THE 2024 YOUNG MATHEMATICAL STORY AUTHORS (YMSA) COMPETITION

THE STUART J. MURPHY AWARD

(THE 8-11 YEARS OLD CATEGORY)

WINNER

‘The Secret of Area’ by Samara Dhankar (10 years old)

at Oberoi International School JVLR (India)

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

www.mathsthroughstories.org/ymsa2024

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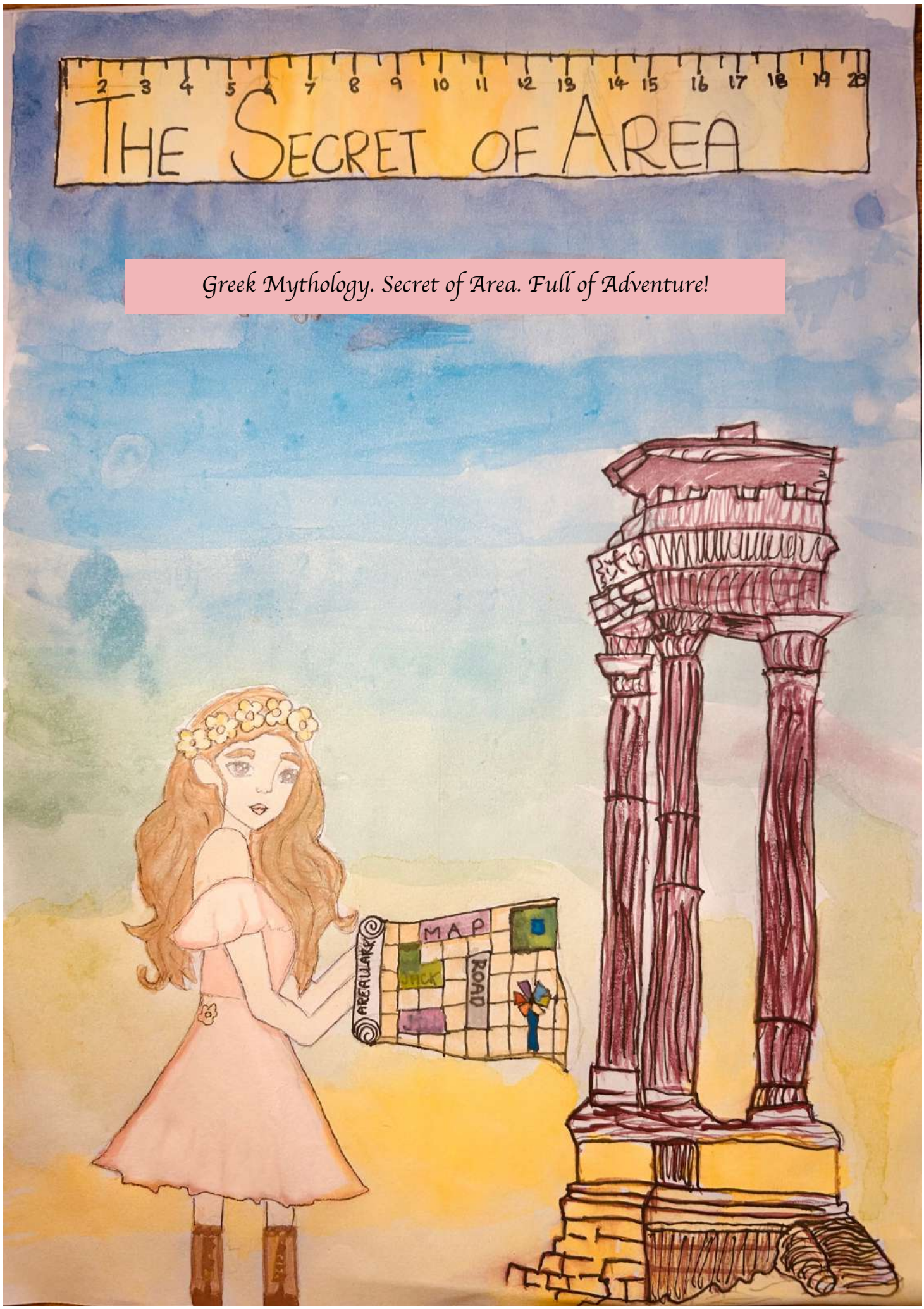
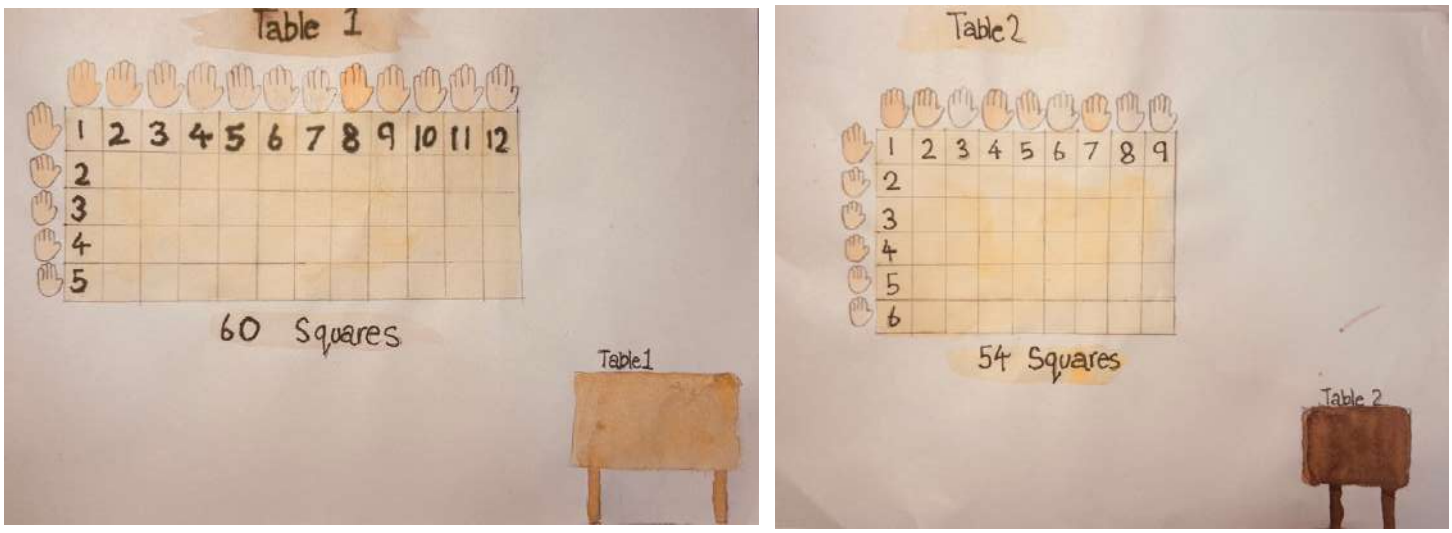


