



**THE 2022 YOUNG MATHEMATICAL STORY AUTHOR (YMSA) COMPETITION**

**THE CINDY NEUSCHWANDER AWARD  
(THE 12-15 YEARS OLD CATEGORY)**

**LONGLISTED**

'A Day of An Ant Family' by Ruiyang Liu (12 years old)  
at the International School of Paphos (Cyprus)

You can read the author's inspiration for the story and the judges' comments  
on:

[www.mathsthroughstories.org/ymsa2022](http://www.mathsthroughstories.org/ymsa2022)

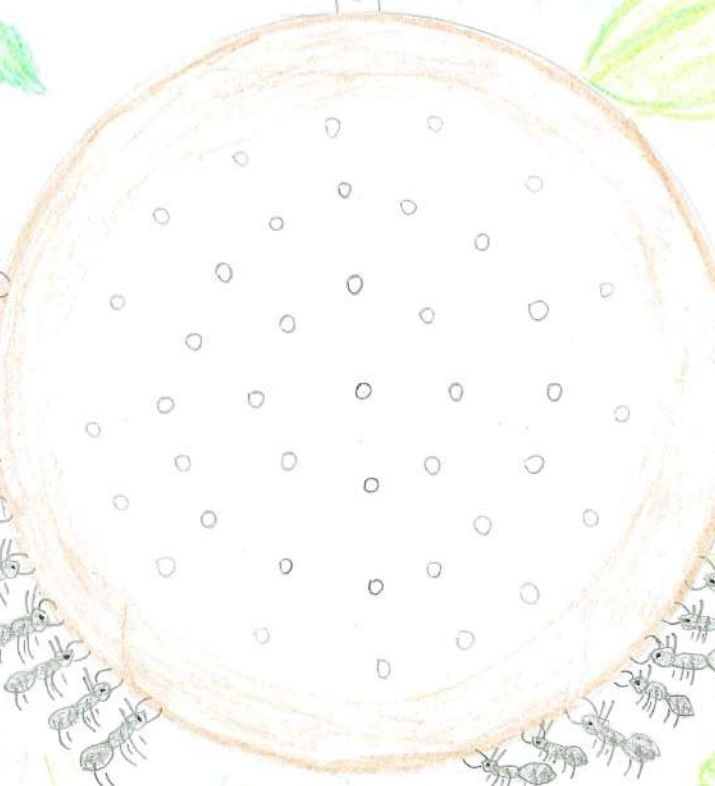
**#YMSAMaths**

A day for an



Ant

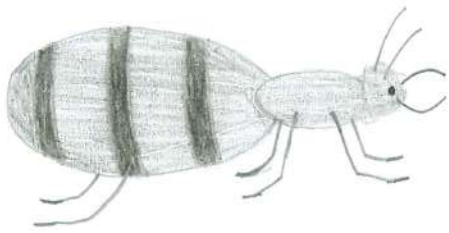
family



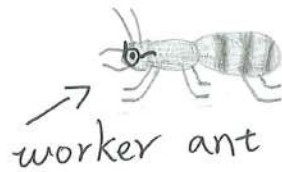
International School  
of Paphos  
By: Lucas Liu

Once upon a time, there was a large Ant family. This is the Queen of this ant family. And those are soldiers, worker ants and a smart worker ant called Madison, who was the smartest in this family. Madison always gives worker ants some good ideas to carry food and Madison also has a fan, who was a worker ant called Kay. Except Madison and Kay, there also a soldier called Charlotte, who was the strongest in this ant family.

