STEAM Tales

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Stories of inspiring women in STEAM:

Emmy Noether

Prepared by MIND

MIND gGmbH
Mittelhessisches Institut für Nachhaltigkeit und Diversität

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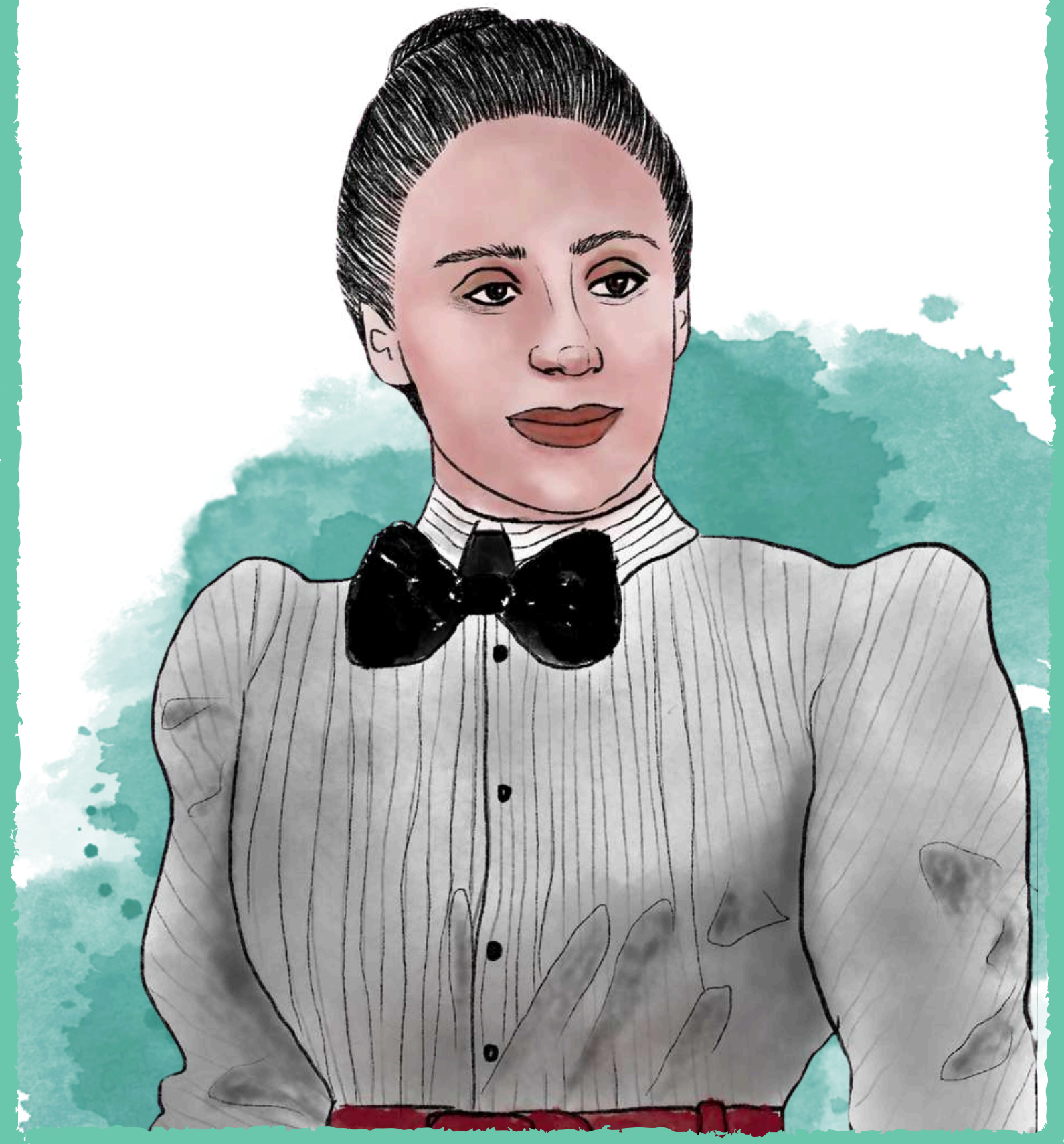
Emmy Noether: The Mathematician Who Dared To Dream



A childhood of patterns and possibilities

Once upon a time, in a German town, lived Emmy Noether, born in 1882. Back then, things were different. Women traditionally stayed home to care for their families, while men worked and pursued careers.