SAMARA DHANKAR OBEROI INTERNATIONAL SCHOOL JVLR

Chapter 1
Ariadne Adores Area

Imagine a girl, *as ordinary as could be*, with brassy curls and huge grey-green eyes filled with curiosity. That was Ariadne from the island of Crete in Greece. However, there was something extraordinary about her. She loved the math concept of Area. She would spend her leisure time walking around the streets, measuring the area of any object. Ariadne had ways of measuring the surface area with just about any object in her hand or her hand itself!

Once, on a balmy afternoon, while playing with her toy chariot in her father's quiet study, Ariadne saw two tables. She had a sudden urge to find out which table was bigger. As she didn't have anything to measure with, she used her palm and found out that the length of Table 1 was 12 palms while the width was 5 palms. She quickly drew a grid on a piece of paper and counted the number of squares. She found out that the area of the first table was equal to 60 palm squares. She did the same for Table 2 and found out that the length was 9 palms and the width was 6, the area of Table 2 thus being 54 palm squares. She concluded that Table 1 was bigger by 6 palm squares.



Ariadne calculates area using her palm

Some called her hobby of calculating area 'fascinating' while some called it 'weird'. Her siblings made fun of her and they did not understand why she liked to find out the area of things. To them, area was simply a math concept they learned at school, destined to be forgotten much like the forgotten memories of those who drank from the **River Lethe**.

After yet another day of being made fun of, Ariadne sat crying in her father's boat. Slowly, she slipped into slumber. She woke up to the sound of thunder along with lightning. As she scanned her surroundings, she realized that because of the storm, her boat had drifted away from shore and that she was no longer in Crete, but in a town called "Areallark". Exhausted and having nowhere to go, she decided to have a look at the town.

Chapter 2
Road in Ruins

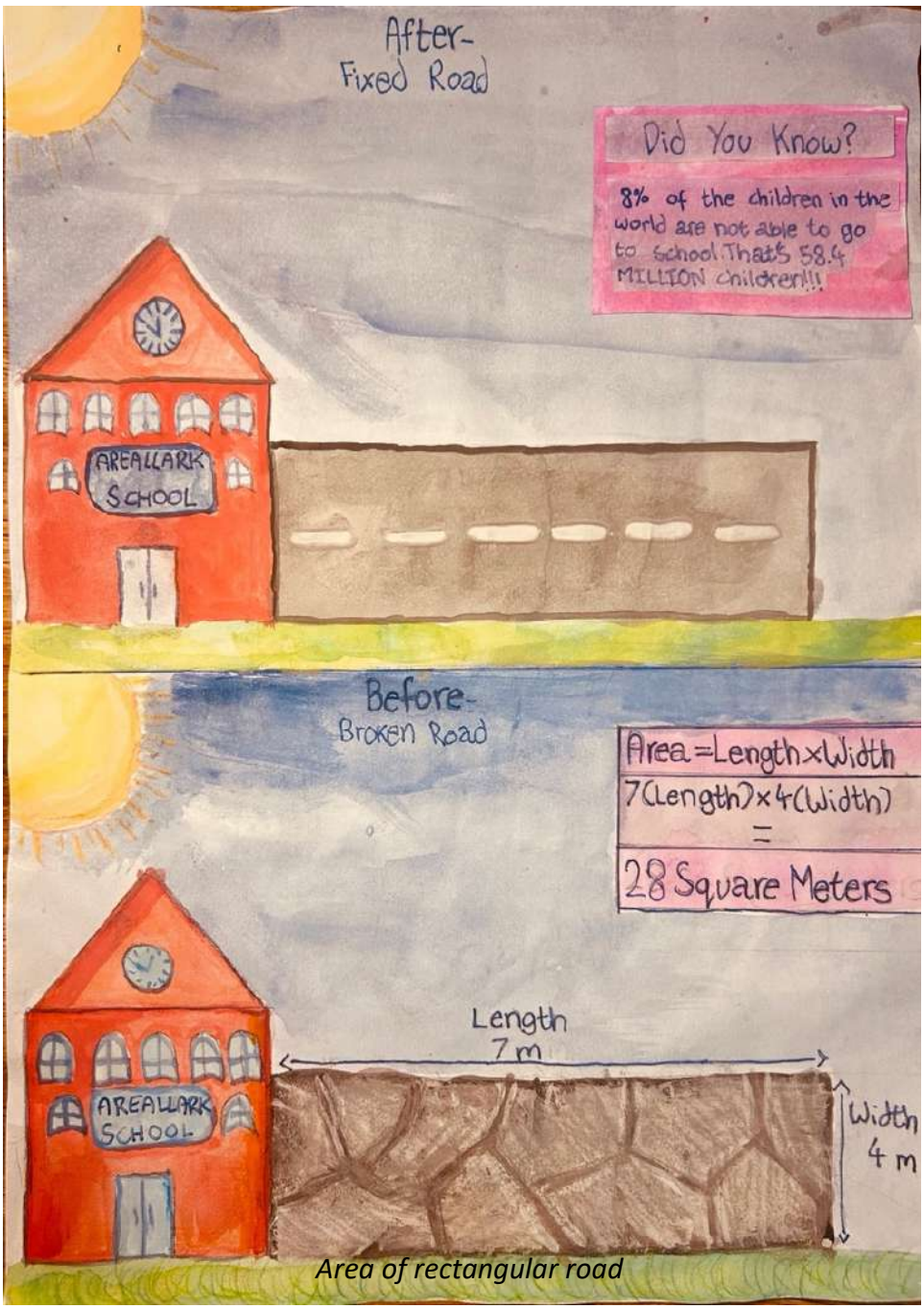
After walking around for what felt like forever, Ariadne spotted a worried looking boy standing near a small, broken lane leading to a school. She went towards him and asked what the problem seemed to be**.**

