **Complementary Angles** are two angles whose sum is 90 degrees.
15. **Supplementary Angles** are two angles whose sum is 180 degrees.
16. **Supplements (or complements)** of congruent angles are congruent.
17. If two angles form a **linear pair**, they are supplementary.
18. If two angles form a **linear pair and are congruent**, they are **right angles**.
19. **Third Angles Theorem:** If two angles of one triangle are congruent to two angles of a second triangle, then the third angles are also congruent
20. **Isosceles triangles** have two **congruent sides**.
21. **Isosceles triangles** have two **congruent base angles**.
22. If **two sides** of a triangle are **congruent**, then the **angles opposite those sides are congruent.**
23. If **two angles** of a triangle are **congruent**, then the **sides opposite those angles are congruent.**
24. If a triangle is **isosceles**, the bisector of the vertex angle is perpendicular to the opposite side.
25. If the line from an angle of a triangle which is perpendicular to the opposite side meets the opposite side at its midpoint, then the triangle is **isosceles.**
26. Defn. of $\perp$ **bisector**- A perpendicular bisector is a line segment or ray that divides a line segment into two congruent line segments and creates congruent right angles.
27. Defn of **angle bisector**- An angle bisector divides an angle into two congruent angles.

28. Defn of **median of a triangle**-A median is a segment drawn from any vertex of a triangle to the midpoint of the opposite side, it divides the opposite side into two congruent segments.
29. Defn of **altitude of a triangle**- An altitude is a segment drawn from a vertex of a triangle so that it is $\perp$ to the opposite side.
30. Defn of **midsegment of a triangle** - The segment connecting the mid points of two sides of a triangle is parallel to the third side and half its length.

31. Two **parallel** lines cut by a **transversal** create **congruent alternate interior angles.**

32. Two **parallel** lines cut by a **transversal** create **congruent alternate exterior angles**.

33. Two **parallel** lines cut by a **transversal** create **congruent corresponding angles**.

34. If two lines are **perpendicular to the same line**, then they are **parallel**.

*35. **SAS ≅SAS***

*36. **SSS ≅SSS***

*37. **AAS ≅AAS***

*38. **ASA ≅ASA***

*39. **HL ≅HL***

40. **C**orresponding **P**arts of **C**ongruent **T**riangles are **C**ongruent **(CPCTC)**

SIMILAR TRIANGLE REASONS:

41. *AA ~ AA*

42. *SAS ~ SAS*

43. *SSS ~ SSS*

44. **C**orresponding **S**ides of **S**imilar **T**riangles are in **P**roportion. **(CSSTP)**

44a. ***C**orresponding* **A**ngles of **S**imilar **T**riangles are **C**ongruent _**(CASTC)**

45. In a proportion, product of the means equals the product of the extremes OR In a proportion, cross-products are equal.

45a. If cross-products are equal (the product of the means equals the product of the extremes), then the corresponding sides of the similar triangles are proportional.

46. **Triangle Side Splitter Theorem-** a line segment splits two sides of a triangle proportionally if and only if the line segment is parallel to the third side of the triangle.

47. **Angle Bisector of a Triangle Theorem-** if a ray bisects an angle of a triangle, then it divides the side opposite the angle into segments that are proportional to the other two sides of the triangle.

PARALLELOGRAM REASONS, SHOW ONE OF THESE :

48. Both pairs of opposite sides of a parallelogram are congruent

49. Both pairs of opposite angles of a parallelogram are congruent

50. Both pairs of opposite sides of a parallelogram are parallel.

51. One pair of opposite sides are both congruent and parallel.

52. The diagonals bisect each other.

RECTANGLE REASONS, SHOW ONE OF THESE :

53. The quadrilateral is a parallelogram with one right angle.

54. The quadrilateral is equiangular.

55. The quadrilateral is a parallelogram whose diagonals are congruent.

RHOMBUS REASONS, SHOW ONE OF THESE :

56. The quadrilateral is a parallelogram with two congruent consecutive sides.

57. The quadrilateral is equilateral.

58. The quadrilateral is a parallelogram whose diagonals are perpendicular to each other.

59. The quadrilateral is a parallelogram, and a diagonal bisects the angles whose vertices it joins.

TO PROVE A SQUARE, SHOW:

60. The quadrilateral is a rectangle AND a rhombus.

<u>CIRCLE PROOF REASONS:</u>

61. Congruent arcs have congruent chords.

62. Congruent chords intercept congruent arcs

63. Parallel chords intercept congruent arcs. [Arcs are between the chords.]

64. Chords equidistant from the center of the circle are congruent.

65. If an angle is inscribed in a semicircle, it is a right angle

66. If a diameter (or radius) is $\perp$ to a chord, then it bisects the chord and its arc

67. The $\perp$ bisector of a chord is a diameter or radius of the circle.

68. All radii of the same circle are congruent.

69. A central angle equals its intercepted arc.

70. If two chords are unequal, the shorter is farther from the center.

71. Inscribed angles that intercept the same arc or congruent arcs are congruent.

72. A tangent line is perpendicular to a radius at the point of tangency.

73. Two tangent segments drawn to a circle from the same external point are congruent.
    (Hat Theorem)