

# The Triangle Secret



*Book 6 in The Math Kids Series*

## ***The Math Kids Series***

*Have you read them all?*

1. The Prime-Time Burglars
2. A Sequence of Events
3. An Unusual Pattern
4. An Encrypted Clue
5. An Incorrect Solution



# The Triangle Secret



*Book 6 in The Math Kids Series*

by

**David Cole**



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*To friends lost this past year,  
but never forgotten.*



# Chapter 1



Jordan Waters let out a contented sigh as he looked around his fifth-grade classroom. He felt like things were finally back to normal. The school year had started off very badly. Jordan and Justin Grant, his best friend since kindergarten, had been put into one class. The other half of the Math Kids, Stephanie Lewis and Catherine Duchesne, had been placed in Mrs. Wilson's class. To make matters even worse, Mr. Miller, his new teacher, had made it quite clear he was not a fan of anything to do with math.

Luckily, the Math Kids had been able to use their math skills to prove that Mr. Miller's son had been falsely accused of reckless driving. To return the favor, Mr. Miller had pulled a few strings and got Stephanie and Catherine moved into his class. The Math Kids were reunited, and things were right with the world. Mr. Miller had put them in the same math group, and now they had time to work together on difficult math problems. There was nothing

better than a tough math challenge as far as Jordan and his friends were concerned.

This time the problem came from Catherine's dad. He taught math at the college and had even written some of his own math books. Mr. Duchesne knew his daughter and her friends loved math and always had a new problem for them to solve. In fact, it was solving a math problem that first introduced them to the math professor. When Mr. Duchesne had been kidnapped, he wrote Catherine a secret message that she and her friends solved using the Fibonacci series, a famous math pattern. The Math Kids had figured out the clue and were able to rescue him. That was also when the four friends had met FBI Special Agent Carlson, who had been assigned to the kidnapping case. That introduction had led to the agent asking the Math Kids to assist the FBI on a cold case involving a bank robbery, and from there an unlikely friendship had developed between them.

"Okay, here's the problem," Catherine said as she read from a sheet of paper. "The new ice cream store has sixteen flavors of ice cream. How many ways can they make a three-scoop ice cream cone?"

"Does the order of the scoops matter?" Stephanie asked.

"That's a great question, Stephanie," Justin said. "That makes a big difference when you're counting up the total number of possible combinations."

## *The Triangle Secret*

"It says the order of the scoops doesn't matter, just the flavors that end up in the cone," Catherine answered.

"So, two scoops of chocolate and one scoop of vanilla is the same no matter how you stack them up?" Stephanie asked.

"Well, obviously that's not right," Jordan chimed in. "You should always put the vanilla scoop in between the two chocolate scoops."

"Can we stick to the math and not your taste buds?" Justin asked.

Stephanie made her way to the white-board. She had the best handwriting, so she usually ended up being the one who wrote down the group's thoughts.

"We could do it the hard way," Jordan said. "We could write down all of the combinations and count them, but I have a feeling there's an easier method."

"I think you're probably right," Catherine said. "My dad is usually trying to teach some lesson when he gives us a problem like this. I think we should make a table and see if we can come up with a pattern."

Stephanie started a table on the white-board.

Flavors	Possibilities	Combinations
1	1	aaa

"I used letters for the flavors," she said. "The first one is pretty easy. Boring, but easy."



*David Cole*

"I don't know," Jordan said. "A three-scoop chocolate ice cream cone doesn't sound boring to me."

"We probably shouldn't do ice cream problems right before lunch," Justin said. The other Math Kids laughed.

"Okay, back to work," Stephanie said. With the help of her friends, she filled out the next few rows in the table.

Flavors	Possibilities	Combinations
1	1	aaa
2	4	aaa, aab, abb, bbb
3	10	aaa, aab, aac, abb, abc, acc, bbb, bbc, bcc, ccc
4	20	aaa, aab, aac, abb, abc, acc, bbb, bbc, bcc, ccc, aad, abd, acd, add, bbd, bcd, bdd, ccd, cdd, ddd

"Wow, the number of possibilities really goes up fast with each new flavor," Catherine said. "It will take us forever if we have to keep writing down all of the possible combinations. Does anyone see a pattern yet?"

The four friends stared at the board, hoping something would jump out at them. Stephanie jotted some numbers on a sheet of paper, then just as quickly scratched them out in frustration. Jordan spent his time trying to figure out the number of possible combinations for five flavors of ice cream, hoping the extra piece of information would allow him to figure out the pattern. Justin closed his eyes, trying to get into his "zone." When he got into the zone,

## *The Triangle Secret*

he usually came out with an answer, but this time he came up blank.