"I am Carlos, the son of **Hephaestus**," said the boy. "As you can see, a few months ago, this road broke and none of us townsfolk can fix it. Meanwhile, education rates have dropped in Areallark as children are unable to go to school due to the road being broken," said Carlos. Ariadne was shocked to see that a worn-out road had made education inaccessible to so many. She said, "Well education is a right for all, so we need to fix the road!"
"I could fix the road with cement, but I need to find out how much cement is needed," Carlos exclaimed.

Ariadne announced that to figure out the amount of cement needed, they had to find out the area of the broken road. "This road is rectangle-shaped. To find out the area of a rectangle, all we have to do is measure the length and the width of the road and multiply it," She took out a magical measuring tape that her father had given her which could be used to measure any unit and started measuring the ruined road.

Length of the road: 7 meters
Width of the road: 4 meters
Area: Length x Width
7 meters x 4 meters= 28 square meters.

"That's perfect! One large bucket of cement can cover 2 square meters, which means we need 28/2 = 14 buckets!" said Carlos who was known for his meticulous masonry.
Carlos then ran to the nearest cement shop and came back with 14 buckets of cement.



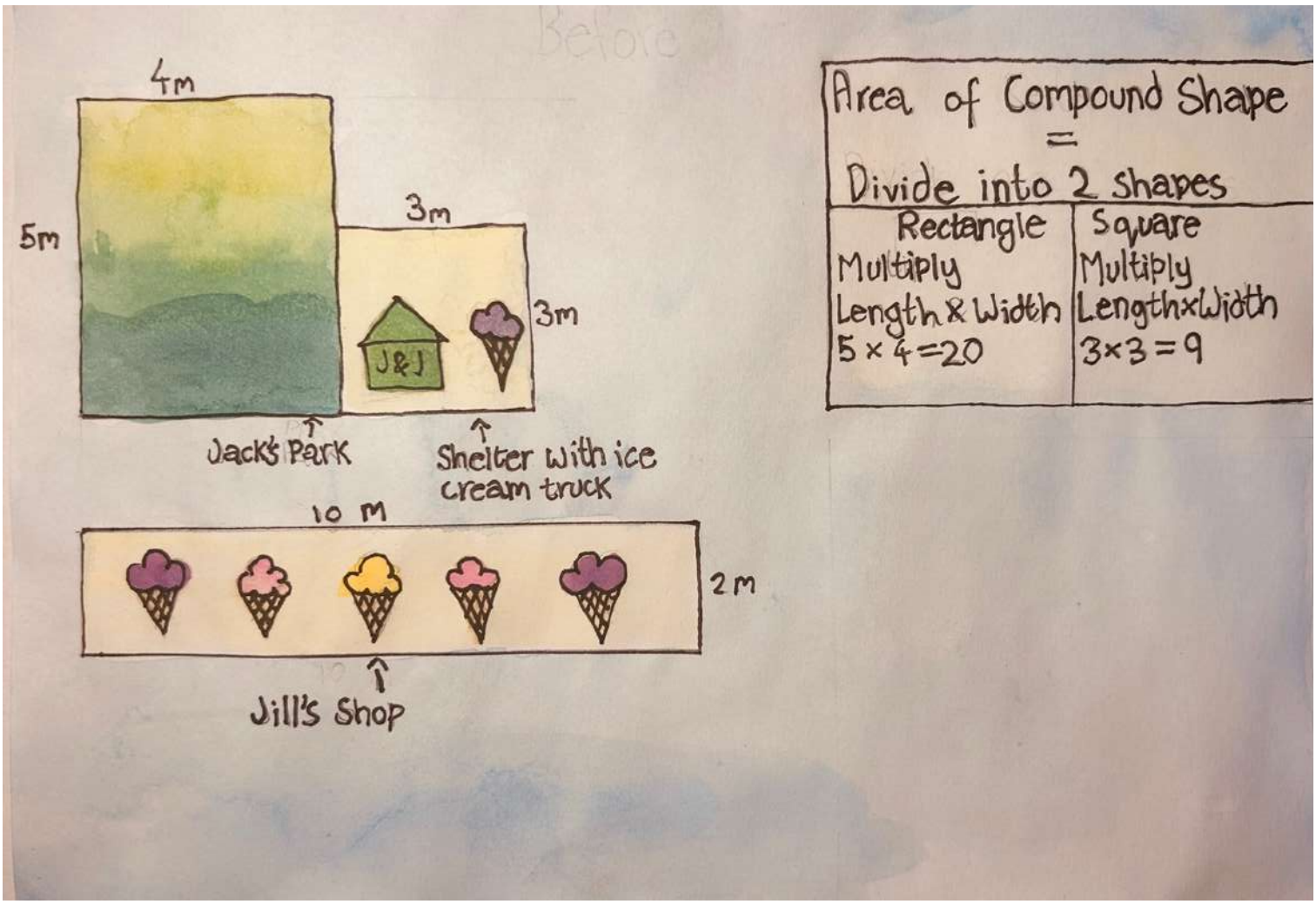
Area of rectangular road

The whole town gathered and started applying the cement. Within minutes, the road had been rebuilt. Everybody thanked Ariadne for helping their children resume their education. Ariadne with her **knowledge of area had not only built a road but also ensured that every child in Areallark had access to education.**

Chapter 3
A Territorial Feud

Ariadne now rushed off to explore more. Before long, she heard a pair of siblings bickering and saw a little girl sitting beside them. The girl introduced herself as demigod - Andromeda, the daughter of **Athena,** while the brother-sister duo introduced themselves as Jill, the owner of an ice cream shop, and Jack, the owner of a Kids Park. The greedy siblings wanted to claim each other's land to have a larger area for themselves.
Ariadne knew that to solve this conflict, she had to find out the area of both the lands.