Emmy's family loved learning. Her dad was a math professor, her mom came from a wealthy family, and even her two brothers were scientists!

Question for children:

Can you imagine hearing science and maths discussions during dinner? Intimidating for a kid, right?

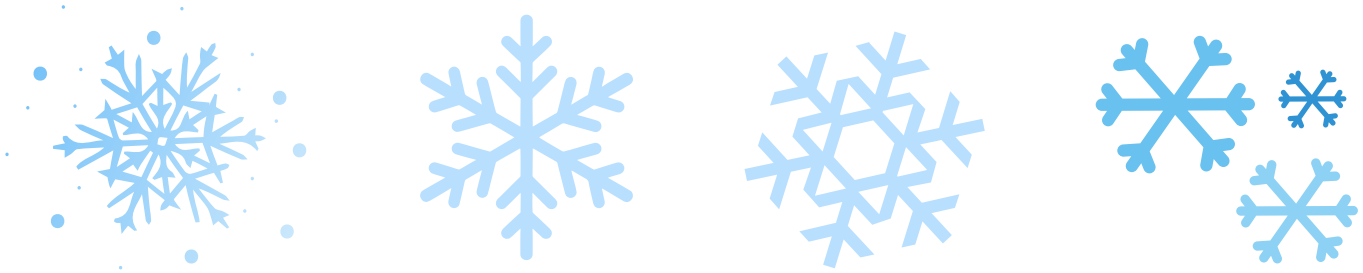
Emmy loved dancing and listening to music. She also loved to explore nature. She was amazed by the patterns created by the camellias during spring and the symmetry of the snowflakes during winter. Nature was her playground! She would excitedly tell her dad about these wonders. Her dad, impressed by her curiosity, would show her how these patterns and symmetries were actually like codes created by nature that could be deciphered using the language of mathematics!

Emmy's dream was to learn about math and understand the world. However, because things were very different, people used to tell her she shouldn't study maths.

Question for children:

Boys, how would you feel if someone told you that you couldn't do something you love because of your gender?

As Emmy grew up, she never forgot her passion for maths and how exciting solving puzzles and finding **patterns** and **symmetries** in nature made her childhood magical!



From words to numbers

Emmy enjoyed watching her dad work on maths and often assisted him at the University where he worked. This made her feel closer to maths and its mysteries. Plus, she got to hear amazing mathematical talks about big ideas that made her very curious. Being around maths so much, she felt a deeper connection with it. As more girls began studying, Emmy, at 18, opted to study languages to become a teacher.

Question for children:

But was that what she really wanted to study?

Deep down, Emmy knew that languages weren't her true passion but she felt pressured because people said maths wasn't something for girls. Yet, as she was studying in the classroom, she couldn't help but wonder about the amazing maths world, the one she loved exploring as a child.

Despite what was expected from girls back then, Emmy felt that her true destiny was to learn about maths, not languages! While her language textbooks discussed grammar, her heart whispered of numbers and algebra. Every day the urge to follow her childhood dreams intensified.

Determined, Emmy made a bold decision to enrol in maths classes at the University of Erlangen.

Denied…yet determined!