Queen



Madison



Kay



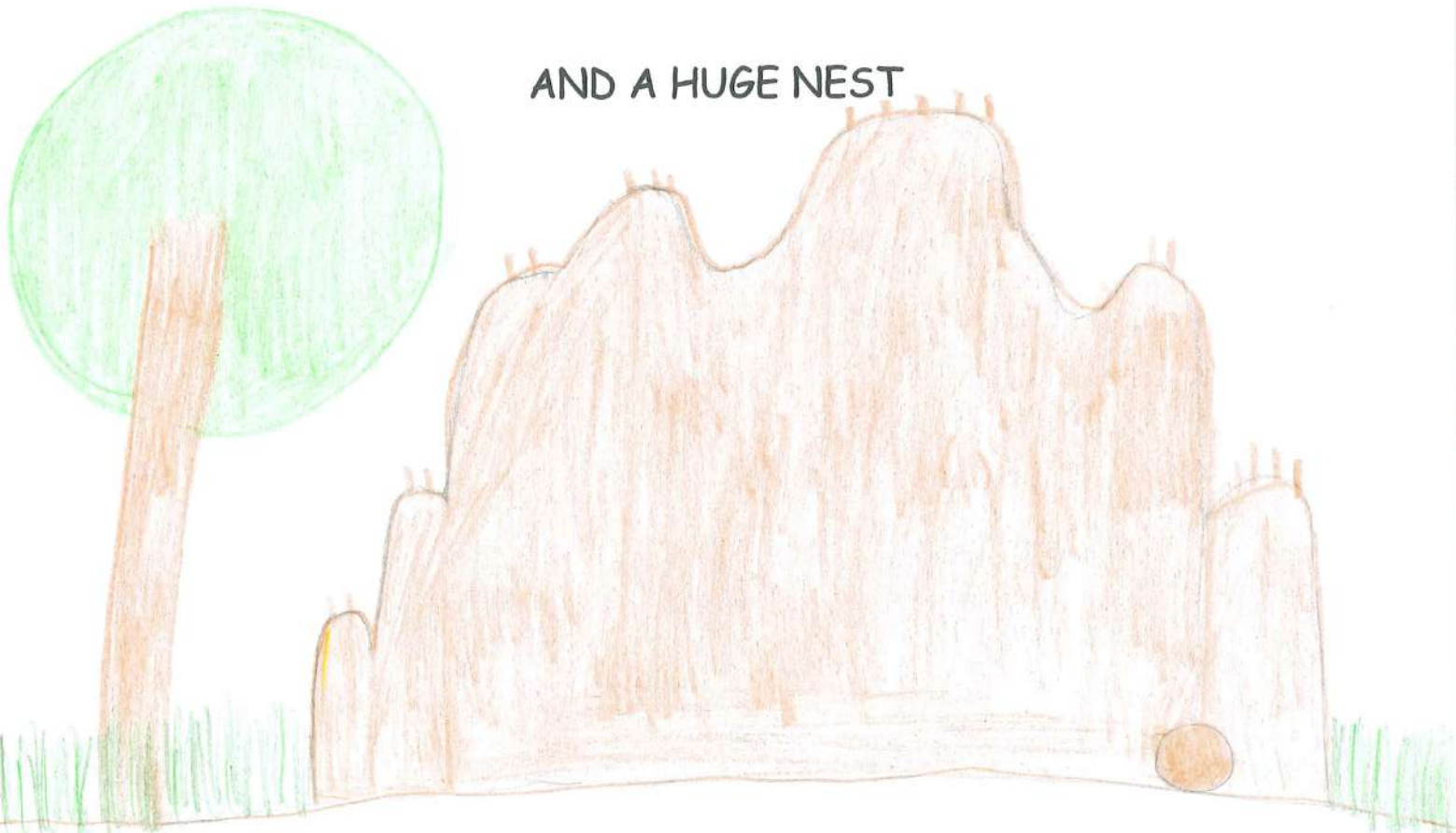
← worker ant

Charlotte



↑ soldier

AND A HUGE NEST



A day in the morning, the queen yelled

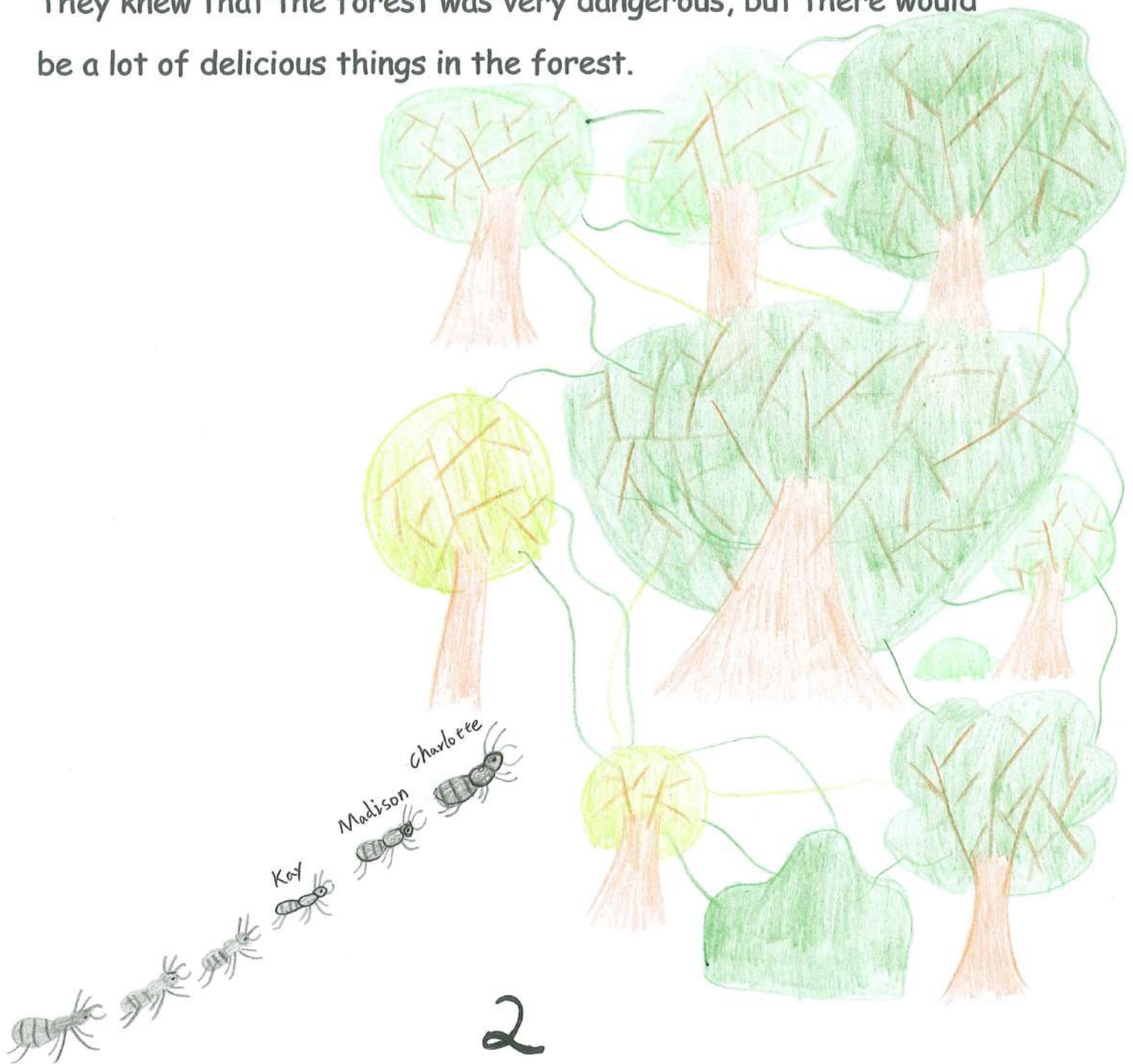
"I just eat food only one square centimeter or several foods that are not one square centimeter, put together into one square centimeter! And one of the worker ant need to tell me how many square centimeters this whole food has."

"Let's come out to find food!" Charlotte shouted.

"I go with you." Madison said.

Worker ants, Charlotte and Madison walked toward the forest.

They knew that the forest was very dangerous, but there would be a lot of delicious things in the forest.