"Jack's piece of land is a compound shape, which means that it contains two shapes. To find out the area of a **compound shape**, we have to divide it into 2 shapes and calculate the areas of both shapes separately." She divided the park into **2 shapes: a square and a rectangle**.
First, she measured the length and width of the rectangle and multiplied it. 5 meters (Length) x 4 meters (Width) = 20 square meters, so the area of the rectangle part of the park was 20 square meters. Then, she measured the square part of the park. 3 meters (Length) x 3 meters (Width) = 9 Square Meters. "Now, all we have to do is add up. So, 20 sq. meters + 9 sq. meters = 29 square meters!" Ariadne exclaimed.
Ariadne then began calculating the area of Jill's shop which was a rectangle. The length was 10 meters and the width was 2 meters. 10 x 2= 20, meaning Jill's area was 20 square meters. So, Jack owned 29 square meters and Jill had 20 square meters.



Area of a compound shape

After hearing a lot of squabbling, Andromeda, known for her prudence, had a sudden idea. She proposed that instead of claiming each other's land, both the siblings should have equal amount of area. Jack could give away the square part of his land for a good cause and then both would own 20 square meters.

Ariadne suggested that they could use the extra square part of Jack's Park for sheltering the homeless and Jill could add an ice cream truck there. Thus, the homeless, tired of the sun could seek shelter in the day and enjoy an ice-cream too. Everyone praised the idea. Even though now Jack and Jill were not be able to claim more land, they still had equal areas and were able to spread ample happiness by sharing the extra space with others who needed it more.
Ariadne learnt that how a simple solution based on **principles of equality and sharing** can even resolve several territorial conflicts around the world. **From wars and conflicts to mundane things, Area can solve it all, just within a blink!**

Chapter 4
A much-needed Forest

Just as Ariadne left the park, she befriended a demigod named Margaret, the daughter of **Demeter**. They were out on a walk, when Margaret spotted a dry, barren track surrounding a square-shaped lake. Suddenly, some animals approached Ariadne and told her that the natives of Areallark had cut down trees on the track, hence the animals had no place to live. The dry barren track prevented them to drink water from the lake.

Margaret suggested that she could plant some trees on the track and add more greenery, but for that, she would need to find out the area of the track. Ariadne explained that this was an inscribed shape, which meant a shape inside a shape like the square lake inside the big rectangle land. To find out the area of the track, they needed to find out the area of the lake and subtract it from the area of the entire land.

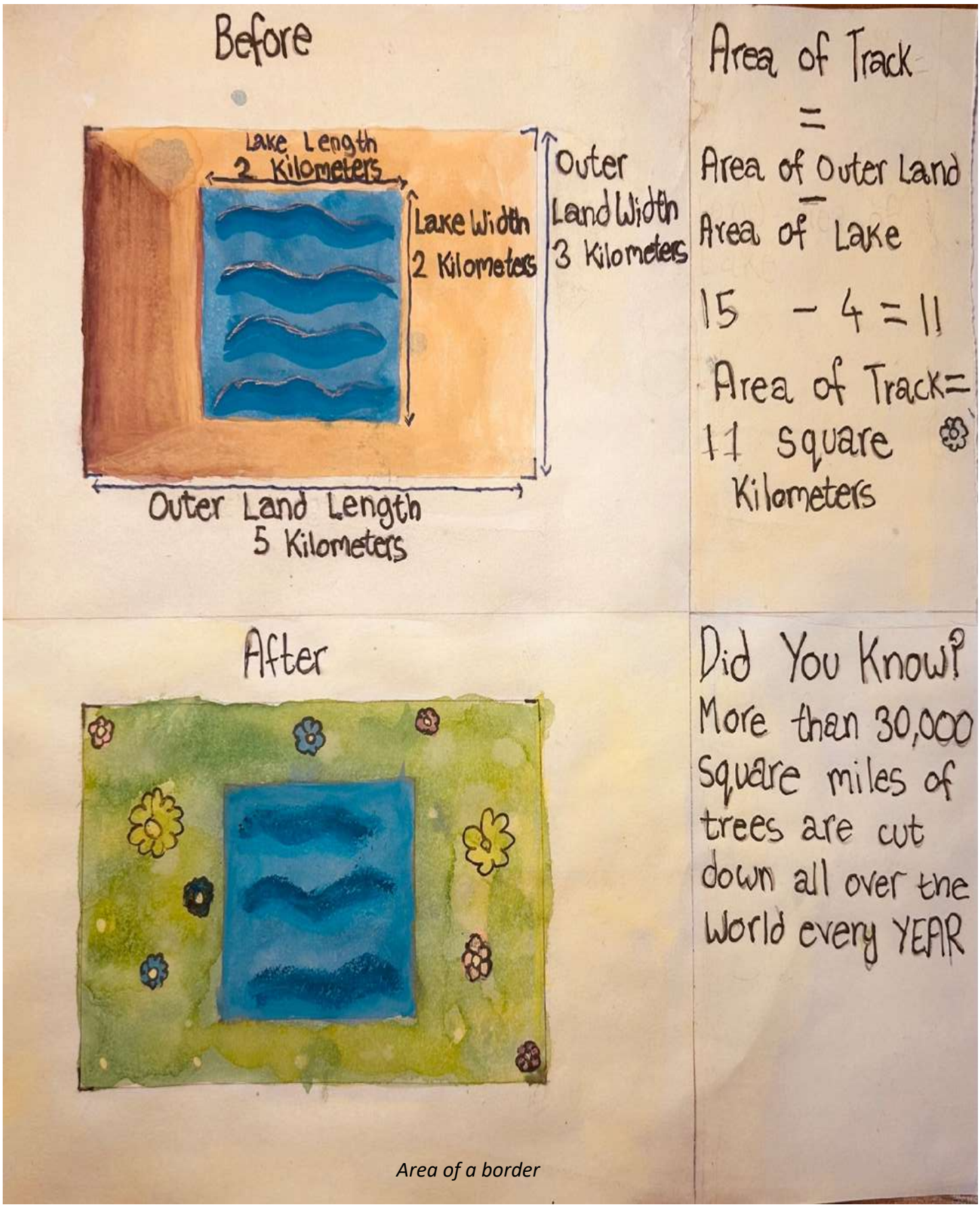
Once again, she took out her measuring tape and started by measuring the area of the outer land. The length of the outer land was 5 kilometers and the width was 3 kilometers. 5x3=15, so the area of the entire outer land was 15 square kilometers. They then measured the lake. Since it was a square, the length and width were both 2 kilometers, which meant that the area of the lake was 4 square kilometers. All that was left to do was subtract the area of the lake from the area of the entire land. "I've got it! 15-4= 11! The area of the track is 11 square kilometers!' exclaimed Ariadne.

