THE 2023 YOUNG MATHEMATICAL STORY AUTHOR (YMSA) COMPETITION

THE CINDY NEUSCHWANDER AWARD

(THE 12-15 YEARS OLD CATEGORY)

SHORTLISTED

'Mia's Seating Plan!' by Amelia Daon Kang (12 years old)

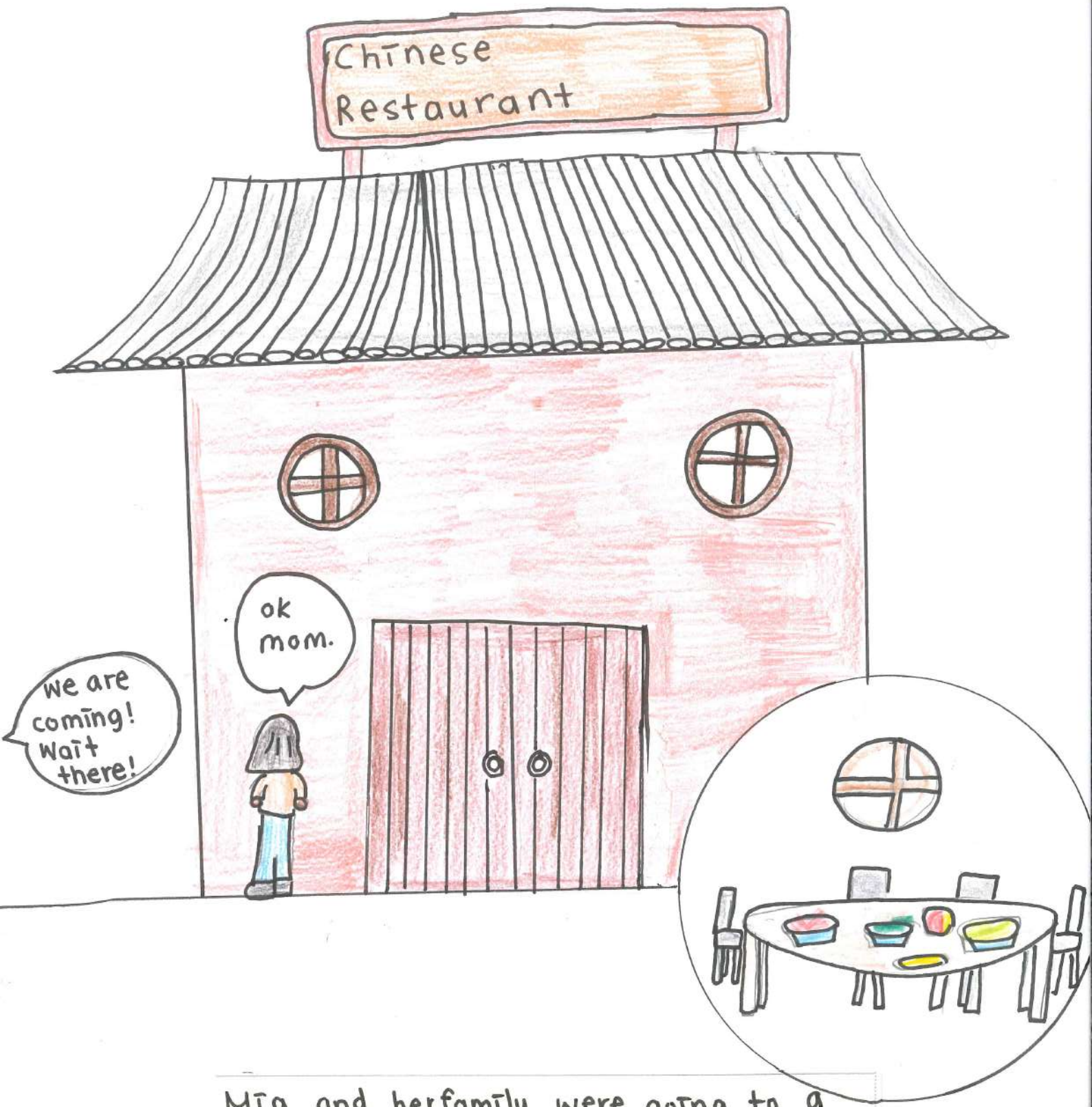
at Dulwich College Beijing (China)