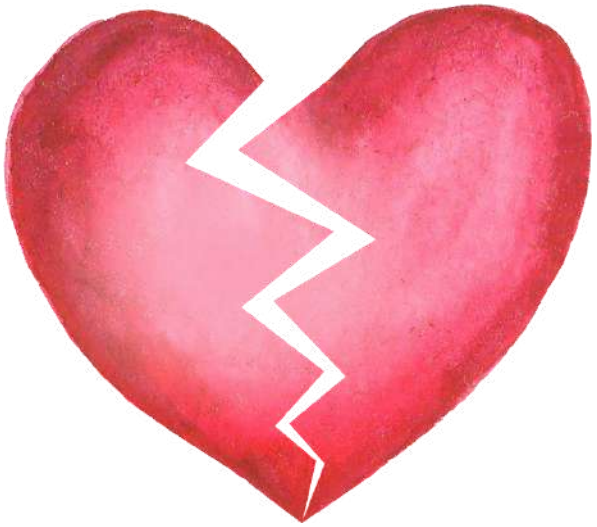
However, when she tried to enrol, the University didn't accept Emmy.

"This has been my dream since I was a child," Emmy sobbed to the clerks. "To learn maths was all I ever wanted!", she continued, as she cried.

But Emmy didn't give up! She learned that with special permission from professors, she could at least attend classes as a guest student. However, she couldn't pursue a maths degree, participate in class discussions, or take tests.

Explanation for children:
It's like going to a party with your friends, but you're not allowed to dance or eat cake! Most people wouldn't enjoy such a party, right?

Emmy was heartbroken because without a degree people wouldn't take her seriously.



Wisdom and encouragement

Emmy had her biggest supporter by her side: her dad.

"Maths is a magic door to nature," he said warmly, "and you're a brave explorer!" Emmy, with tears in her eyes, whispered "But, dad, they say maths isn't for girls, what if I'm not good enough?".

Holding her hand, he replied, "Maths sees no genders, my daughter. Always remember that your passion for maths is what makes you special. Believe in yourself and you'll do great things, with or without a degree".
His words lifted Emmy's spirits.

Question for children:
Can you think of a time when you were sad about something you couldn't do and your parents helped you through it? It was like that for Emmy!

With strong resolve, she asked each maths professor for permission to join their class. Most of them already knew her from helping her dad and knew how smart she was. They believed, like her dad, that she belonged in maths.

Question for children:
I wonder how happy Emmy must have felt with everyone's approval! It must have been a very exciting moment for her, right?

Against all odds

For 3 years, she went to classes and learned a lot! Finally, in 1904, at age 21, girls were allowed to officially attend the university! Emmy was happy to finally be a real maths student.

But it wasn't easy. Most students were boys and they weren't welcoming and thought girls didn't belong there.

Question for children:
Can you imagine facing challenges like Emmy did, but still having the courage to follow your dreams? Did this stop Emmy? No way! She kept going and going!

Her courage paid off in 1907 when she earned her degree – the second woman ever to get a maths doctorate in Germany!

Question for children:
Have you ever felt super proud when you finally solved a tricky puzzle or won a football game? It feels awesome, right?

Emmy's reputation grew and, in 1915, two renowned mathematicians, Felix Klein and David Hilbert, sought her help! Stuck on problems, they knew Emmy's unique way of approaching and solving problems could help and invited her to work at the University of Göttingen. Now, she had encouragement from her father and recognition from her male colleagues who believed maths was for everyone who loved it, not just boys! Emmy's incredible journey was just at beginning.

Embracing the challenge

Joining Hilbert was a dream come true for Emmy! It was like a magical door being opened to new adventures and experiences that would allow her to learn more and more about maths! But it also meant leaving her family and the place she felt safe. She knew some people might treat her unfairly just because she was a girl.

Question for children:
Can you imagine leaving everything you know behind to chase a dream?

Plus, the pressure to succeed in a field dominated by men, without her dad's daily support, scared her. But that didn't stop her because she wanted to show the world that even girls could learn and be good at maths!
She accepted the offer and left her hometown to move to Göttingen.

Explanation for children:
Today, it's a quick car ride, but back then, only the wealthy had cars. Travel mostly involved horse-drawn wagons, taking days or even weeks! Emmy didn't know when she'd see her family again!

Although she was scared and hesitant, she was brave and determined to learn more about maths no matter what!

The price of passion

In the following years, Emmy learned new ways of doing maths and worked together with other mathematicians to solve really hard problems.

Question for children:
How does working as a team help us do things we can't do alone?

