

STEM

CHANGEMAKERS

ACTIVITY PACK





ACKNOWLEDGEMENTS

A special thank you to the incredible WAGGGS STEM Changemakers Team and Learning and Leadership Development Team for their dedication, vision, and hard work in making this programme and activity pack a reality:

Chhavi Goyal, Denise Teoh, Andrea Chakma, Sophie Rymer, Imogen Fitzpatrick, Amy Jarvis, Grace Tam, Ghadie Elhelaly, Judy Tuwei, Paul Bigmore, Juna Chang, Harshita Muraka, Nefeli Themeli, Anna Bambrick, Verity Shaw and Andii Verhoeven

We are especially grateful to the STEM Changemakers project and co-creation teams from the Member Organisations for their valuable feedback, creativity, and support in shaping this activity pack.

(In alphabetical order):

Girl Guides Association Malaysia, Girl Guides of Singapore, Girl Scouts of Taiwan, Nepal Scouts, Sri Lanka Girl Guides Association

This resource is:

Created by Kabwe Yambayamba

Designed by Irasema Dávila Pastrana

The creation of this STEM Changemakers curriculum has been made possible with support from the Spectris Foundation, and the KLA Foundation.

World Association of Girl Guides and Girl Scouts



World Bureau

12c Lyndhurst Road
London NW3 5PQ



United Kingdom Telephone

+44 (0)20 7794 1181



Email: wtd@waggg.org



Website: www.waggg.org

Registered Charity No. 1159255 (England & Wales)



INTRODUCTION TO THE STEM CHANGEMAKERS PROGRAMME

The STEM Changemakers Programme is an exciting initiative developed by the World Association of Girl Guides and Girl Scouts, applying the Growing & Learning Framework. It empowers girls and young women to explore the world of STEM (Science, Technology, Engineering, and Mathematics) through fun, engaging, and purpose-driven learning experiences. At its heart, the programme is about equipping young people with the knowledge, confidence, and leadership to see themselves as future changemakers in STEM.

This activity pack includes three interactive sessions and a hands-on STEM Challenge workshop.

In the sessions, participants will discover what STEM means, how STEM skills are part of their everyday lives, and how these skills can be used to address global challenges. They will also explore the critical importance of gender equality in STEM fields and learn about role models who are breaking barriers and creating impact.

After completing the sessions, participants will work together in small groups to tackle a real-world issue using their STEM skills. This collaborative challenge is an opportunity to apply critical thinking, creativity, and teamwork to create solutions for a more equitable world where girls can thrive.

Upon completion of the sessions and the challenge, participants will earn the STEM Changemaker badge. To fully achieve this, each participant will be encouraged to 'take action' by sharing their learning with at least two peers or members of their community—spreading knowledge and multiplying the impact.

This programme can be delivered in regular unit meetings or camps, led by trained adult leaders. Member Organisations are also invited to join the **WAGGGS Campfire platform** to connect with others, access additional STEM resources, and celebrate their learnings and achievements together.



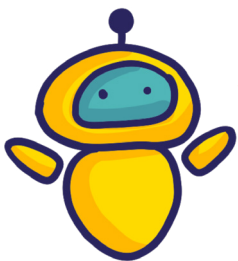


HOW WE ARE GROWING AND LEARNING

For over 100 years, Girl Guiding and Girl Scouting has been offering life-changing learning experiences. We have equipped girls and young women with the skills, values, and confidence to thrive and lead. However, today's world is evolving rapidly shaped by complex challenges like inequality, climate change, new technologies, and shifting social dynamics.

To help girls navigate this world, we embrace **lifelong and lifewide learning** - learning that happens throughout life and in every aspect of life. **This lies at the heart of our Compass 2032 vision: an equal world where all girls can thrive.**

The **Growing and Learning (GAL) Framework** helps us achieve this. GAL supports Girl Guide and Girl Scout organisations to embed the characteristics of quality learning across all levels of our Movement. It applies to both youth and adults, aligning Member Organisations and WAGGGS under a shared vision of transformative learning experiences.



A prism is a transparent object that separates visible light into its different colours. As light passes through it, the light slows and bends; each colour bending at a slightly different angle. What begins as one unified light beam becomes a spectrum of diverse colours.

The prism below helps us visualise how Girl Guiding and Girl Scouting transforms the shared light of purpose into a spectrum of growth outcomes. The different elements of our approach, like our method, leadership model, and the space we create, interact like the structure of a prism, shaping the learner's journey in unique and meaningful ways.