Margaret calculated the number of magical seeds needed for that kind of large area. She took out the seeds from her toolbelt and began planting them on the track. In just a matter of minutes, a lush green forest was created.

What was once a desolate barren track was now a plush forest trail. It was so much more than trees, it was an example of how humans, animals, insects and birds could coexist.

*Orangutans swung from trees to trees, birds perched on branches humming sweet notes, children fed on the berries and butterflies swirled in the air filled with the sweet scent of flowers***.**

Once again, the townsfolk thanked Ariadne for gifting them a lush forest using her knowledge of Area. Ariadne told them that they should preserve the forest as trees not only give us shelter but trees are also home to countless species.



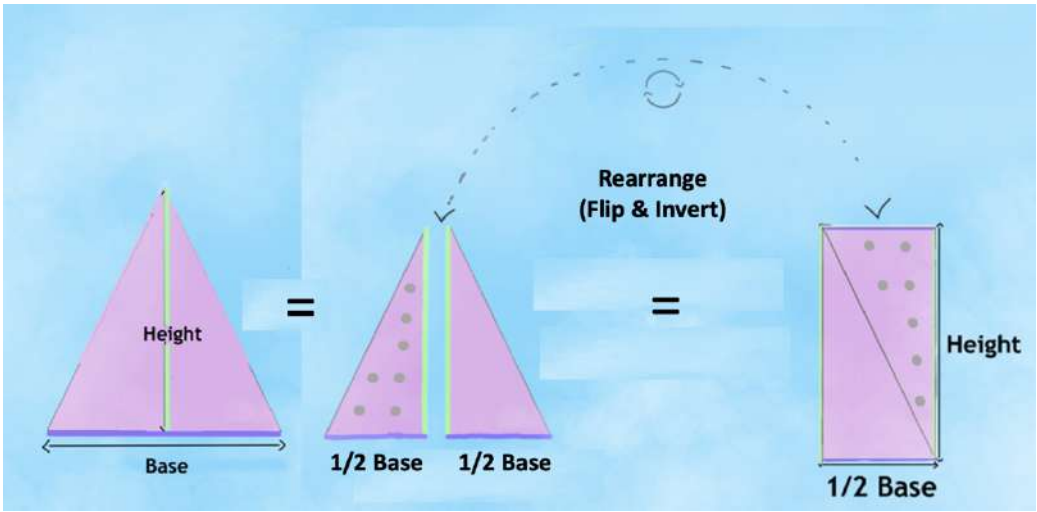
Area of a border

Ariadne was now beginning to understand that **using principles of Area, she was not only solving simple problems like constructing a road but was also giving solution to serious problems of deforestation.**

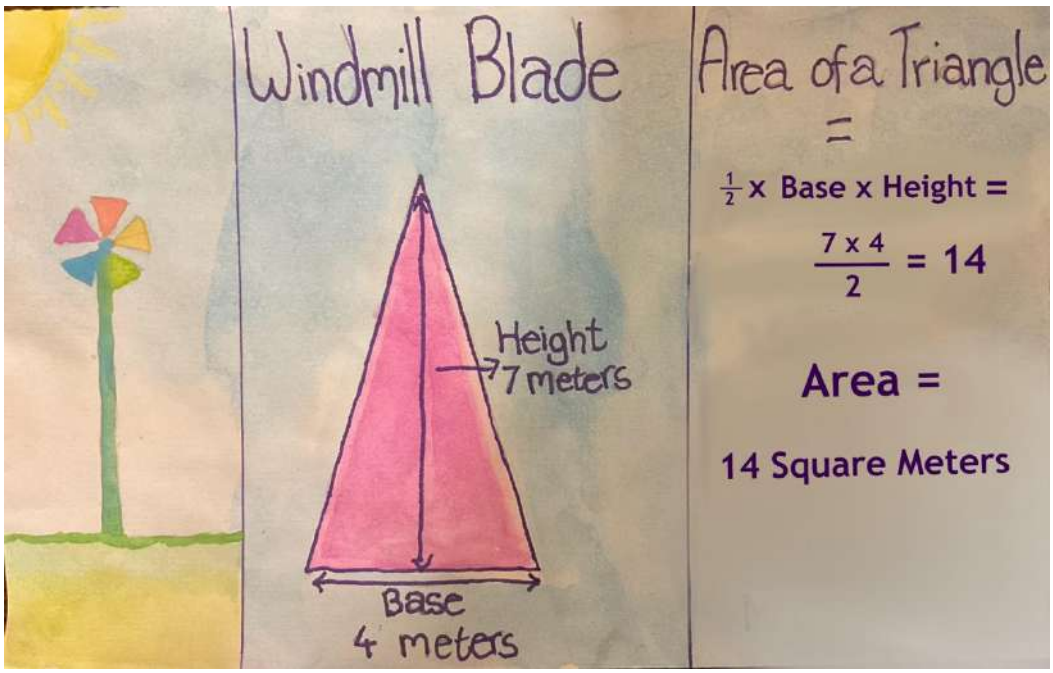
Chapter 5
Clean Energy

After a while, Ariadne spotted a group of Areallark's scientists along with a boy huddling over something. As she approached them, the boy introduced himself as Jabari, the son of **Ares**. Ariadne discovered that the scientists had decided to install a small windmill, as a source of renewable energy and harness wind energy to generate electricity for the town. The scientists had ordered the parts of the windmill, but it had come with just 1 triangle blade when they needed 5 triangle blades.

