

1.6 – Reasoning to Solve Problems

We know that inductive reasoning can lead to a conjecture that may be proven by deductive reasoning. However, conjectures may be false, and can be disproven by finding a counterexample.

Example: Inductive or deductive?

- a. Show the sum of two even number is even by using several examples.
- b. No mathematician is boring. Ann is a mathematician. Therefore, Ann is not boring.
- c. Show why your statement makes sense.
- d. You give evidence that your statement is true.
- e. Six other examples show that your conjecture is true.
- f. What three coins have a value of \$0.60?

A **logic puzzle** is a word problem which requires the use of mathematical deductive reasoning to solve. The process of working from one or more general statements to reach a logically certain conclusion, is **deductive logic**.

Example: There are three boxes. One is labeled “APPLES”, another is labeled “ORANGES”. The last one is labelled “APPLES AND ORANGES”. You know that each is labeled incorrectly. You may ask me to pick one fruit from one box which you choose. How can you label the boxes correctly?

Example: Mary's mom has four children. The first child is named April. The second is named June and the third is named June. What is the name of her fourth child?

If a logic problem seems too confusing, it is often helpful to use a table to keep track of the clues.

Example: Al, Bob, Cal and Dave are on four different sports teams.

- Each play on just one team
- They play football, basketball, baseball and hockey
- Bob is a goalie
- The tallest player plays basketball, and the shortest baseball
- Cal is taller than Dave, but shorter than Al and Bob.

	Foot	Bask	Base	Hock
Al				
Bob				
Cal				
Dave				

What sport does each play?

Example: Denise is having a birthday party with 6 of her family members. They are her grandmother, mother, aunt, brother, father and uncle. Their names in random order are Ben, Lily, Jeff, Betty, Jane and Luke. Look at the clues and figure out who is who.

Clues:

- Ben is not Denise's uncle.
- Denise's grandmother's name starts with B.
- Luke is not Denise's brother
- Lily is not her aunt
- Denise's father's name is Jeff

	Ben	Lily	Jeff	Betty	Jane	Luke
Grandmother						
Mother						
Aunt						
Brother						
Father						
Uncle						