Module 6 – Reasoning and Proof

Lesson 1 – Types of Reasoning

Name

Fill in the blanks.

1. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a statement that is assumed true without proof.
2. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a statement that needs to be proven before it is accepted.
3. Two methods that are used to prove theorems are the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

State which property supports the conclusion made in each statement.

|  |  |
| --- | --- |
| 1. If AB = CD, then CD = AB | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 2. If Q is between A and T, then AQ + QT = AT | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 3. If AB = CD + DT and CD + DT = CT, then AB = CT | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 4. If AC = AB + BC and BD > AC, then BD > AB + BC | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| 5. If AQ = BR, then AQ + CT > BR + CT | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

Complete the following proof.

Given:

Prove:

|  |  |
| --- | --- |
| Statements | Reasons |
| 1. | 1. |
| 2. AC = AB + BC | 2. |
| 3. | 3. Transitive Property of Equality |
| 4. BD = BC + CD | 4. |
| 5. | 5. Addition Property of Equality |
| 6. AB = CD | 6. |
| 7. | 7. |

**Properties of Real Numbers**

1. Properties of Equality
   1. Reflexive Property a = a
   2. Symmetric Property of Equality If a = b, then b = a
   3. Transitive Property of Equality If a = b and b = c, then a = c
   4. Addition Property of Equality If a = b and c = d, then a + c = b + d
   5. Subtraction Property of Equality If a = b and c = d, then a – c = b - d
   6. Multiplication Property of Equality If a = b and c = d, then ac = bd
2. Properties of Inequality
   1. Transitive Property of Inequality If a > b and b > c, then a > c
   2. Addition Property of Inequality If a > b, then a + c > b + c
   3. Multiplication Property of Inequality If a > b and c > 0, then ac > bc

If a > b and c < 0, then ac < bc

**Substitution Principle**

If a = b than *a* may be replaced by *b* in any equations or inequality, or vice versa.

**Congruent Segments**

If the length of PQ is equal to the length of RS, then PQ is congruent to RS.

**Betweenness**

Point O is between point B and Y, in symbol B-O-Y, if and only if it satisfies the following conditions:

* B, O, and Y are collinear and distinct points
* BO + OY = BY