Catherine looked at the sequence of possibilities. "1, 4, 10, 20. There's something familiar about that pattern, but I can't quite put my finger on it."

The lunch bell rang, interrupting their work. They put the problem out of their minds as they ate lunch. Instead, they discussed Catherine's upcoming art show.

"Are you entering one of your drawings?" Stephanie asked.

"No, I'm trying something a little different this time," she said.

Stephanie's eyes widened. In her opinion, Catherine was a great artist, but Stephanie had never seen her do anything but sketches. "What are you doing?" she asked. "Painting?"

"I thought about that. I have been reading a book about Wassily Kandinsky. He was a pioneer of abstract art."

"Abstract art, huh?" Justin interjected. "That's just shapes that don't make any sense. In my opinion, if I can do it, it's not art."

"I think you'd actually like Kandinsky," Catherine retorted.

"I doubt it."

"What if I told you his art was full of math?" Catherine asked.

"Well, that might make it a little more interesting."

"He used shapes—especially circles and squares—in most of his works. It is amazing to see how much expression he could get out of such simple shapes."

"How can you get expression out of a square?" Justin asked. His look said he wasn't buying it.

Stephanie ignored Justin. "So, you're doing an abstract painting?"

"No. I am using shapes though. But unlike Kandinsky, my entry is going to be three-dimensional. I'm going to..." Catherine grew quiet and smiled. "I just remembered where I saw that pattern," she said. "I'm pretty sure I know how to solve the problem now."

Before she could say anything more, Jordan's phone buzzed. He pulled it out of his pocket and stared wide-eyed at the screen while his friends looked on.

"Your art project is going to have to wait," he said tensely. "I just got a text from Agent Carlson. He's in trouble!"



# Chapter 2



**T**wo days earlier...

FBI Special Agent Bob Carlson stepped out of Terminal 3 at Cairo International Airport and was immediately hit with a blast of hot, dry air. It was mid-morning, and the temperature was already in the low nineties. Carlson removed his suit coat and draped it over one arm. He loosened his tie and looked around, searching for the contact he was supposed to meet.

"Agent Carlson?"

Carlson looked to his right and saw a small, dark-skinned man wearing a pair of white pants and a loose-fitting cotton shirt. The man gave Carlson a brief bow and extended his hand.

"Mr. Hassan?" Agent Carlson asked.

"Mahmood Hassan," the man responded with a wide smile. "It is an honor to greet you, Agent Carlson." Another short bow.

"The honor is mine," Carlson replied.

"This way, sir. My car is just over here." Hassan motioned

toward a four-door sedan parked with one tire up on the curb. It was dented and so dusty it was difficult to determine the color underneath. Hassan opened the trunk and Carlson stowed his small suitcase.

When Carlson was seated, Hassan started the car and darted into traffic, narrowly missing being hit by a taxi. The driver honked loudly as he swerved out of the way. Hassan laughed and waved.

"I really appreciate you picking me up. I could have rented a car," Carlson said.

"That is a very bad idea, Mr. Carlson. The traffic is quite horrible, and Cairo drivers follow laws that are both numerous and unwritten."

Hassan passed a car on the right, veering onto the shoulder before swerving back onto the road in a cloud of dust.

"See, that was quite all right," Hassan smiled. "We'll be at your hotel in a zucchini bite."

Hassan laughed at Carlson's confused look.

"I think you would say we'll be there soon."

Carlson chuckled, but clutched the door handle as Hassan changed lanes again without bothering to look to see if a car was in the way. Another horn blasted as a truck steered to the left just in time.

"And I thought driving in Washington, D.C., was dangerous," Carlson said.

"No worries, my friend," Hassan said. "As a great

## *The Triangle Secret*

imam once said, 'My heart is at ease knowing that what was meant for me will never miss me, and that what misses me was never meant for me.'"

Carlson let out a sigh of relief when they finally arrived safely at the hotel. Hassan quickly hopped out of the car and retrieved Carlson's bag from the trunk.

"I'll give you some time to get settled in," Hassan said. "I'll pick you up first thing in the morning and we'll go to the pyramids. They are only fourteen kilometers away, but with traffic we should plan on at least an hour of travel. I'll meet you outside the hotel at seven o'clock."

"That'll work perfectly. I'll see you then, Mr. Hassan."

"Please, call me Mahmood, sir."

"Only if you call me Bob."

"Thank you, Bob, sir." Hassan gave another bow and got back into his car. He pulled into traffic, his horn blaring.

Thirty minutes later, Carlson had checked in, showered, changed his clothes, and was ready to explore. He was only in town for two days, and he wanted to see as much as he could in that short time.