"We could make 4 more blades from metal, but we need to know the exact area of the blade," Jabari piped up. Ariadne who has till now calculated area of squares and **rectangle was now curious to figure out the area of a triangle**. She measured the blade. The height of the triangle was 7 meters, and the base was 4 meters.



She imagined splitting the triangular blade into two right angled triangles and then rearranging the two triangles to form a rectangle. "**Thus, the area of formed rectangle is same as that of the original triangle**", Ariadne confirmed. "Now the length of this rectangle is same as the height of the original triangle and width of the rectangle is ½ of base. So, the area of triangle= ½ base x height", Ariadne exclaimed. Area of triangle blade= ½ x4 meters (base)x 7 meters (height)= 14 square meters.



Jabari immediately started carving out each blade of 14 square meters out of the sheets of metal, while Ariadne helped. Once all the blades were ready, the townsfolk of Areallark came together to assemble the windmill. Soon the gusts of wind started moving the blades and in no time the blades were spinning as swiftly as the winged horse, **Pegasus**, creating electricity.

Ariadne and Jabari had once again helped Areallark preserve their natural resources by introducing wind energy. **Clean Energy is the Future Energy.**

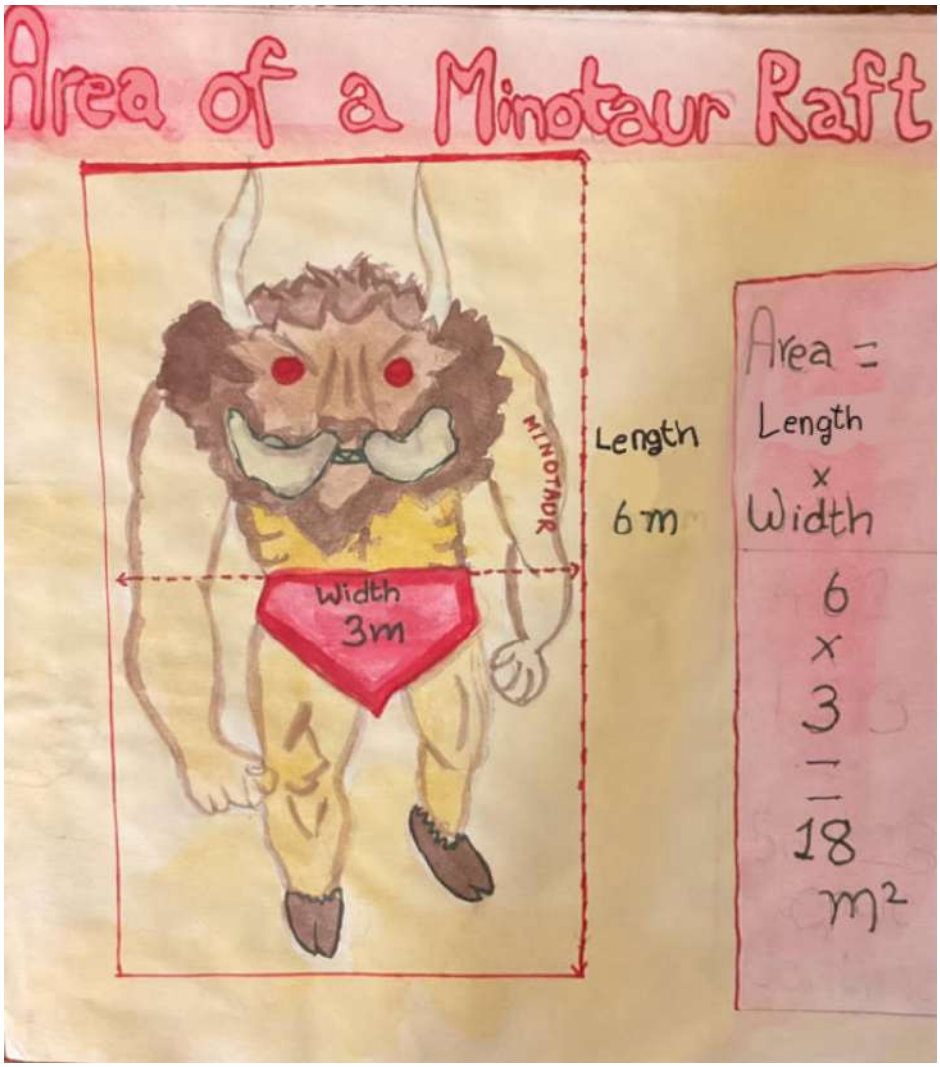
Chapter 6
This is not the End

Having applied her knowledge of Area, Ariadne felt refreshed and now was ready to return home. Before she could get in the boat, she heard a terrifying roar echoing around her. When she turned around, she found herself face to face with the mighty **Minotaur**, one of the Greece's most fearsome monsters.

He was a half-man, half-bull creature with huge canines, glowing red eyes, and sharp horns like the "xiphos", the Greek sword.