Every day brought new discoveries, and she was enjoying it all! However, every rose has its thorn! Her strength and determination were put to the test daily. She was the only female researcher at the University and some male students doubted her competencies to be there. To make things worse, although Emmy was teaching and making research harder than any other professor, she was the only one not being paid.

Question for children:
Why? Because she was a girl. How do you think she felt about this? Sad, of course…

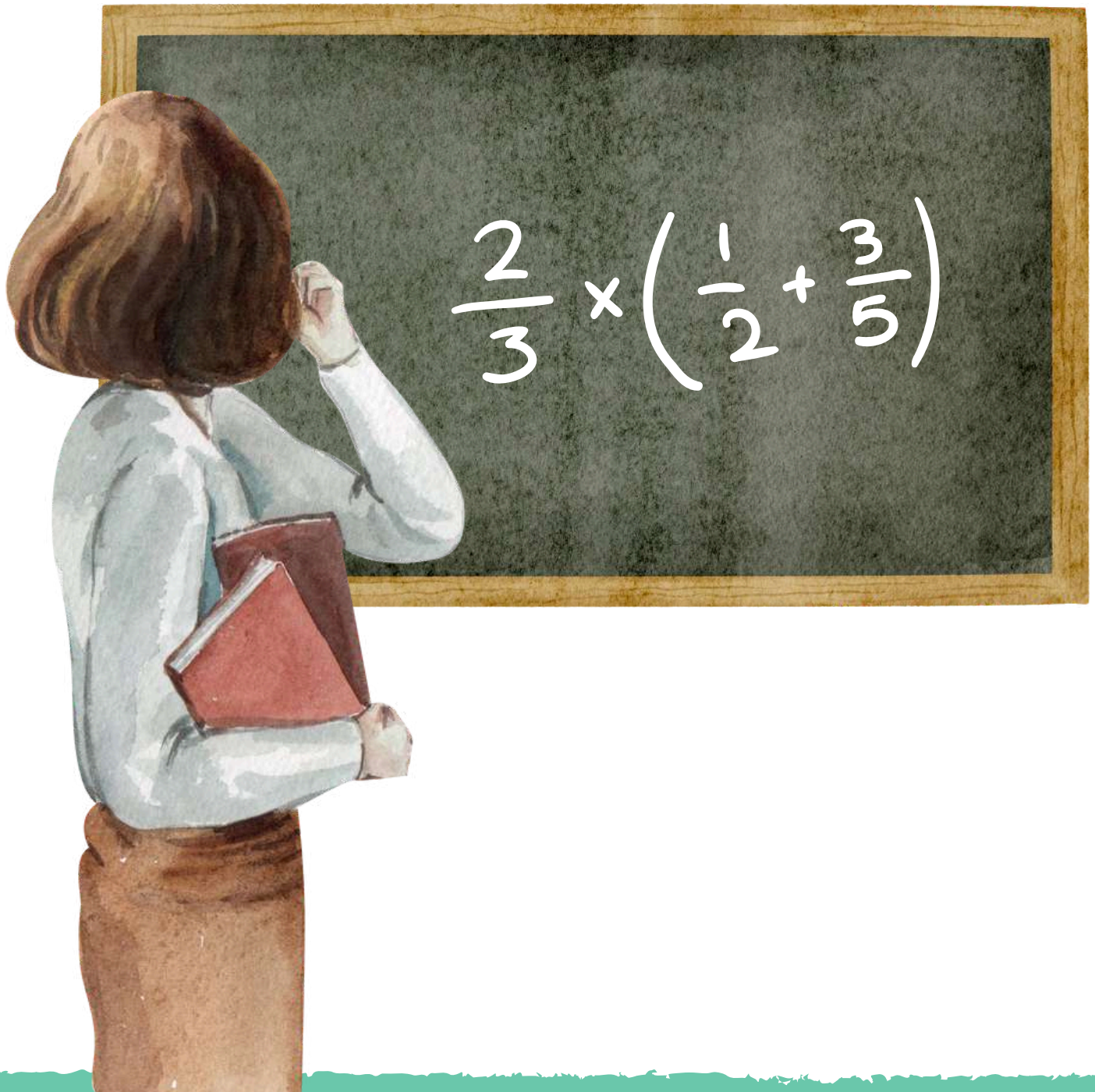
But Emmy's passion persisted! She moved to Göttingen to do research with other great minds who accepted her in maths, and that kept her flame alive!

