

An Artificial Test



Book 8 in The Math Kids Series

The Math Kids Series

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2. A Sequence of Events
3. An Unusual Pattern
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Book 8 in The Math Kids Series

by

David Cole



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*To Her Majesty Queen Elizabeth II,
who always ruled with
grace and dignity.*



Chapter 1



“Okay, everyone, we’re almost ready for takeoff, so it’s time to get those seatbelts fastened,” the pilot said over the loudspeaker.

“Wow, this jet is amazing,” Stephanie Lewis exclaimed as she looked around at the beautiful teak wood, the thick blue carpet, and the subdued lighting.

“It’s a Gulfstream G650ER,” Justin Grant said from the seat behind her. “This baby can go more than seven hundred miles per hour and fly eighty-six hundred miles without refueling.”

“What a shock,” Catherine Duchesne said with fake surprise. “Justin read up on all of the jet stats before the trip.”

“And I didn’t even tell you the most important thing,” he responded. “This jet cost more than sixty-six million dollars. Sixty. Six. Million. Dollars.”

“That’s not the most important thing,” came the voice of Jordan Waters, Justin’s best friend since kindergarten. He

was sitting across the aisle from Justin and was grinning from ear to ear. This was Jordan's first time on a plane, and the fact that it just happened to be on a custom-designed luxury business jet owned by billionaire Willard Howell was definitely an added plus.

"What's more important?" Justin asked.

"Whether or not they serve dinner on this plane," Jordan retorted.

Aimee, the flight attendant, overheard the conversation and answered. "Yes, there will most certainly be dinner. I believe Mr. Howell ordered up something special for you."

"It's not some fancy stuff, is it?" Justin asked anxiously. "You know, like snails or caviar or something like that?"

"What's caviar?" Jordan asked.

"Fish eggs," Justin said.

"Yuck!" Jordan said. "No fish eggs for me, please. And no green stuff like salad or brussels sprouts."

Aimee smiled. "I think you'll be happy with Mr. Howell's menu choices. How do hamburgers and French fries sound?"

"Now you're speaking my language," Jordan said.

"And I believe we have everything we need for hot fudge sundaes for dessert," Aimee said.

"Now you're *really* speaking my language!"

The four friends settled back into their plush leather seats, checked their seat belts, and looked out the window as the jet began to taxi out to the runway. They

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were going into sixth grade in the fall, but they had one more special adventure before that happened, so school was the last thing on their minds.

It all started when Justin's dad, a software development manager, was offered a new job that would have required the family to move to St. Louis, far away from his best friends. At the same time, Catherine's dad, a math professor at the local university, had come up with an idea for an application that could solve complicated problems. Jordan was able to recognize the two should be working together and contacted Mr. Howell to finance it. Mr. Howell had agreed and G-Knot, the new company, was off to a great start. Two months later, Mr. Grant and Mr. Duchesne were heading to London to demonstrate the initial version of the software to some potential customers. It was Mr. Howell's suggestion that the four kids join them on the trip.

"Are you sure?" Justin's dad had asked when Howell had brought it up.

"Why not?" the eccentric billionaire had asked. "Look, the Math Kids have proven themselves to be very capable. I think it's high time they get to put math aside for a couple of weeks and see the world. You can all fly over on my jet, and I'll meet you there in a week when I'm done with my meetings in New York."

The Math Kids was a club Justin, Jordan, and Stephanie had formed when they were in fourth grade. Catherine had joined when they needed another person for the district

math competition. The club was originally created around the love they had for solving math problems, but it turned out their math skills were useful for solving real-world problems too, including catching some neighborhood burglars, finding a fortune in lost gold, and rescuing Catherine's dad from kidnappers.

As soon as the decision was made for the kids to go, there was a flurry of activity—getting passports for everyone, booking hotels, and arranging for a guide for the kids. Now, the kids and Justin and Catherine's dads were all on a private jet headed to London, England.

"We've been cleared for takeoff," the pilot announced.