"Look! There is a thin slice of square candy in front!" Kay shouted.

"But how do we know that we can cut down one square centimeter and how many square centimeters this whole food has."

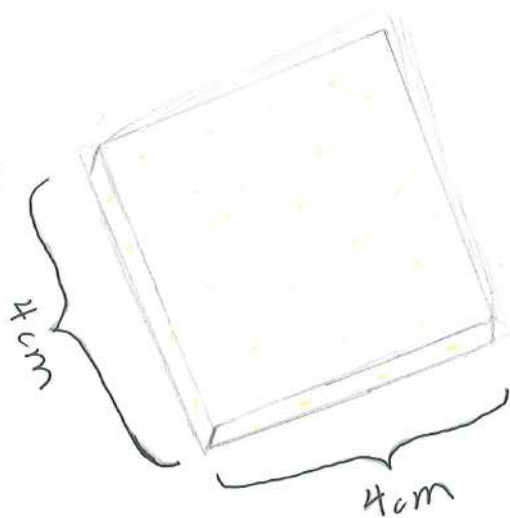
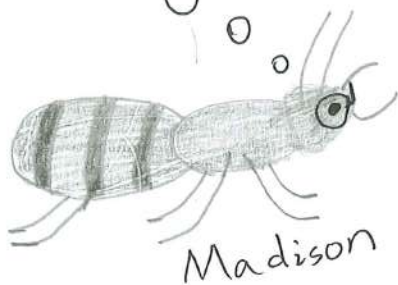
"Madison, don't you know?" Charlotte asked.

Charlotte didn't believe Madison was smart.

"I know. Our body is one centimeter long so we can measure the length and calculate the square centimeters of this thin slice of square candy." Madison answered. "Then each worker ant cut down every centimeter all the way."