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

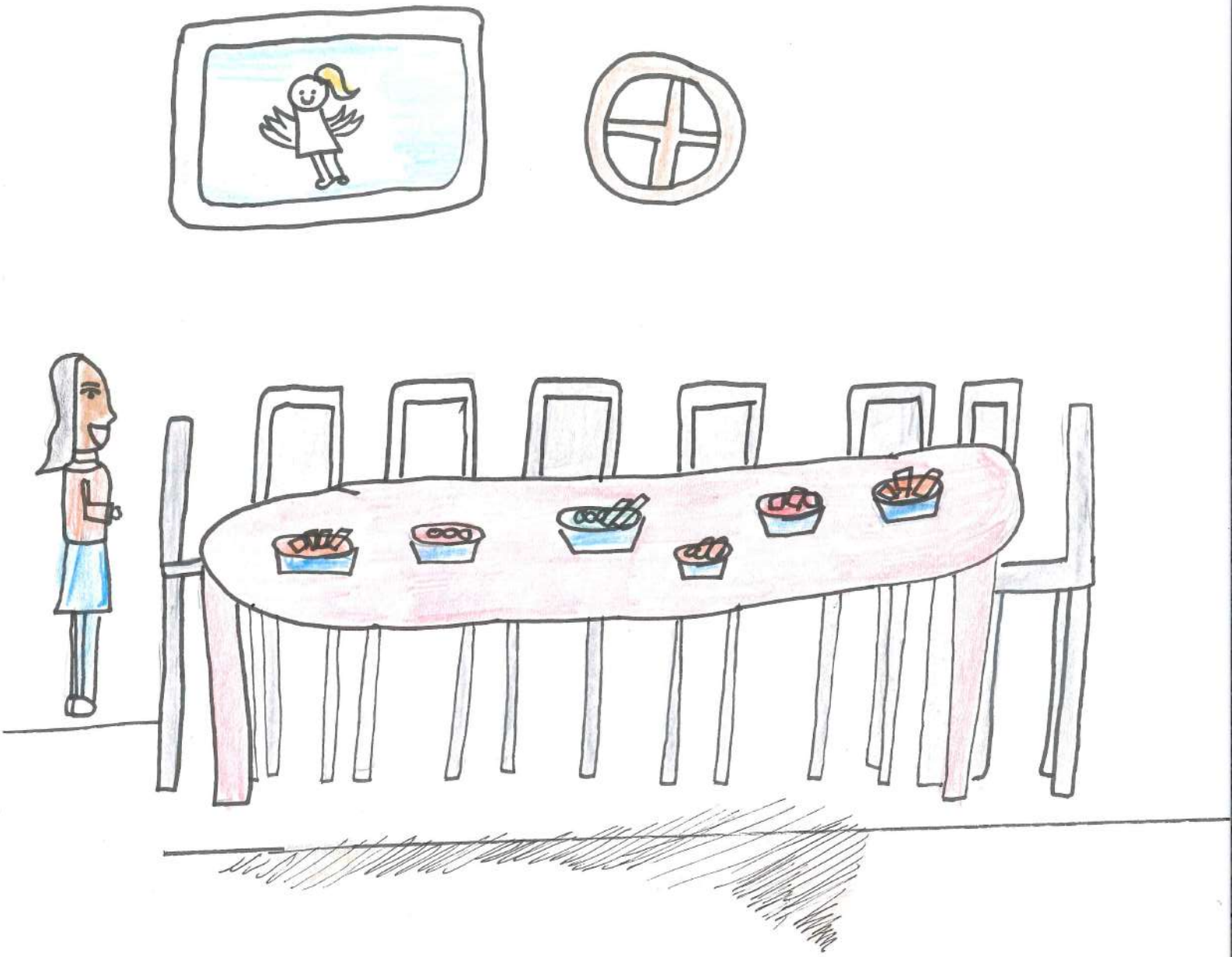
www.mathsthroughstories.org/ymsa2023