"Here we go," Jordan said, his fingers tightening on the armrests. The engines roared and the jet sped down the runway and soared quickly into the evening sky. Everyone stared out the windows and watched the houses grow smaller and smaller. Soon everything was lost to sight as the jet passed through a bank of clouds. Justin pulled a small book out of his overstuffed backpack and began thumbing through the pages.

"You brought a book?" Jordan asked incredulously. It was summertime and Justin was not much of a reader even when they were in school.

"It's a language guide," Justin said.

"You do know they speak English in England, don't you?" Stephanie teased.

"Yeah, but not the same English we speak," he said.

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"For example, what we call chips in the United States are called crisps in England. If you ask for chips over there, you'll get French fries—you know, like fish and chips? And a biscuit over there is what we would call a cookie."

"Interesting," Stephanie said. "Does your little book have any translations other than food?"

"It sure does. Here's one for you. What we call soccer—you know, that game you play all the time—the English call that football. Not at all like the *real* football we have in the States."

"I knew that one," Stephanie said, smiling at his comment about her favorite game. "Anything else we should know?"

"Well, don't compliment someone on their pants," he said.

"Why not?" Jordan asked.

"Because pants are what they call underwear over there," Justin said.

"Nice pants, Justin," Stephanie said, giggling as Justin turned a deep shade of red.

An hour into the flight, Aimee brought trays with burgers and fries. While they were eating dinner, the four friends talked excitedly about their plans for the trip.

"I want to go on the London Eye," Jordan said.

"I want to go to Stonehenge," Catherine said.

"I want to see where they did the executions at the Tower of London," Justin added.

"That's a pleasant thought," Stephanie said. She frowned at Justin.

"Well, it's true," Justin protested. "There were twenty-two people executed there!"

"There will be plenty of time for everything," Catherine's dad said as he walked up the aisle from the back of the jet where he and Justin's dad had been discussing their meeting plans.

"In the meantime, how about you finish off that last fry and try to get a little sleep so you'll be ready to go when we land?" Justin's dad asked.

"Wait, we can't go to bed yet!" Jordan exclaimed.

"Why not? Is your head too full of ideas about what you want to do?" Justin's dad asked.

"No, my belly is too empty," Jordan responded. "Aimee promised us dessert."

"And I always keep my promises," Aimee said as she produced a tray of bowls heaped with ice cream. "Who's ready for ice cream?" She poured hot fudge onto the ice cream and added whipped cream and a cherry on top.

"Does your guide have a word for this?" Stephanie asked.

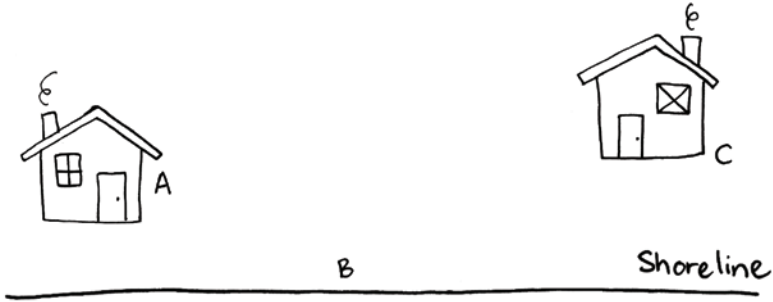
"Delicious," Justin answered with a grin.

After the hot fudge sundaes, they still weren't ready for bed. "How about a math problem, Mr. Duchesne?" Jordan asked.

"Okay, just one and then you should get some sleep," he answered. "Let me think of one that's short and sweet."

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He thought for a moment and then nodded his head. "Okay, I've got one for you. I'll have to draw it out for you."



He pulled a sheet of paper from his notebook and drew a quick sketch.

"A fisherman was going to his friend's house for dinner. He agreed to bring some fresh fish. Where should he stop at the shore to fish so that his journey is the shortest?"

Wait! Do you want to try to solve this puzzle before the Math Kids do?

Where should the fisherman stop at the shore to fish? In other words, how can you show the shortest route from A to B to C?

"Uh oh," Jordan said. "I'm not very good at geometry. This is one of those tricky triangle problems, isn't it?"