Ariadne looked around and saw all the four demigods Carlos, Andromeda, Jabari standing next to her to help her fight the demon.
Together, they came up with a plan to bind Minotaur to a raft and drift him away on the Aegean Sea. When the Minotaur with a menacing glare was about to strike, Andromeda with her magic, lulled him to sleep. Once the monster slipped into slumber, Ariadne wondered how much should be the area of the raft to drift away the monster on it. Using her wit, she quickly drew a rectangle around the Minotaur's body covering his entire height and width, while he was lying. She measured the length of the drawn rectangle and found out it was 6 meters. The width of the rectangle was 3 meters. So, the rectangular area around Minotaur's body was 3 meters x 6 meters`=18 square meters.

Considering this calculated area, Jabari and Carlos gathered wooden planks and constructed a rectangular raft of surface area 18 square meters that the monster's body could fit on. While the monster was asleep, they stealthily tied him on the raft. With a sigh of relief, they pushed the raft containing the ferocious monster into the ocean only to be swept away by the stormy waters of the Aegean Sea. Finally, Ariadne and the demigods, with the clever application of Area had once again saved the town of Areallark from the clutches of a monster that seemed undefeatable.



Such is the power of Knowledge!

Chapter 7
This is surely the End, right?

Finally, it was time for Ariadne to be homeward bound. After a heartfelt farewell with the demigods, Ariadne embarked on her journey back to Crete. Following a long boat ride, she was joyfully welcomed by her family upon her arrival. The next day, Ariadne excitedly went to school and shared with her classmates her amazing experience at Areallark. She talked about the fascinating things she learned about the concept of area and how it was applied in various real life situations. *Building a road that paved the way to education, resolving a territorial conflict, conserving nature and even defeating the monster mightier than her*. Her maths teacher, thoroughly intrigued by her story, decided that it would be a fantastic opportunity for the class to visit Areallark and explore these mathematical concepts in a real-world context.

This decision sparked enthusiasm among the students as they eagerly awaited their upcoming field trip. After this, Ariadne's peers finally realised the value of Area and its practical applications in solving not only simple problems but also complex ones.

Now, would you also want to embark on this journey to find the Secret of Area ?

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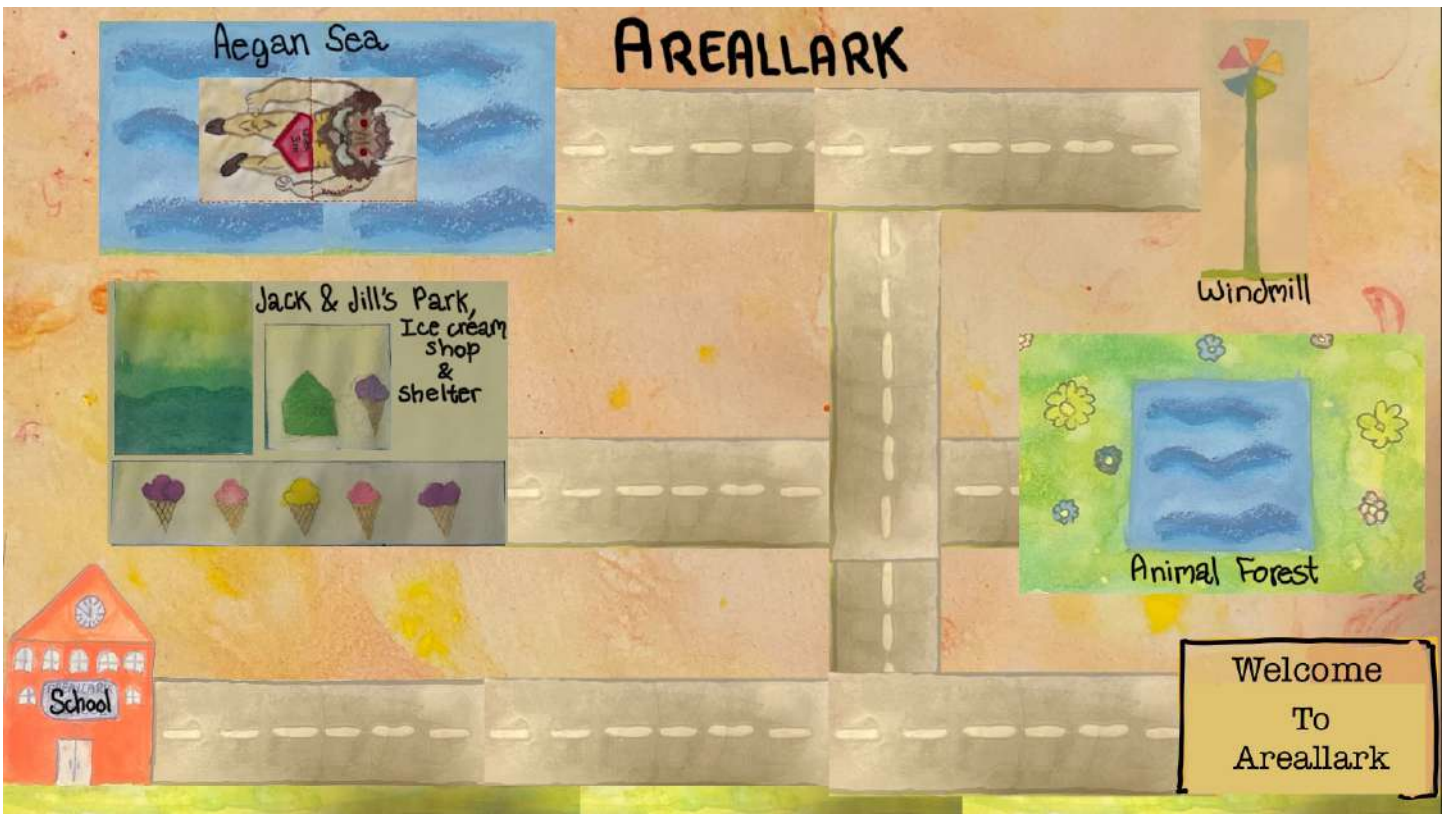
The End