#YMSAMaths

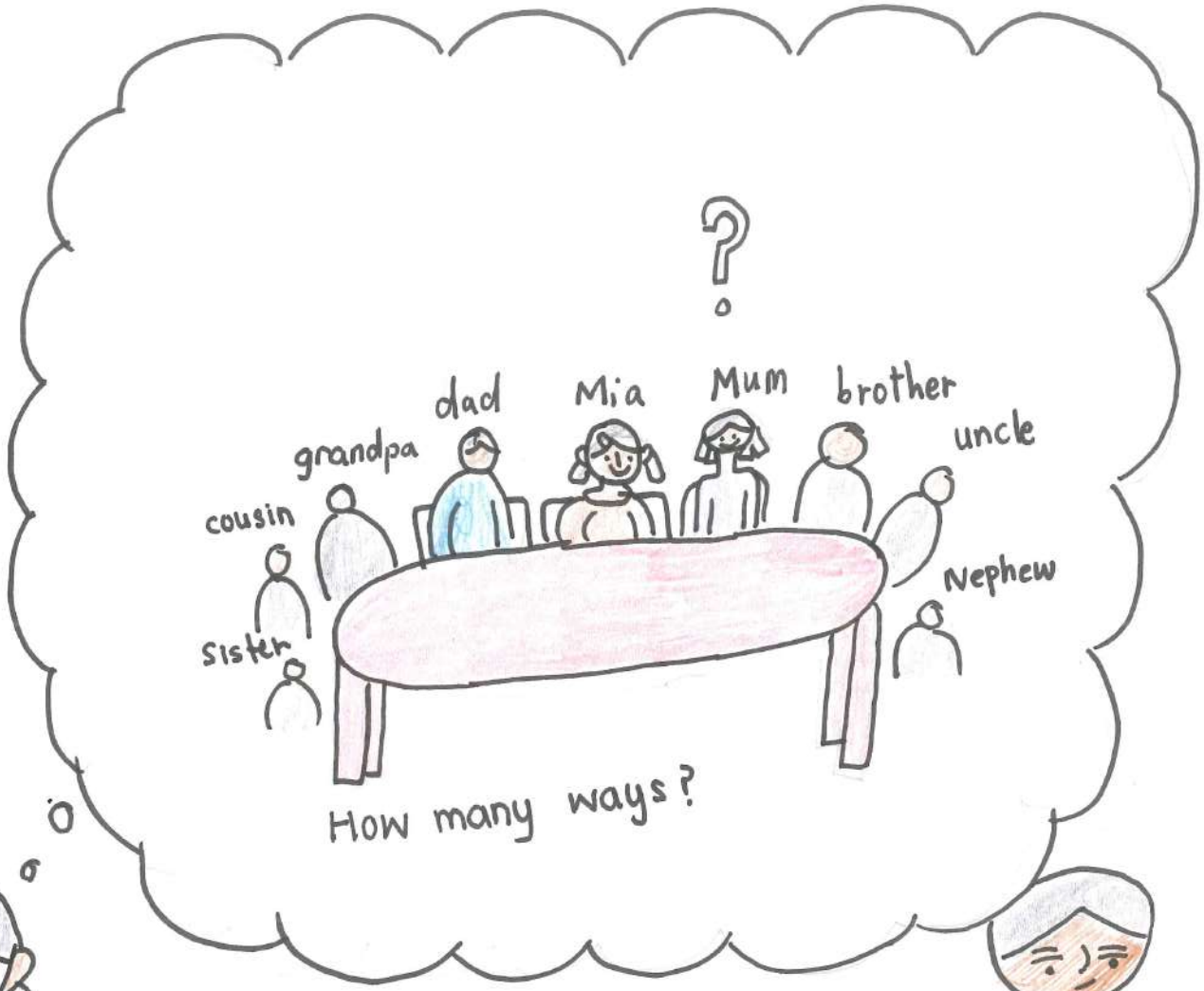
MIA'S
SEATING
PLAN!
By Amelia Daon kang DCB