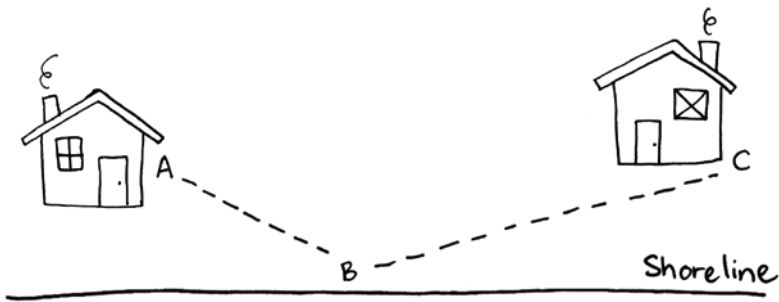
Mr. Duchesne smiled. "I'm sure you could figure it out with some triangles, but I promise you there is an easier solution. In fact, you can solve this one in two minutes with nothing more than a simple drawing." With that cryptic clue, he returned to the back of the plane.

"Your dad may say this is easy," Jordan said to Catherine, "but he also has, like, a dozen math degrees. I bet it's harder than he says it is."

"Possibly," she answered, "but I think maybe he was trying to give us a clue by saying we could solve it with a simple drawing."

"Well, you're the artist," Justin said. He handed her a pencil. "Draw away!"

Catherine stared at the sketch her father had drawn while her three friends watched expectantly. She drew in some dashed lines to show the route the fisherman would have to take to the shoreline and then on to his friend's house.



"I don't know," Jordan said. "I mean, that's the shortest path if that's where B is, but we don't really know where B is, do we?"

"That's a good point," she said. "That's the real question. You know, it would be a lot easier if the fisherman lived

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out in the sea. Then we could just draw a straight line from his house to his friend's house."

A huge smile broke across Stephanie's face. "That's it!"

"That's what?" Catherine asked.

"Let's move the fisherman's house into the sea. Make it just as far from the shore as his house is now."

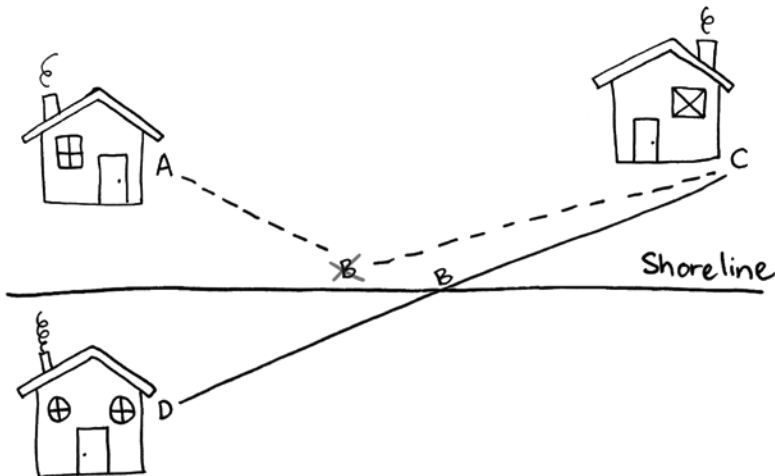
Catherine looked dubious but added another house out in the water.

"Okay, now draw a line from C to the new house," Stephanie said.

Catherine did as Stephanie requested.

That's when Jordan saw where Stephanie was going. "Where the line between D and C crosses the shoreline is where he should fish!" he said excitedly.

Catherine crossed out the original B and moved it to the new line.



"Since the house in the water is the same distance from the shore as his real house, we know the distance from A to B is the same as the distance from D to B," Stephanie said.

"And we know the distance from D to C is the shortest route because the shortest distance between two points is a straight line," Jordan added. "Your dad was right! The problem really could be solved with a simple picture."

Catherine's dad heard the commotion and walked up to see what the kids were up to. He smiled when he saw the drawing.

"Nailed it," he said. "And now, let's get some sleep."