Formula  
the area of  
a square:  
side length  
by the side  
length

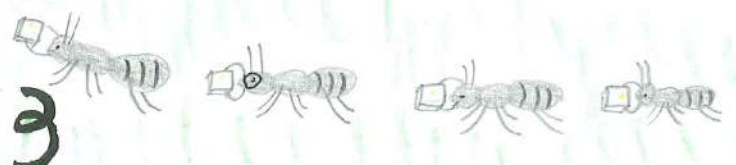
$$4 \times 4 = 16 \text{ cm}^2$$
$$16 \div 1 = 16$$
$$16 \text{ cm}^2 = 16 \text{ pieces}$$



"If your plan is wrong, you will be in trouble." Charlotte said.

"Hurry up! Worker ant, the queen needs us."

After that worker ant start cut down the flat square candy and moved home.



"What! Who did it?" The queen asked.

"It's Madison." Kay told the queen.

"She told us how to do, and then we cut down."

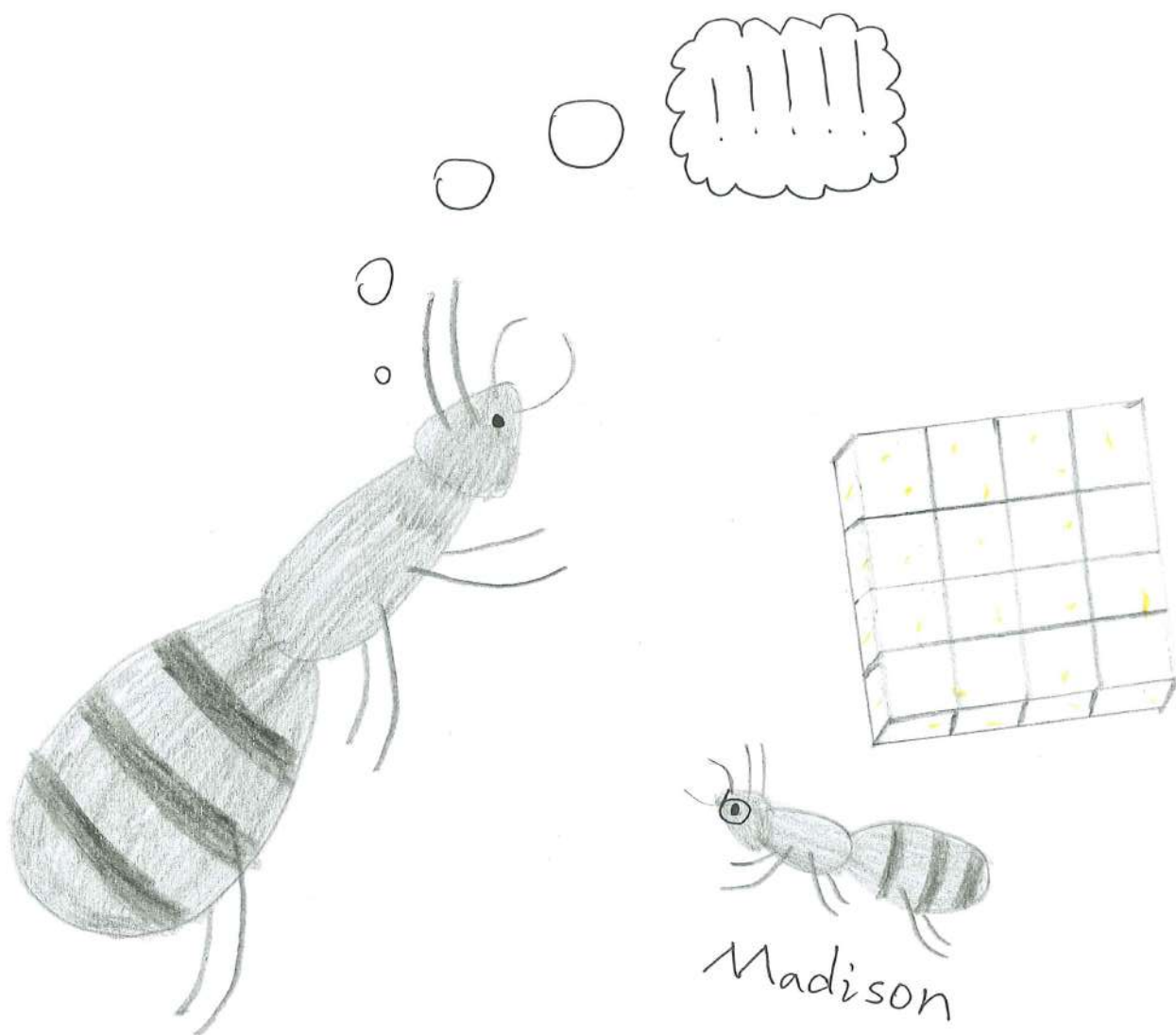
"I always thought I was the smartest in this nest." The queen said.