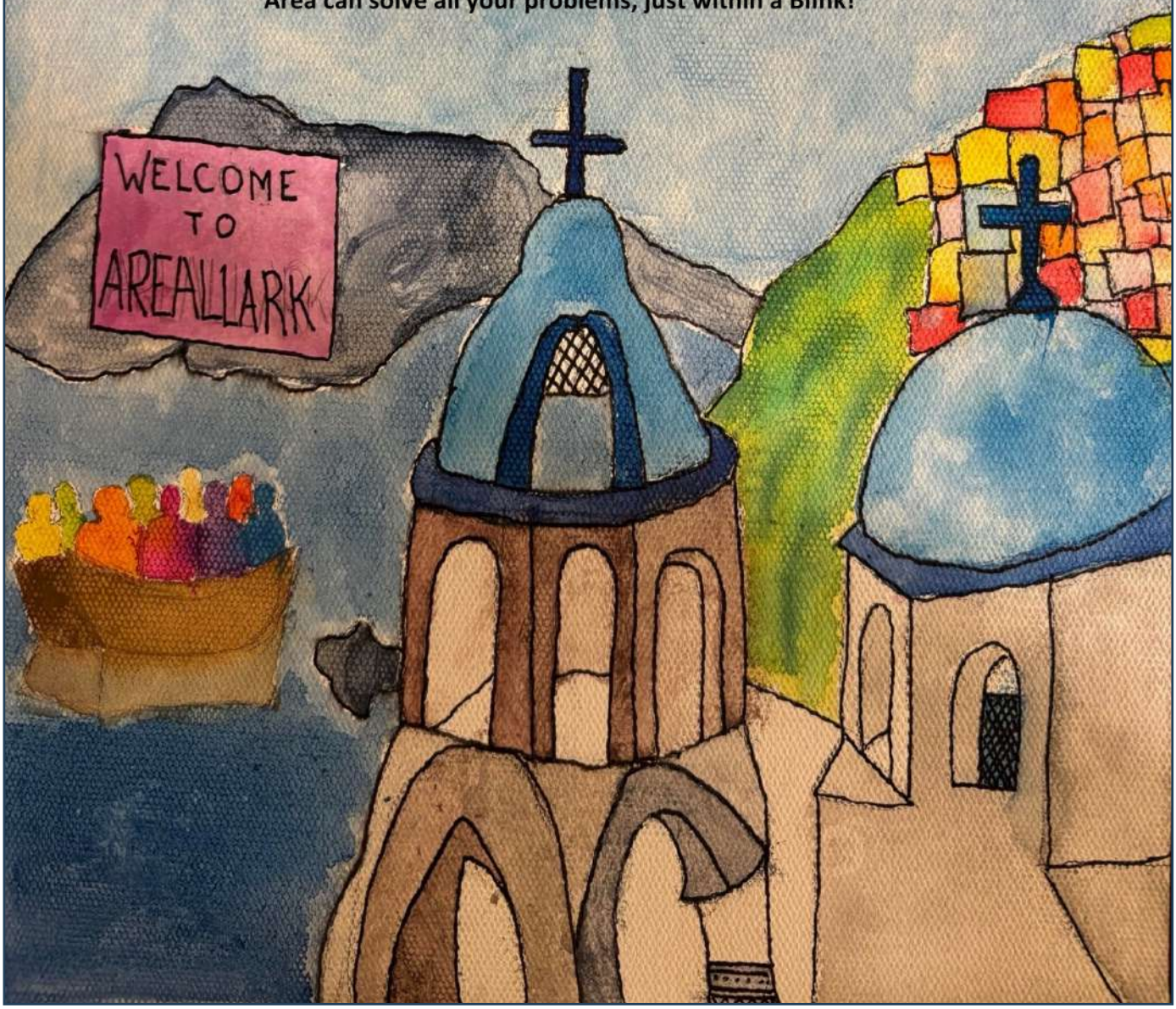


Area can build, area can fix,
A road in ruins using mortar and bricks,
Area can fairly divide and unite,
Two siblings in a fight,
And give a fair share to the ones in plight!

Area can evaluate, area can calculate
The amount of forest needed for our good fate!
It can build green trails
Where all can coexist - the birds, the butterflies and the snails!
Area can make the blades of windmills that spin
A sustainable future can now begin

Multiplying length and width or base and height
Will give you area that will delight
The Secret of Area is here

For once you know this, there is no fear
From wars and conflicts to mundane things,
Area can solve all your problems, just within a Blink!



GLOSSARY

River Lethe: Also known as the **river of forgetfulness**, as all those who drank from it experienced complete forgetfulness.
Hephaestus: The Greek God of fire, carpentry and invention.
Athena: The Greek Goddess of wisdom and patron of crafts
Demeter: The Greek Goddess of harvest and agriculture
Ares: The Greek God of war and courage
Pegasus: A winged horse in Greek Mythology, known for his speed.

BLURB

After another day of being made fun of, Ariadne sits down crying in her father's boat. Suddenly, a storm comes out of nowhere and her boat has drifted away to an unknown town called, "Areallark". She decides to explore and, on her way, solves many problems and uncovers the true Secret of Area. Read to find out more.

ABOUT THE AUTHOR

My name is Samara Dhankar, a Grade 5 student at Oberoi International School JVLR in Mumbai. I have a passion for writing and mathematics. My last year's YMSA win encouraged me to continue writing math stories. Just as Ariadne, I also enjoy exploring. I am learning Indian classical and Western vocals, as well as playing the violin. I love the art of illustrating, which is why I have created all of my illustrations by hand using water-colours.

Recently, I have been reading a lot of books on mythology, including Norse, Egyptian, Greek, and Roman mythology. This fascination for mythology inspired me to create a fictional story based on Greek mythology. In the story, I feature demigods from all over the world, including African, Greek, Irish, and Spanish. As the demigods and Ariadne explore Areallark, each problem they encounter requires them to collaborate and make use of their individual strengths and knowledge of Area. At the end, Ariadne shows us that Area is not just a math concept, but it is a powerful tool which can solve not only simple problems but can also help us build a green, peaceful and a sustainable future.