But it was in 1920 that Emmy began an amazing journey that changed the world of maths forever. She started exploring a new kind of maths called abstract algebra, which is like solving puzzles with numbers but in a different way.

Question for children:

Remember her unique way of thinking and solving problems that impressed those famous mathematicians?

So, there she was, doing her maths magic! She began publishing her maths works, one after another, and quickly gained worldwide recognition from famous scientists and mathematicians! Emmy was discovering things in maths that no other mathematician had discovered before. It was like finding new patterns and connections in nature!



A small victory

In 1924, 4 years later, Emmy pulled off a small victory! She finally started getting a little bit of money for her work. Not much, but in a place that valued boys over girls, it meant the world. It also showed people couldn't ignore Emmy's talents in maths anymore.

Question for children:
And guess what it also meant?

It meant that, after all, maths was something for girls, too!
The word spread, first in the University, then in Germany, and then around the world. Her groundbreaking research in maths, especially in abstract algebra, began to change how mathematicians found solutions to other difficult problems. Her passion and innovative ideas inspired many other researchers, and soon, her name became synonymous with brilliance in mathematics. Because she was so good at explaining hard problems, some students would even look for her when they didn't know how to solve problems or discuss fascinating aspects of mathematics. People even started to name the students "Noether Boys"!

Explanation for children:
Noether was Emmy's surname.

The art of maths

Emmy ended up making many discoveries and contributions to the maths world! Just like how you learn the way to do addition and subtraction in school, there are also special things in maths that were named after Emmy! So now, when mathematicians want to solve special kinds of problems, they use the maths that Emmy discovered.

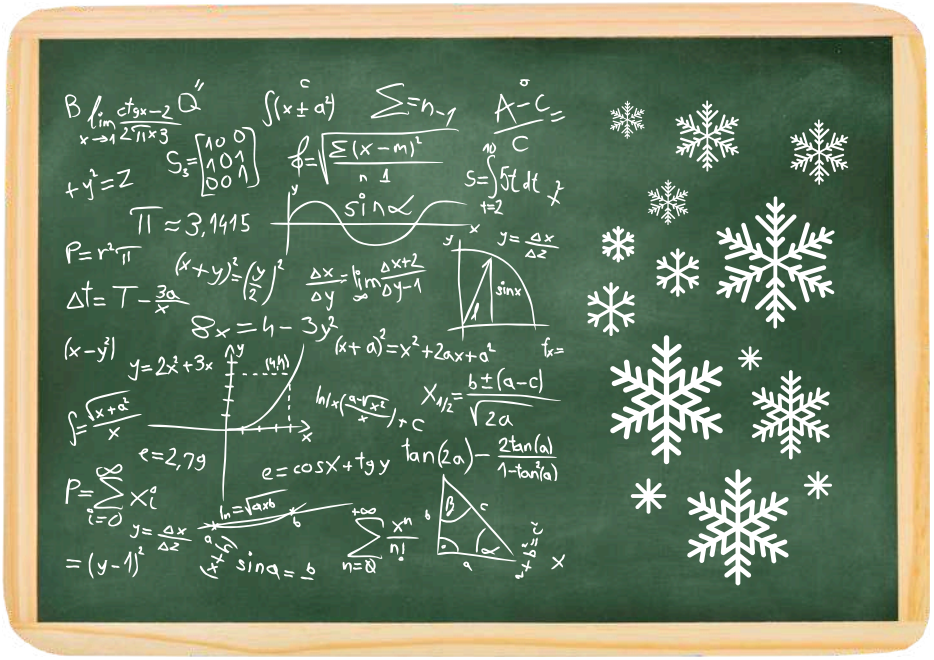
Explanation for children:

It's like finding new colours to make your painting even better! Isn't it cool how one person, even though she was a girl, made a big impact on maths?

