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About This Book

This book offers a collection of fun, engaging, easy-to-use math detective cases for Grades 6 – 12+. Students must apply critical reading, critical thinking, and mathematical reasoning. The mathematics needed to solve these cases requires the application of common middle school math concepts, 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 needed 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.

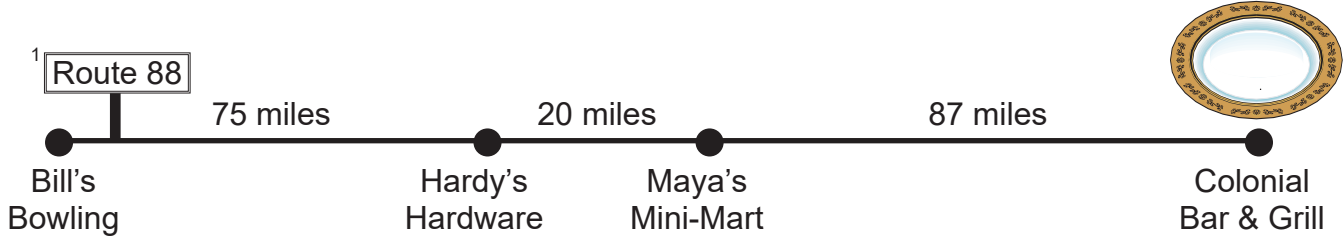
Writing and explaining mathematical reasoning is a valuable experience that may sometimes feel new to students, and it is natural that student explanations may not have the full written detail and expression of the book's formal solutions. Teachers and parents are encouraged to receive student presentation 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.

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

The Missing Plate on Route 88



²At 3:30 p.m. on Friday, police in Timberlake County arrest one of the four suspects below for stealing a signed Presidential Plate from the Colonial Bar & Grill on Route 88. ³The plate went missing from the restaurant sometime after 9:00 a.m. on Friday. ⁴Each suspect has his own car and traveled along Route 88 only by driving his car. ⁵On the day the plate went missing, the only road each suspect traveled on was Route 88.

⁶The mileage of each car (how many miles driven per gallon of gasoline) is shown.

Car Owner	Car Mileage
John	35 miles per gallon of gasoline
Evan	25 miles per gallon of gasoline
Luke	40 miles per gallon of gasoline
Frank	30 miles per gallon of gasoline

⁸John was spotted at Hardy's Hardware at 11:00 a.m. ⁹Evan was seen at Maya's Mini-Mart at 9:15 a.m. and at Bill's Bowling at 10:45 a.m. ¹⁰Luke was with a friend at Bill's Bowling from 9:00 a.m. to 11:30 a.m. ¹¹Frank has receipts showing he was at Hardy's Hardware at 9:30 a.m. and Maya's Mini-Mart at 11:45 a.m. ¹²None of the four suspects stopped for gas on Friday.

¹³The police interview each suspect somewhere along Route 88 on Friday. ¹⁴After they listen to all four suspects' statements below, the police ask to search the car of one of the suspects, and then the suspect confesses to removing the Presidential Plate from the restaurant and pulls the plate from the trunk of his car.



John

¹⁵On Friday I was never more than 100 miles from Hardy's Hardware.



Evan

¹⁶My car used less than 7 gallons of gasoline on Friday.



Luke

¹⁷I am having car troubles and cannot drive faster than 40 mph.



Frank

¹⁸When I was at Hardy's earlier today my car had 12 gallons of gas. ¹⁹It now has less than 7 gallons of gas.

Use mathematical reasoning to describe the best evidence for your conclusions. Refer to the sentence numbers, diagram, and table and show calculations when needed.

The Innocent

Suspect Name: _____

Suspect Name: _____

Suspect Name: _____

The Guilty

Suspect Name: _____