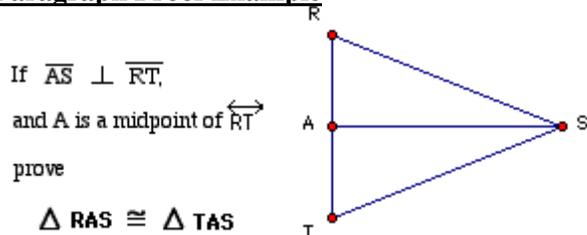


Some key concepts on reasoning and proofs:

- A _____ is a good guess or an idea about a pattern.
- A _____ or axiom is a statement that is accepted as true (e.g., through any two points, there is exactly one line; if two lines intersect, then their intersection is exactly one point).
- Undefined terms, definitions, postulates and algebraic properties are used to prove that other statements or conjectures are true. Once a statement or conjecture has been shown to be true, it is called a _____, and it can be used to justify that other statements are true.
- A conditional statement is a statement that can be written in the form “if p , then q ”. The phrase immediately following the word “if” is called the _____, and the phrase immediately following the word “then” is called the _____. For example: If you buy a car, then you get \$1,500 cash back. In this example, the hypothesis is “you buy a car”, and the conclusion is “you get \$1,500 cash back”.
- There are two types of reasoning: inductive and deductive reasoning. _____ uses examples to make a conjecture. _____ uses facts, rules, definitions, or properties to reach logical conclusions. Inductive reasoning by itself does not prove anything, but deductive reasoning can be used to prove statements.
- A _____ is a convincing argument that shows why a statement is true. In a proof, each statement you make is supported by a statement that is accepted as true. One type of proof is called a _____ or informal proof. In this type of proof, you write a paragraph to explain why a conjecture for a given situation is true.

Five essential parts of a good proof:

- 1) If not provided and if possible, draw a diagram to illustrate the given information.
- 2) List the given information.
- 3) State the theorem or conjecture to be proven.
- 4) List the conclusions that can be made from the information given, properties, theorems, postulates and definitions.
- 5) State what is to be proved (established beyond doubt).

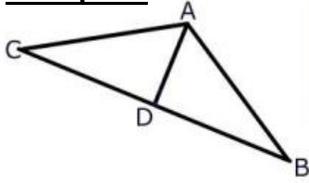
Paragraph Proof Example

Since A is a midpoint, the segments \overline{RA} and \overline{AT} are congruent by definition of midpoint.

Since \overline{AS} and \overline{RT} are perpendicular, then $\angle RAT$ and $\angle TAS$ are right angles and congruent to each other.

Last, \overline{AS} is congruent to itself by reflexive property.

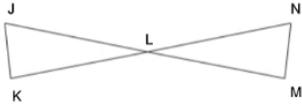
So $\triangle RAS \cong \triangle TAS$ by SAS.

Example 2:

Given
 \overline{AD} is perpendicular to \overline{CB}
 $\overline{CA} = \overline{AB}$

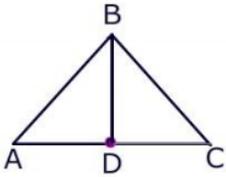
Prove: $\triangle CAD \cong \triangle DAB$

Practice: Write a paragraph proof for each exercise below:



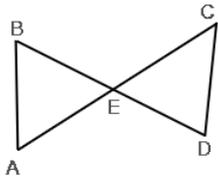
JM bisects KN, KN bisects JM, $\overline{JK} \cong \overline{NM}$

A) Prove: $\triangle LKJ \cong \triangle LNM$



$\overline{AB} \cong \overline{BC}$, \overline{BD} is a median of side \overline{AC}

B) Prove: $\triangle DCB \cong \triangle DAB$



E is the midpoint of segments BD and AC

C) Prove: $\triangle ABE \cong \triangle DEC$