He hailed a taxi and directed the driver to Khan el-Khalili, a market in the historic center of the city. Carlson spent an enjoyable two hours looking through the medieval-style mall with its spice dealers, gold merchants, and everything else a person might want to purchase. He haggled with a merchant for a small Aladdin-style metal lamp. The shop owner wanted two

hundred and fifty Egyptian pounds, but Carlson bargained him down to one hundred and twenty-five, about eight US dollars. He stopped for lunch, enjoying kushari, a mix of noodles, rice, black lentils, fried onions, and tomato sauce, while he watched the tourists pass by.

He asked a merchant for directions to the Cairo corniche, an area Hassan had recommended to Carlson because of its great views of the Nile.

"Dok Dok dock," the vendor told him, pointing down a twisted row of shops.

"Dock dock dock?" Carlson asked.

The man laughed. "Yes, Dok Dok is the name. It's a dock, you know, like a boat landing. It's in Garden City."

"Oh, that makes more sense."

He walked toward the river and was able to secure a ticket on a felucca, a traditional wooden sailing boat, that was headed in the right direction. The ship was about to set sail when two burly men hopped aboard just in the nick of time. They wore identical blue-striped kaftans, the traditional loose-fitting outerwear worn by many Egyptian men. With dark, thick beards, they could easily have passed for twins.

Under a stiff breeze, the felucca made good time while Carlson enjoyed the view. It was a rare instance of relative quiet in a city of twenty million people. When the ship docked forty minutes later, Carlson found his way to the Grand Egyptian Museum. He marveled at the large stone

## The Triangle Secret





obelisk outside the museum, and took his time taking in the grand staircase that led to the main exhibition space. He walked through rooms filled with mummies of ancient kings, enormous statues, boats, coffins, and artifacts from the pyramids. He was admiring the Gold Mask of Tutankhamun, which was made of almost twenty-five pounds of gold, when he noticed the two men from the boat.

They were standing just inside the entrance to the room. They were conspicuously looking at nothing, just standing against a wall. They turned quickly when Carlson glanced their way, pretending to examine a blue vase adorned with a large image of a cat. Something signaled an alert in the back of Carlson's brain, and he decided it was time to leave. He quickly left the room through the rear exit and circled around through the Temple Garden exhibit and back to the front of the museum. He took a quick look around to see if he was being followed, then descended the grand staircase and exited out the front door. Outside the museum, he sat on a bench behind a short row of bushes. He peered through the foliage but didn't see the men exit. *It's probably nothing*, he thought.

Carlson took a taxi to a restaurant Hassan had suggested. He was able to get a table with a nice view of the Nile as dusk settled. The restaurant served many traditional Egyptian dishes and Carlson selected a few his new friend had recommended. He ate shish tawook,

## *The Triangle Secret*

chicken cooked on a skewer and served with rice and pita bread, and had a large glass of qamar al-deen, a delicious drink made from apricot juice. Dessert was umm ali, a light pastry topped with powdered sugar and shredded coconut.

When dinner was finished, he hailed another taxi to take him back to his hotel. The streets were crowded with throngs of people. His driver had to slam on the brakes several times to avoid hitting pedestrians who had strayed off the sidewalk. He drove with one hand on the steering wheel and the other on the horn the entire way back to the hotel.

Agent Carlson paid the driver and entered the hotel. He took a glance outside and saw two familiar-looking bearded men in blue-striped kaftans leaning against the wall across the street. *Well now, this is starting to get interesting*, he thought to himself as he waited for the elevator.

# Appendix



## Abstract Art and Math Activity

Wassily Kandinsky was born in Russia in 1866. He is known as a pioneer of abstract art. Abstract art doesn't look like real life. Instead, the style uses bold lines, shapes, and colors to sometimes imitate real images, but often it has no picture at all.

Abstract artists often try to express their feelings or emotions, which is known as expressionism. Kandinsky's artwork was both abstract and expressive, which meant it fits into a special category of art called abstract expressionism.

You will see math in much of Kandinsky's art. He often used shapes, especially circles and squares, in his paintings.

Do you want to use some math to create your own art?

Supplies:

- 2 sheets of white card stock
- Watercolor paints

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- Watercolor paint brush
- Water
- Paper towel
- Ruler
- Scissors
- Glue stick

Steps:

- 1) Use the watercolors to paint circles on one sheet of card stock. Use any design you like (for example, make swirls or concentric circles that start as a dot and grow larger). No matter what kind of circles you create, be sure to cover the entire paper and use several colors within each circle.
- 2) Let the paint dry completely.
- 3) On the back of the dried artwork, use a ruler to make a grid of one-inch squares.
- 4) Cut the artwork into squares and mix up the pieces.
- 5) Lay the squares randomly on the other piece of card stock to create an abstract picture.
- 6) Glue the pieces down securely.