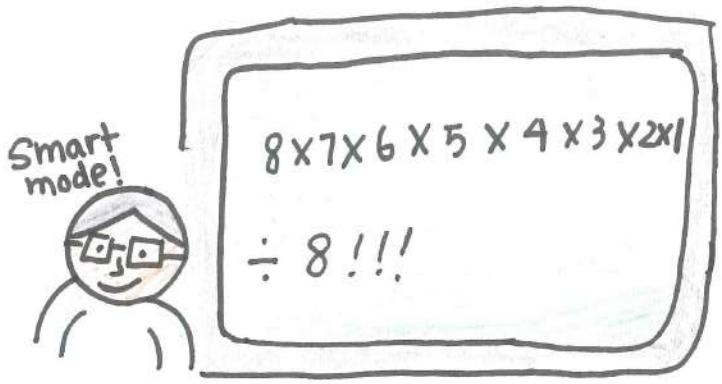
Mia and her family were going to a restaurant. When they went inside, there were lots of food. There were dumplings, hotpot, mapo tofu, kungpao chicken and more. Mia's family were excited about it.

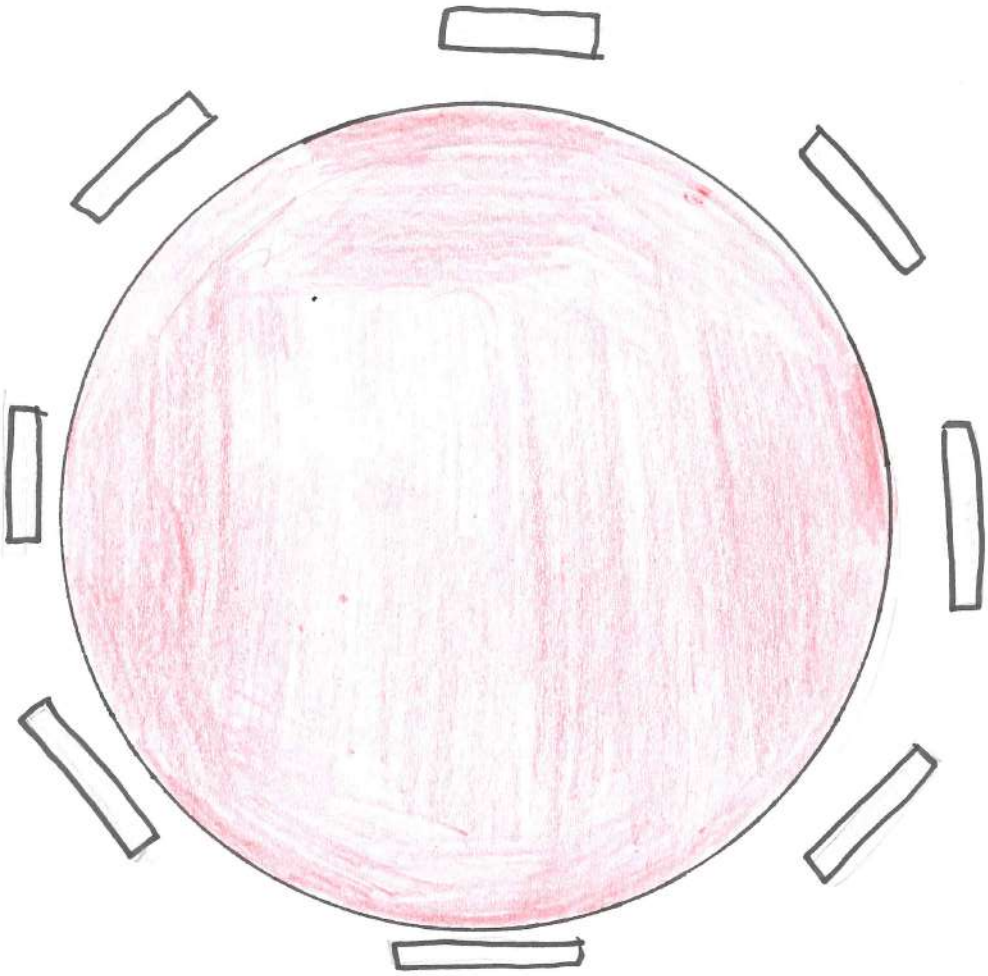


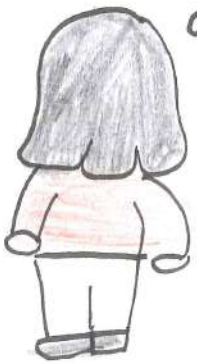
When they went inside, there was a round table. Mia wanted to sit next to everyone but because the table was round, she ~~can~~ only can sit with two people. She wanted to know how many ways she can sit with her family.