"Okay, go find more food, please."

"What! Your plan is correct." Charlotte whispered to Madison.

"That's okay; there is more food you need to think."

"Let's go, worker ants!" Charlotte shouted.



This time, they went into the forest again, looking for more tasty foods.

"Faster! Faster! There is something in the front!" Shouted Charlotte.

"What is that? Is it a green plastic pack?" Kay asked.

"Yes, it is." Charlotte answered. "Let's open it together."

"Three! Two! One! Pull! Three! Two! One! Pull!" Charlotte shouted the slogans.

"Wow! It's a chocolate bar." Madison and Kay both exclaimed.

"But why this chocolate bar so thin?" Kay asked.

"Maybe it melted a little bit." Madison answered.



"Madison, don't you know?" Charlotte asked.

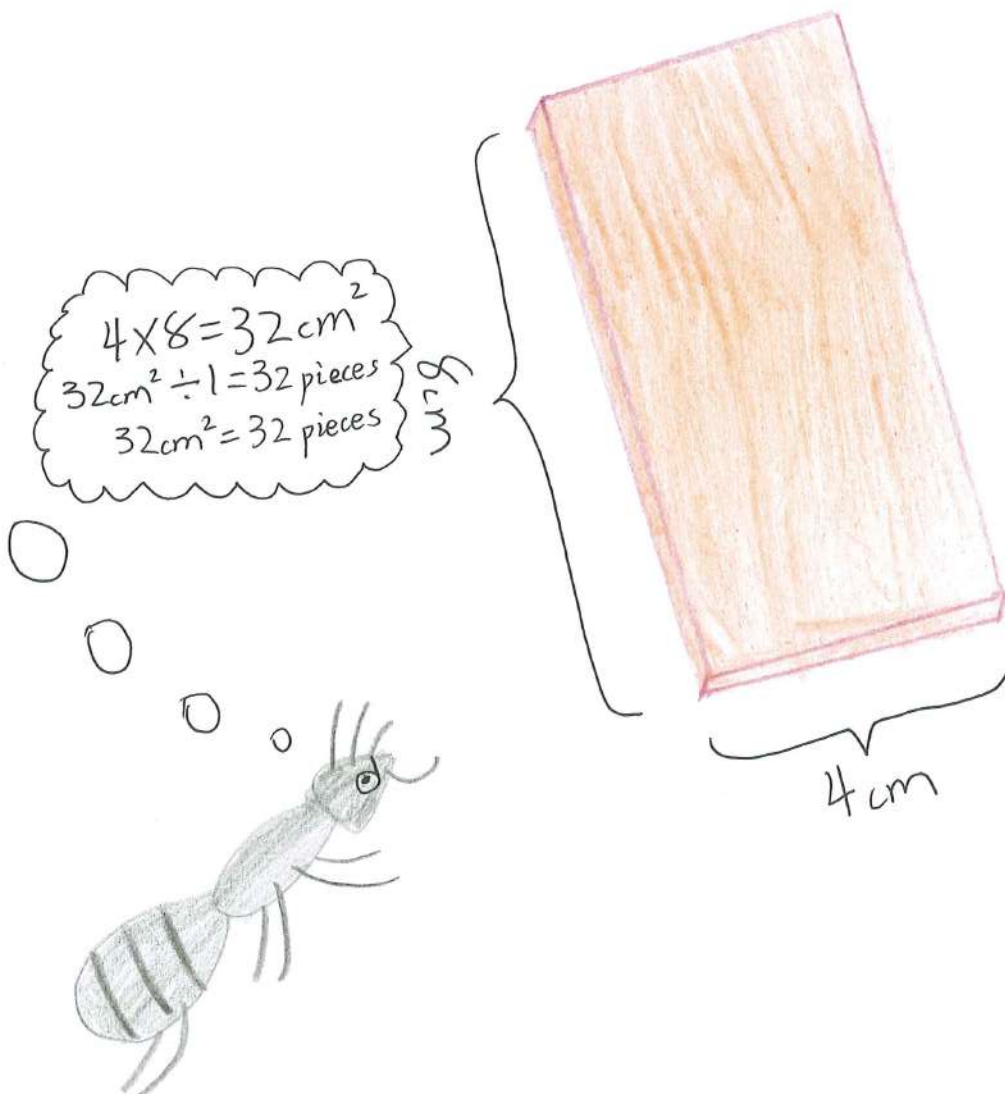
"It's very easy. Kay, you are my fan, such a simple question, you should know." Madison answered.