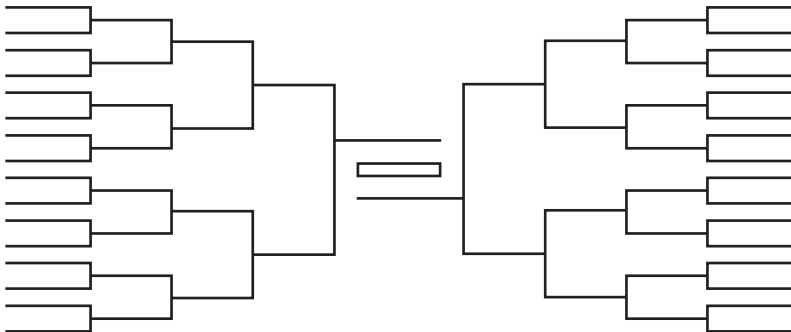
The result will be a beautiful Kandinsky-inspired picture!

## How Many Games in the Tournament?

There is a lot of math behind setting up a tournament. How many teams will play? How many losses can a team have before they are eliminated? How many games can be played at the same time (how many fields are available to play soccer, for example)?

The coach said there are thirty-two teams in the tournament. It is a single elimination tournament, so a team is out of the tournament as soon as they lose one game. How can we figure out how many total games will be played?

There are a few different ways to solve this problem. One way is to draw out the bracket and count the number of games played.



Another way is to count the number of games in each round. A simple table works well here:

Round	Number of Games
1	16
2	8
3	4
4	2
5	1
<b>Total Games</b>	<b>31</b>

There is an even easier way to solve this problem. There are thirty-two teams in the tournament. Thirty-one of these teams will lose, one in each game, so there must be thirty-one total games.

## The Math Behind Beethoven's Music

Ludwig van Beethoven (1770–1827) was a German composer and pianist. He is known as one of the greatest composers of all time. He began to lose his hearing at age twenty-eight and was totally deaf by the time he was forty-five. Despite that, he continued to compose beautiful symphonies. How was he able to do that?

By stacking notes together in a particular way, we create a geometric series of frequencies that create

## *The Triangle Secret*

consonance, a combination of notes which sounds naturally pleasing to our ears. Even though he was deaf, Beethoven understood these patterns and was able to create by relying on the certainty of mathematics.

### **Hidden Patterns in Pascal's Triangle**

There are a lot of different patterns hidden in Pascal's triangle. Besides the counting numbers, triangular numbers, and powers of eleven that Stephanie and Catherine found, you can also find these patterns:

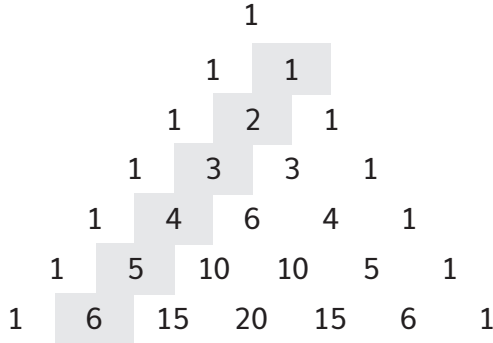
#### ***Powers of 2***

To find the powers of 2, just add all the numbers across in a row.

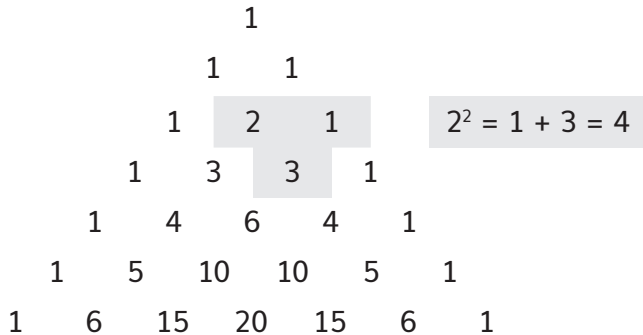
				1						= 1 ( $2^0$ )				
				1		1				= 2 ( $2^1$ )				
			1		2		1			= 4 ( $2^2$ )				
		1		3		3		1		= 8 ( $2^3$ )				
	1		4		6		4		1	= 16 ( $2^4$ )				
	1		5		10		10		5		1	= 32 ( $2^5$ )		
	1		6		15		20		15		6		1	= 64 ( $2^6$ )

### Square numbers

To find the square numbers, first find the diagonal with the counting numbers.