They reclined their seats to form beds. Aimee supplied pillows and blankets and dimmed the lights. Within minutes, the four were drifting off to sleep forty-one thousand feet over the Atlantic Ocean.

Two rows back, the two dads talked quietly.

"Hmm, this doesn't look good," Mr. Grant said.

Justin's eyes popped open and he craned his neck to see that his dad was looking at something on his laptop.

"What's that?" Mr. Duchesne asked.

"This news article says London is under a heightened security level due to suspected terrorist activity. Just chatter so far, but the authorities are concerned," Justin's dad said.

"Well, since we'll be meeting with the folks from Scotland Yard, I'm sure we'll hear all about it."

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"You think the kids will be okay on their own?"

"I'm sure they'll be in good hands with the guide Howell hired," Catherine's dad replied. "Besides, the kids have a good eye for recognizing trouble."

"That's what I'm worried about," Justin's dad said. "If there is trouble to be found, our kids seem to have a knack for finding it."

Concerned about what he had heard, it was a long time before Justin was finally able to fall into a fitful sleep.

Appendix



Hyde Park and Speakers' Corner

Speakers' Corner sits on the northeast edge of Hyde Park. On Sunday mornings, you'll often find crowds gathering to listen to speakers discussing their views on a wide range of topics. Historic figures who have spoken at Speakers' Corner include Karl Marx, George Orwell, and Vladimir Lenin.

About 250 years ago, people were hung near this spot at the infamous Tyburn Gallows. More than 50,000 people were executed between 1196 and 1783, when the gallows were finally dismantled. Before being hung, those condemned to die were allowed to speak—sometimes to confess, others to protest their innocence or criticize the authorities—thus marking the beginning of speeches in this area. The executions drew many people to witness the event. Londoners could even buy tickets to watch the executions.

Protesters often started or ended their marches at Hyde Park. In 1866, the protesters found the park locked. They began to riot, tearing up hundreds of yards of fencing to gain access to the park. The following year, a crowd of 150,000 defied a government ban and marched to the park. In 1872, the Parks Regulation Act guaranteed the right to meet and speak freely in Hyde Park. It has been used as a site for public speech and debate ever since.

Women's Royal Naval Services (WRNS)

Women made up about 75 percent of the people working in Bletchley Park during World War II. They were nicknamed the Wrens. They performed many important jobs, including the operation of the cryptographic machines used for code breaking. They even helped to wire and solder the Colossus computers. They worked around the clock in three eight-hour shifts.

The code breaking team at Bletchley Park recruited women who had skills in math, linguistics (the study of languages), and even crossword puzzles. The *Daily Telegraph*, one of the London newspapers, held a contest where a crossword puzzle had to be solved in less than twelve minutes. The winners were recruited to work at Bletchley Park.

The Turing Test

Alan Turing is perhaps best known for cracking the German Enigma code during World War II, but he was also a pioneer in the emerging field of artificial intelligence. In his 1959 paper "Computing Machinery and Intelligence," he proposed the "Turing test," a simple approach to the question of whether machines can think.

If someone is talking to a computer that's pretending to be a human and that person can't tell if it's a human or not, we say the computer passes the Turing test and is actually "thinking."

No computer has ever passed the Turing test.

Stealing the Crown Jewels

There has been only one attempt to steal the Crown Jewels. In the spring of 1671, a man named Thomas Blood pretended to be an Anglican clergyman and befriended Talbot Edwards, the keeper of the jewels. Blood convinced Edwards to show the jewels to some of his friends. They ambushed the keeper. When the 77-year-old ex-soldier fought back, Blood hit Edwards with a mallet and stabbed him in the stomach with a knife.

Talbot Edwards was able to slip off his gag and yell for help. There was a mad dash for the Tower gates, with

Blood drawing a pistol and wounding one of the Tower guards. Blood was able to make it to his horse but was caught before he could escape. The Crown Jewels were recovered, and Blood was brought before King Charles II himself.

Surprisingly, the king pardoned Blood, who went on to spend much of the rest of his life working as a spy and enforcer for the kingdom.