"Ofcourse I know!" Kay said to Madison. "It's the same with that thin slice of square candy."

"We measure the length and calculate the square centimeters of chocolate bar. Then each worker ant cut down every centimeter all the way." Kay said to Madison.

"Yes, your correct!" Madison whispered to Kay.

Formula  
the area of  
a rectangle:  
length times  
width



When they finished cutting, they moved home.



This time the Queen didn't say anything, just nodded.

When we were about to go to rest, the Queen said to us "Find more food, please."

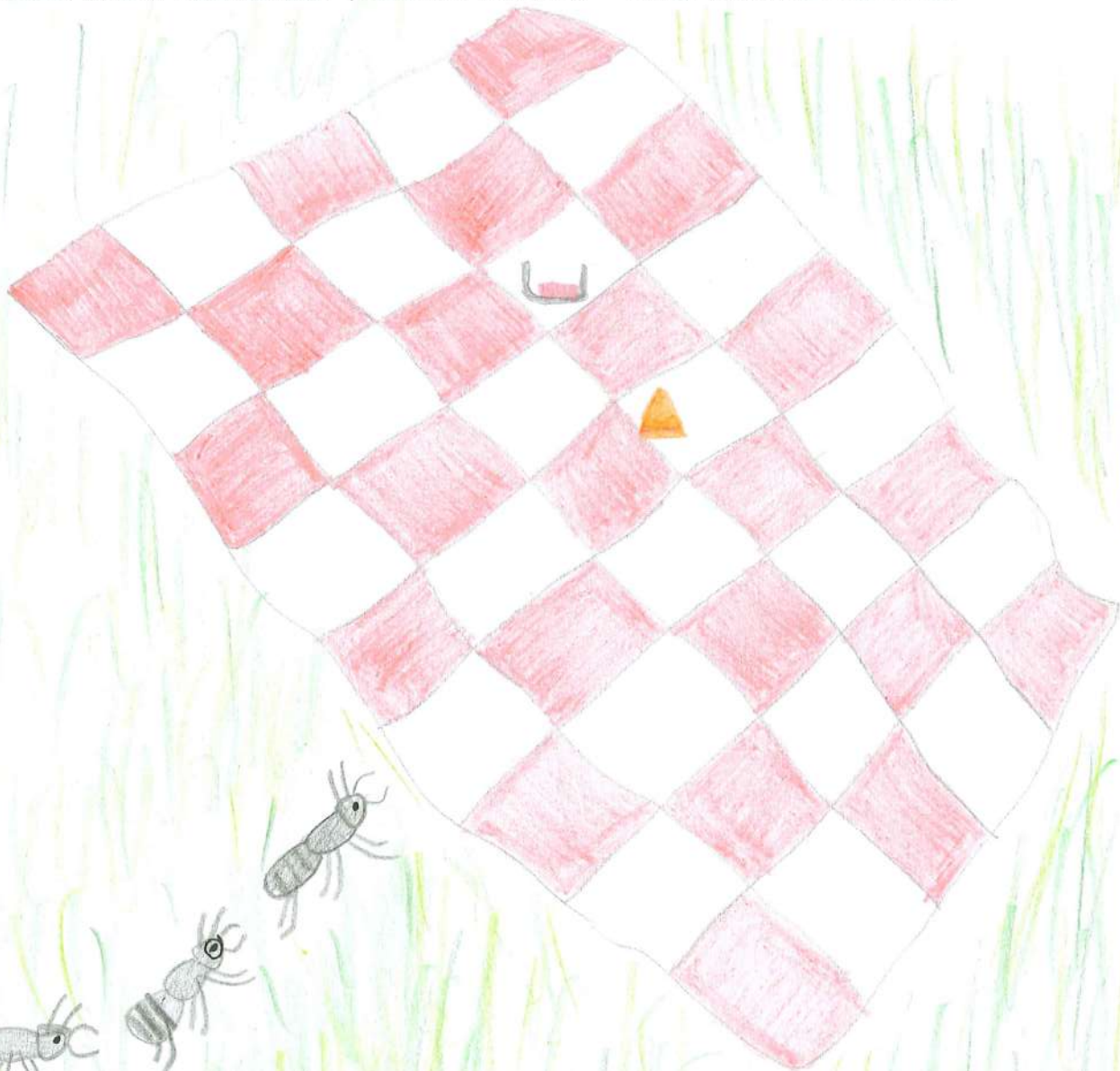
"Okay, our queen." Answered Charlotte.

