# Table of Contents

# About This Book

This book offers a collection of fun, engaging, easy-to-use math detective cases for Grades 5 – 12+.  Students must apply critical reading, critical thinking, and mathematical reasoning.  The mathematics needed to solve these cases is accessible to middle school and upper elementary school students, but don't be fooled!  The real challenges are to first identify the clues by synthesizing from different witnesses and suspects, and then determine the necessary math to turn the clues into evidence.

Some cases may be more challenging for younger students, but teachers and parents can always use the optional hints provided to help students when needed.  The cases also develop observation skills, reading comprehension, and deductive and inductive thinking skills.  Learning to identify and evaluate evidence is the very heart of critical thinking.

Writing and explaining mathematical reasoning is a valuable experience that may sometimes feel new to students, and it is natural that student explanations may not have the full written detail and expression of the book's formal solutions.  Teachers and parents are encouraged to receive student presentation of reasoning with flexibility and an appreciation that students will have differing readiness and methods for verbalizing their mathematical thinking.

Though the book's solutions are detailed and comprehensive, the cases may have more than one way to navigate the reasoning and solve the mathematical details, so the reader may come up with a wonderfully different solution method than the one provided in this book.

For more critical thinking and detective fun, please see *Critical Thinking Detective™* and *Critical Thinking Detective™ – Vocabulary* books, along with *Critical Thinking Detective™ – Math* (Grades 6 – 12+).

Read the case below to find the evidence to identify the innocent and guilty suspects.  Remember, the story and suspects' statements are true.

## The Eating Contest Con Artist

[1]Carl, Bernie, Earl, and Randy enter the Peach Valley County Fair eating contest.  [2]Each contestant starts with a silver tray containing 10 hot dogs and 10 hamburgers and eats as much as he can in 12 minutes.  [3]At the end of the contest, each contestant has his tray of uneaten food weighed and the person whose remaining food weighs the least is declared the winner.  [4]One of the contestants has an uncle who is a magician and who teaches the contestant to sneak 1 hot dog and 1 hamburger onto the tray of one of his competitors without anybody noticing.  [5]A local newspaper reporter, Bill, overhears the uncle in the audience bragging to his friend about what he taught his nephew.  [6]Bill investigates and learns the following.

- [7]Each hot dog weighed 4 ounces and each hamburger weighed 6 ounces.  [8]A contestant reminded Bill that 16 ounces equals 1 pound.
- [9]Carl ate a total of 9 hot dogs and 4 hamburgers.
- [10]At the end of the contest, the food left on Bernie's plate weighed 20 ounces.
- [11]For the first 8 minutes of the contest, Earl ate 2 food items every minute.  [12]For the last 4 minutes of the contest, however, Earl was full and could not eat any more.
- [13]At the end of the contest, the food left on Earl's plate weighed 34 ounces.
- [14]Randy alternated the food he ate.  [15]First he ate 1 hot dog, then 2 hamburgers, then 1 more hot dog, then 2 more hamburgers, and so on.

[16]After analyzing this information and hearing the statements from the four contestants below, Bill approaches one of the contestants to let him know he would be writing a newspaper article proving that he cheated by sneaking 1 hot dog and 1 hamburger onto another contestant's plate.  [17]The contestant admits to the reporter and contest managers that he cheated and offers to buy each fellow contestant a dozen chocolate donuts, which they proceed to eat in 3 minutes.



**Carl**
[18]At the end of the contest, I had 40 ounces of food left on my plate.

**Bernie**
[19]I ate 2 pounds of hot dogs and 3 pounds of hamburgers.

**Earl**
[20]During the contest, I ate only hot dogs for the first 5 minutes and then only hamburgers for the next 3 minutes.

**Randy**
[21]I ate 12 food items during the contest.  [22]At the end of the contest, I had 26 ounces of food left on my plate.

Use mathematical reasoning to describe the best evidence for your conclusions.  Refer to the sentence label numbers and show calculations when needed.  Also, decide which innocent suspect is the victim.

## The Innocent

Suspect Name:  _____

Suspect Name:  _____

Suspect Name:  _____

## The Guilty

Suspect Name:  _____