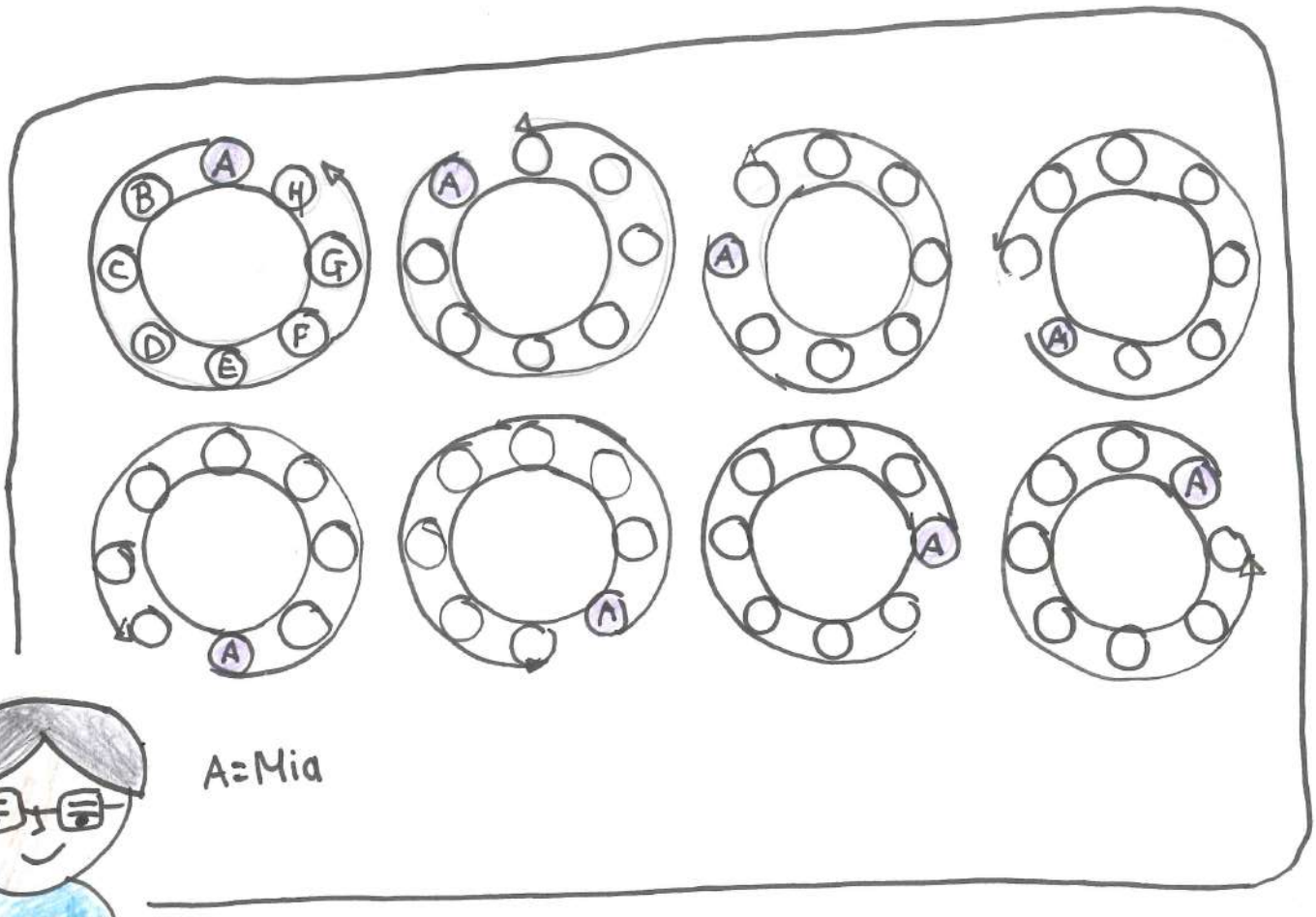
'Hmmm' she thought.
She asked her brother Jack.
"I want to know how many ways I can sit with everyone in my family."
Jack replied "to know how many ways there are, we first need to know what circular permutation is."
"What is circular permutation?" Mia asked in curious voice.
"Circular permutation is the number of ways to set up n distinct objects or items beside a fixed circle."