"Let's go, worker ants!" Charlotte shouted.

This time they went deeper into the forest because there would be some people picnic there.

"Look! There is a picnic mat." Kay shouted.

"Hurry up! See what delicious food is there." Charlotte shouted.



"Let me see, what food they left. " Madison looked around.

"Look! There is a potato chip left there. " Charlotte pointed to the potato chip.

"This potato chip is triangle. Madison don't you know? " Charlotte asked.

"I always know. Well, let's measure one side of this triangular potato chip first, and then measure this side to the opposite corner. " Madison answered. "Finally, multiply the two numbers together and divide by two. "

"Why do we need to divide by two? " Asked Kay.

"If we don't divide by two, the answer will become a square, not the area of the triangle. " Madison answered. "And we need cut down like this. "



(She drew this shape on the ground)

"Oh my god! " Exclaimed Charlotte.

$6 \times 12 = 72 \text{ cm}^2$   
 $72 \div 2 = 36 \text{ cm}^2$   
 $36 \div (11 \times 2 \div 2) = 36 \text{ pieces}$



Formula  
the area of  
a triangle:  
base times  
height dived by  
two

When they finished cut down the potato chip, they found a iron box with a parallelogram of bacon inside. After they put the bacon on the picnic mat, they put in the little triangle chips that they cut.

"Madison, you don't know this time, do you?" Charlotte asked.

"Charlotte, such a simple question, do you need to ask me? Isn't it the same as the slightly melted rectangular chocolate?" Madison frowned and said to Charlotte.

"Hmm, it seems so." Said Charlotte.

"We just need to cut down one of the triangle of this parallelogram and put it on the other side. Just like this method I painted to the ground."

Madison replied to Charlotte.

"Madison, you're so smart!"

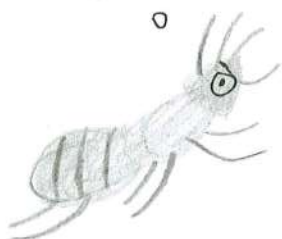
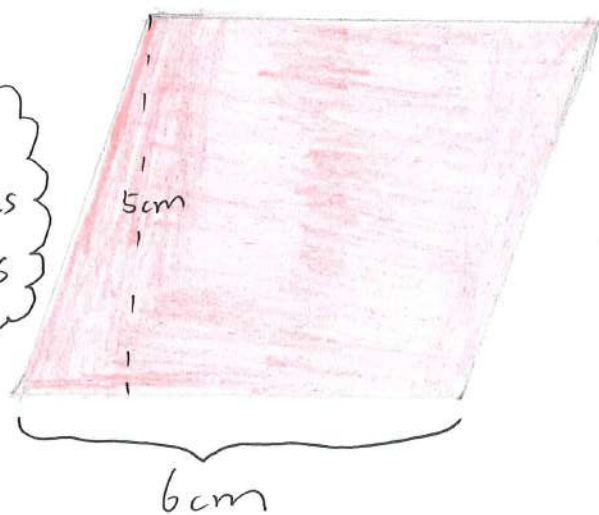


Commented Charlotte.

Charlotte already believes he is smart.

Formula  
the area of  
a parallelogram  
length times  
width (height)

$5 \times 6 = 30 \text{ cm}^2$   
 $30 \div 1 = 30 \text{ pieces}$   
 $30 \text{ cm}^2 = 30 \text{ pieces}$



When they finished cutting, they put the small pieces of bacon in the iron box. After that, they start found more food on the picnic mat.

"Look! Look! Look! There is a round cookie!" Shouted Kay.

"But how can we cut it into one square centimeter?" Asked Kay.

"We don't need to cut, we can roll it home! Then cut into smaller pieces for the ant larvae to eat." Madison answered.

"Oh! That's a good idea!" Kay reminded.

"Let's roll the cookie!" Kay replied.

Then some worker ants carried the iron box and some worker ants rolled the round cookie.