All the mathematicians who worked with Emmy had good things to say about her and the genius she was!

Explanation for children:

Even Albert Einstein praised her as one of the most creative maths geniuses since girls started studying at universities.



Facing discrimination

In 1933, a new rule came to the university. Emmy and some colleagues lost their jobs, not because of their gender this time, but because of their family background.

Explanation for children:

Imagine you were told you couldn't play your favourite game anymore just because of where your family is from.

Emmy, just like her colleagues and even her dear students, felt sad and confused.

It was really tough for Emmy. Before this, Emmy worked in a big lab with other very smart scientists. They shared ideas and helped each other think of new discoveries. Emmy's work helped move maths and science forward in important ways. But now, she was going to lose all of that...her lab, her tools, and the people she worked with.

But Emmy was strong and had faced barriers all her life! So even though she lost access to the laboratory, she kept doing research with the limited tools she had.

A new hope

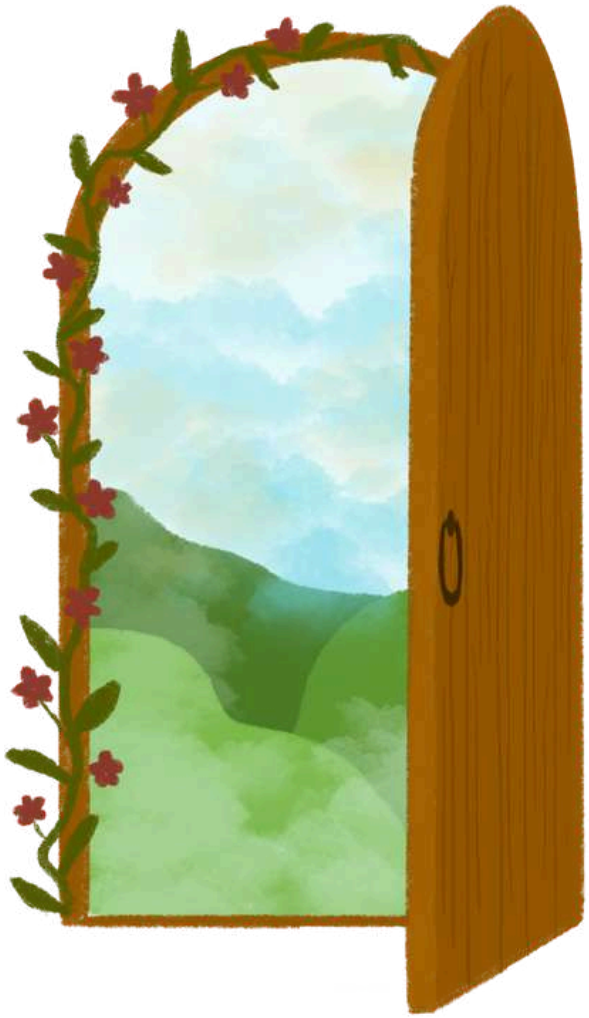
However, Emmy's secret lessons couldn't last long or she could face trouble. Universities abroad wanted her to do research with them, so they offered her new opportunities to continue her research. Having someone so smart with them would inspire other physics and maths researchers and would increase the Universities' reputation and recognition around the world!

In 1933, Emmy moved to the USA for safety reasons, just like her colleague Albert Einstein. At the college, everyone was excited about Emmy and wanted her to share her vast knowledge with them!

Opening doors

Emmy found happiness in the USA and continued her maths research. Everyone knew her for being a genius in mathematics and for being able to contribute with great insights that would lead to other discoveries and more magic in math!
Her reputation grew bigger and she became widely recognised as a brilliant mathematician who made important discoveries.
She was also able to open doors for other girls who enjoyed maths; most importantly, she proved that maths is for everyone!

Final words for children:
Remember, if you love something and work hard, you can achieve your dreams!



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