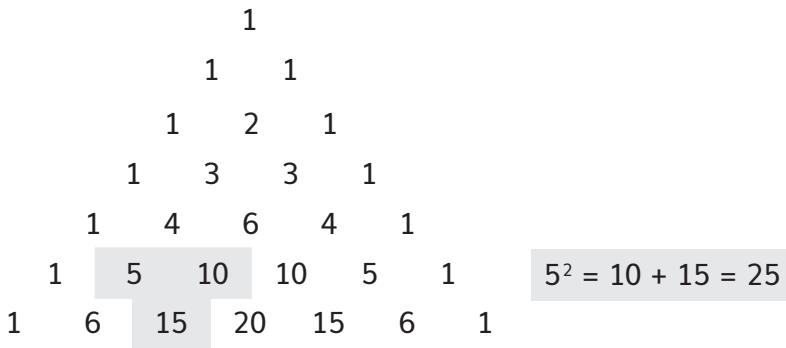
To find the square of a number (the number multiplied by itself), just add the number to the right and below. For example, here's how we find  $2^2$ :





## The Triangle Secret

Here's how we find  $5^2$ :

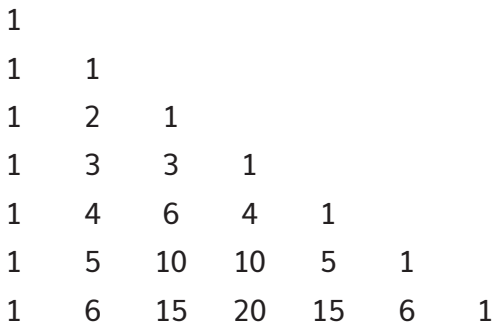


### Fibonacci Sequence

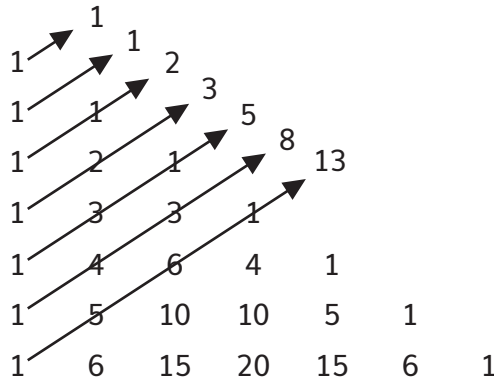
The Fibonacci sequence is a little trickier to find. If you remember from *A Sequence of Events* (book 2 in the Math Kids series), the sequence starts with 1 1. Each additional number is found by adding the two previous numbers. The first few numbers of the sequence are:

1 1 2 3 5 8 13 21...

To find this sequence in Pascal's triangle, we align all the numbers to the left.

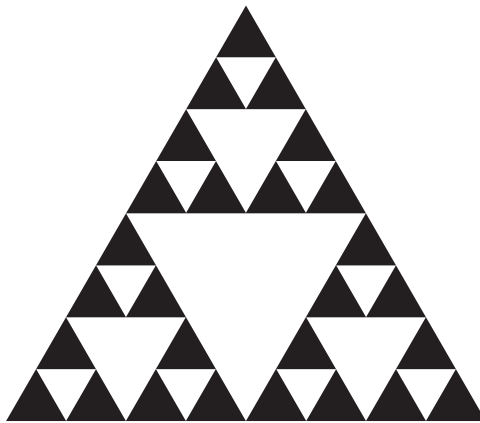


Add the numbers on diagonals as follows:



### Sierpinski Triangle

There is even art hidden within Pascal's triangle. If you put every number inside of a triangle and then color in the odd numbers, you will see this beautiful pattern known as the Sierpinski triangle.



## **Houdini's Will**

In the book, Willard Howell created a strange will that led the Math Kids to his secret bank account. Although this story is fiction, there have been some strange wills in real life. One of these was the last will of Harry Houdini, the famous magician and escape artist.

Besides being an amazing magician, Houdini spent a good portion of his life debunking supposed psychic mediums who claimed to be able to speak to the dead. He would often go to séances (meetings where people attempt to contact the dead, usually by using a medium) dressed in disguise so he could demonstrate that the medium was a fraud.

Houdini died of a ruptured appendix on Halloween in 1926 after being punched in the stomach. Houdini's will contained some very strange provisions. Before he died, he left his wife a secret message. She was told to perform a séance regularly to try to contact him from beyond the dead. Houdini said he would prove it was him by reciting the message he had given her before he died.

Although she held annual séances every year on Halloween for ten years, there was no evidence that he ever appeared.

Coming Next!

# A Knotty Problem

*Book 7 in The Math Kids Series*

by

David Cole