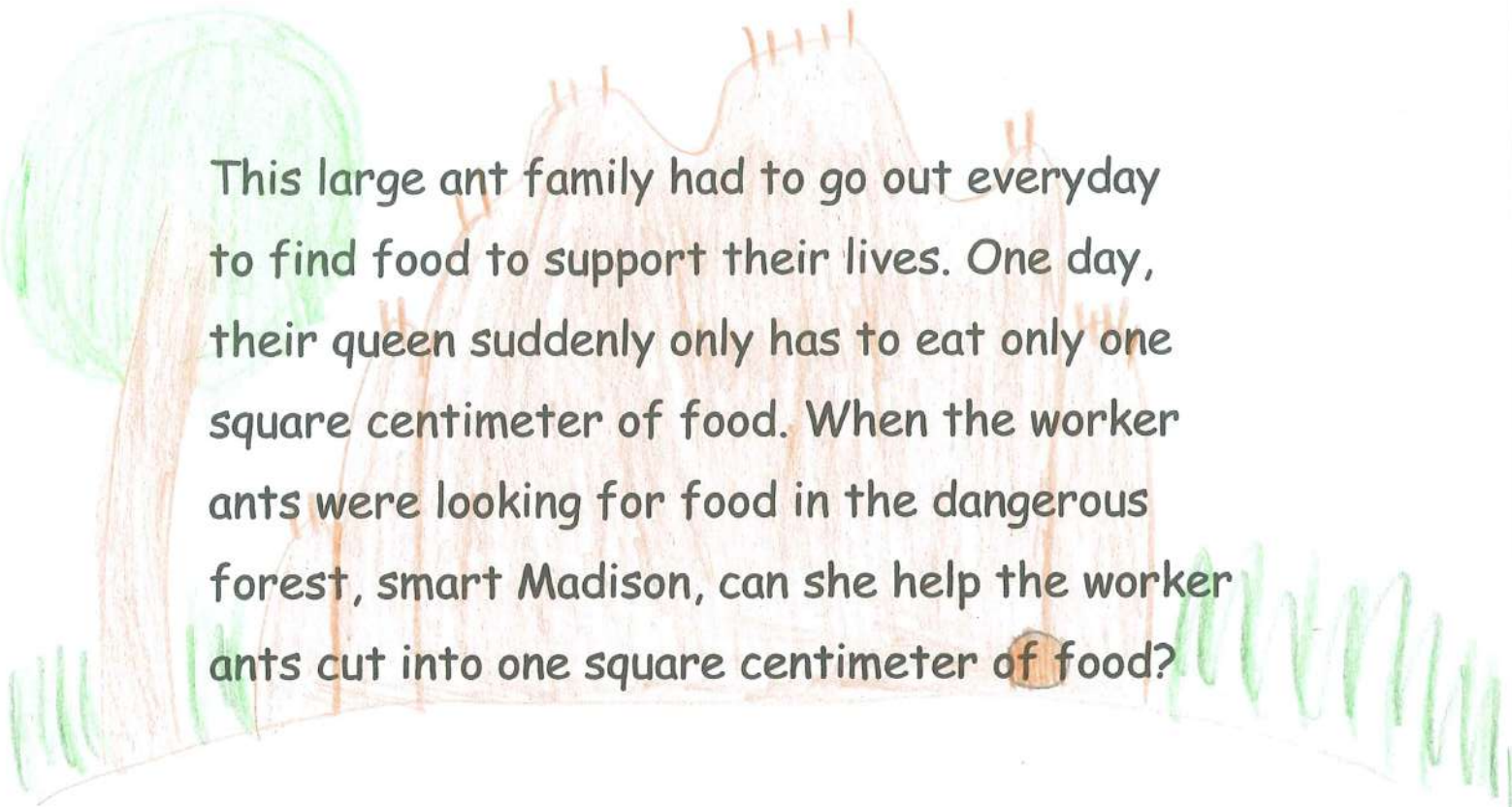
When they went back, they found an oval cookie.

"Madison, do you know how to do that one?" Asked Charlotte.

"Ofcourse I know, let's eat!" Madison joked.

"Madison!" Shouted Charlotte.





This large ant family had to go out everyday to find food to support their lives. One day, their queen suddenly only has to eat only one square centimeter of food. When the worker ants were looking for food in the dangerous forest, smart Madison, can she help the worker ants cut into one square centimeter of food?

## ABOUT THE AUTHER



My name is Lucas Liu and I'm 12 years old. Currently in grade 6 I attend International School of Paphos in Paphos Cyprus. I often observe ants in my daily life and I also like math, so I write this story. I use it a lot when grasping this concept, like I'm calculating the area of a TV screen, the area of a book cover, and the area of a newspaper. A lot of people don't like math, I don't why so I linked this math story about area to the insects we see so often. In my opinion this contest is very fun and we can learn a lot of new things.