Strategies for Solving Lying vs Truth-Telling Puzzles

There are all kinds of puzzles that involve two or more people who always lie, always tell the truth, and sometimes even one who may or may not tell the truth.

You don't know which is which and you are usually allowed to ask a single question to one of the people to determine the truth.

The most basic puzzle is one like the one Catherine's dad provided. For example, you come to a crossroad and want to know the right direction. There are two people, one who always lies (L) and another who always tells the truth (T). You can only ask one question.

The strategy is to ask a question which involves all the people. So, for the basic puzzle, you ask either one: "If I were to ask the other person which is the right way to the town, what would they say?"

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If you ask L, he will lie about what T would say (the correct direction), so he would point you in the wrong direction.

If you ask T, he will tell the truth that L would lie and point you in the wrong direction.

Because both would answer with the wrong direction, all you need to do is take the opposite road.

But what if there were two truth tellers (T1 and T2) and one liar (L)? What question should you ask? If the three were lined up, we would have three possible combinations:

L T T

T L T

T T L

Note that it doesn't matter which truth teller is in which position as both will answer the same way.

We need a question that involves all three people. One possibility is to ask the middle person, "If I asked the person to your left what the person to your right would say when asked about the right way to town, what would they say?"

What? It sounds complicated, but let's look at the three possibilities.

1) L T1 T2

T1 would tell you what T2 would say L's answer would be. Since L would lie and give the wrong direction, T2 would truthfully report L's answer and give the wrong direction too. T1 would truthfully report T2's response and also give the wrong direction. You should go the opposite direction to what T1 says.

2) T1 L T2

L would tell you what T2 would say T1's answer would be. Since T1 would be truthful and give the right direction, T2 would truthfully report T1's answer and give the right direction too. But since L would lie about T2's answer, L would give the wrong direction. You should go the opposite direction to what L says.

3) T1 T2 L

T2 would tell you what L would say T1's answer would be. Since T1 would be truthful and give the right direction, L would lie about T1's answer and give the wrong direction. T2 would truthfully report L's response and also give the wrong direction. You should go in the opposite direction to what T2 says.

In all three cases, you will want to take the opposite direction to whatever the middle person answers.

What if we add someone who sometimes tells the truth and sometimes lies?

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Let's say you go to a town where three people live: one who always tells the truth (T), one who always lies (L), and one who sometimes tells the truth and sometimes lies (S). The first person you meet says, "I always tell the truth." The second one says, "I always lie." The third says, "I sometimes tell the truth and sometimes lie." From these three statements, can you identify who said what?

One way to solve this is with a "truth table." The first column has the three statements. Then, in each column, determine if the person (T, L, or S) could make that statement. For example, if the person says "I always tell the truth," T could make that statement since he always tells the truth. L could also make that statement since he always lies. S could also make that statement if he lies.

Do the same with the remainder of the statements.

Statement	Could this person say this?		
	T	L	S
I always tell the truth	Yes	Yes	Yes
I always lie	No	No	Yes
I sometimes tell the truth and sometimes lie	No	Yes	Yes

The only person who can say "I always lie" is S, so we know the second person is S. Both T and L could say "I always tell the truth," but only L and S can say "I sometimes tell the truth and sometimes lie." Since we know that S is the second person, that means L must be the third person. That leaves T as the first person.

Tower Subway

While authors often invent things while writing, the Tower Subway mentioned in the book is real. It was built in 1869 to allow people to cross the River Thames without having to use the London Bridge. A carriage carrying twelve passengers was pulled along rails on cables using steam power. There were numerous breakdowns and then a man named Thomas Jannang was killed in an elevator accident while leaving the subway. The company went bankrupt within months.

It was reopened as a pedestrian crossing and used for almost thirty years before the Tower Bridge was built in 1894. It was closed to traffic in 1898 and is now used for water mains and telecommunication cables.

The entrance to the Tower Subway still stands near the Tower of London ticket office. This was built in 1926 by the London Hydraulic Power Company.

To my knowledge, there is not a tunnel that leads from the Tower of London to the Tower Subway.

Coming Next!

The Inconsistent Proof

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