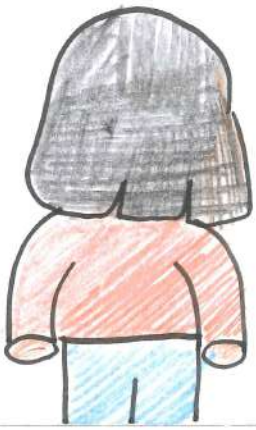




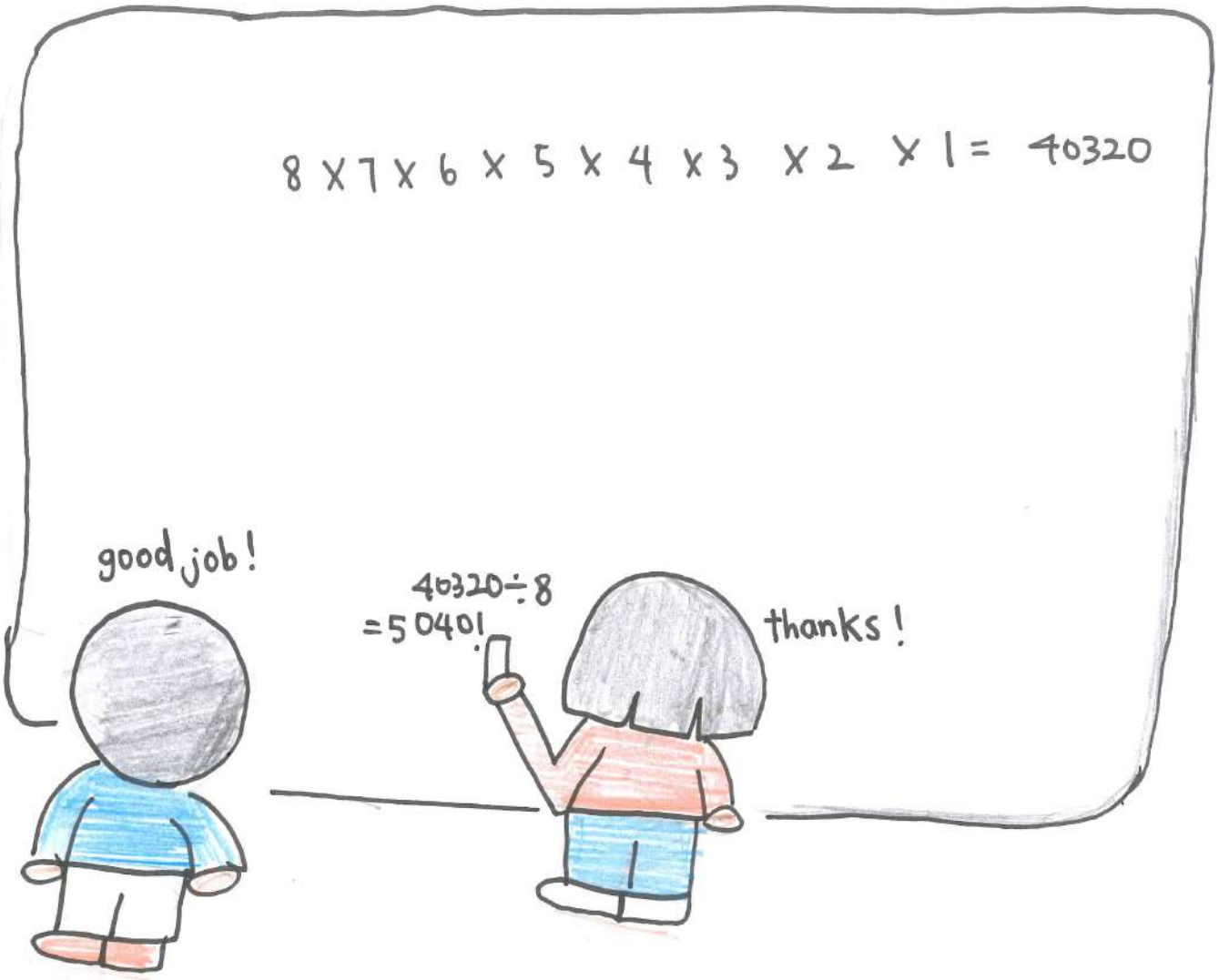


Jack explained "So, if you want to know how many ways that you can sit, you first times 8x7x6x5x4x3x2x1 since there are 8 seats and 8 members in our family." Mia replied, "WOW!"





Jack continued " After you solve $8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$, you then divide it by 8. This is because when you move your seat in one direction, you still have the same arrangement so if there is 8 seats you divide by 8."

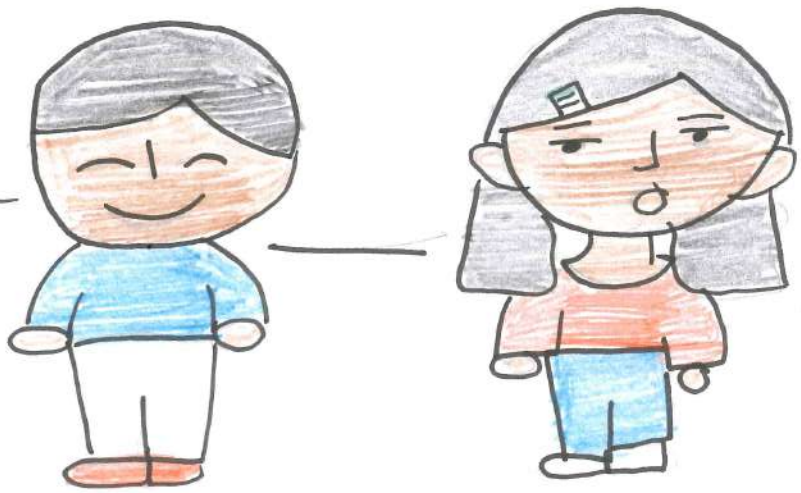


Jack said, "Now you know the way to solve it, why don't you try and find out the answer?"
Mia confidently said "sure!"
"If you times (x) 8, 7, 6, 5, 4, 3, 2, 1, it is 40320 (forty thousand three hundred and twenty) and when you divide (÷) by 8 it is 5040! (five thousand and forty)"

Why don't we try:

$$\frac{8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2}{8} = 5040$$

Same answer!!!



When are you guys eating food?

Jack chuckled as he said "You right but there is easier way to do it! If you make the equation like this: $\frac{8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 1}{8}$ you can see that we can simplify the 8 which makes it easier because you can just times (x) 7 x 6 x 5 x 4 x 3 x 2 x 1 which still makes 5040!"

"So, we have 5040 ways to sit with someone in my family which is a lot." Mia replied.

Mia laughed "I guess I just want to sit with mom and dad. There are too many ways!"
Jack said, "Why don't you sit with me and your mom so that you can learn more about math while we eat?"
"That is a good idea!" Mia smiled as she moved her seat.