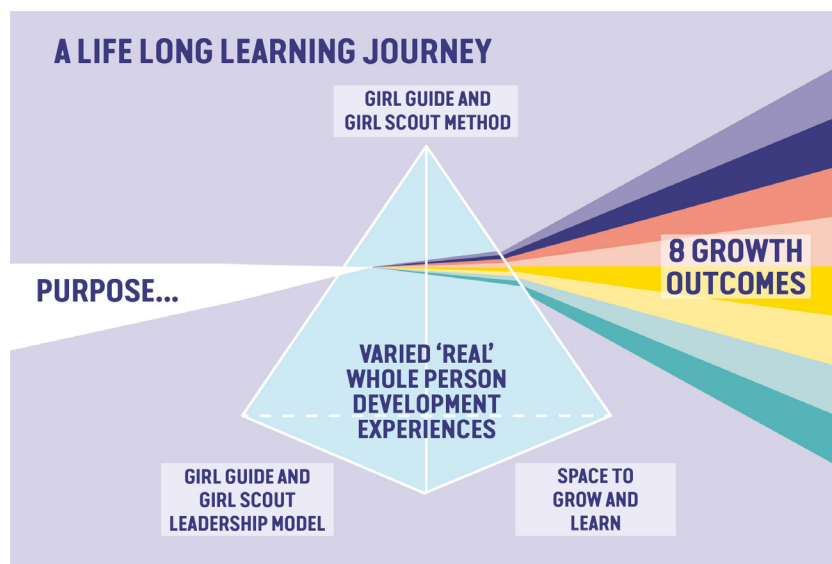
CONNECTED BY A SHARED PURPOSE,

WE USE THE GIRL GUIDE AND GIRL SCOUT APPROACH

TO CREATE SPACE TO GROW AND LEARN

AND OFFER R.E.A.L. LEARNING EXPERIENCES

SO LEARNERS CAN REACH THEIR FULLEST POTENTIAL





The eight growth outcomes, aim to represent how within Girl Guiding and Girl Scouting we support any and every member to:



1. Be confident to be herself.
2. Have integrity and make choices rooted in her values.
3. Be curious and creative.
4. Be prepared to adapt to change.
5. Respect and feel part of nature.
6. Be able to form meaningful connections with all.
7. Care about the world and know she can make a difference.
8. Feel connected with something bigger than herself.

Whether participants are testing water filters, designing tech solutions, or imagining the STEM careers of the future, each activity contributes to developing the **eight Growth Outcomes** - the core of what we believe a Girl Guide or Girl Scout can become. You can find out more about GAL here:- [Growing and Learning](#).

Below is guidance for leaders and facilitators aligned with our Growing and Learning Framework. We encourage you to read, reflect, and intentionally embed it in your practice when facilitating activities.

CONNECTED BY A SHARED PURPOSE

The STEM Changemakers Programme is more than just a learning experience—it's part of our global mission: ***To enable girls and young women to develop their fullest potential as responsible citizens of the world.***

This mission is at the heart of Girl Guiding and Girl Scouting and comes to life through two key dimensions:

- Supporting the growth of each individual as a confident, capable, and active agent in her own life
- Contributing to the creation of a more just and sustainable world through empowered, global citizens

Through this STEM activity pack, we bring our shared purpose into action; helping girls and young women connect with real-world issues, develop critical skills, and become changemakers in their communities. It shows how our Movement continues to be relevant and impactful by equipping young people to shape a better future, using the power of STEM as a tool for empowerment, equality, and global change.



WE USE THE GIRL GUIDE AND GIRL SCOUT APPROACH



Our activities are designed to reflect the **Girl Guide and Girl Scout** educational approach, combining experiential learning, reflection, and youth-led engagement.

We encourage leaders to:

1. Choose activities collaboratively with participants.
2. Work in small groups where appropriate.
3. Build in time for reflection during and after activities.
4. Support group members to take the lead in planning and facilitating sessions.
5. Adapt activities to meet the unique needs and interests of their group.

In WAGGGS, **leadership** is a shared journey that empowers us to work collaboratively and lead with empathy, creativity, and purpose. Your role is to inspire, support, and model values-based leadership throughout the experience.

Being an effective leader means creating a space where everyone feels included, heard, and motivated to explore Science Technology Engineering and Mathematics with curiosity and confidence. By **embedding the six WAGGGS Leadership Mindsets** into your approach, you'll not only support the growth of participants—but also strengthen your own leadership journey.





Reflective

Pause and reflect on each session. Lead with self-awareness, openness, and a willingness to learn from every experience.



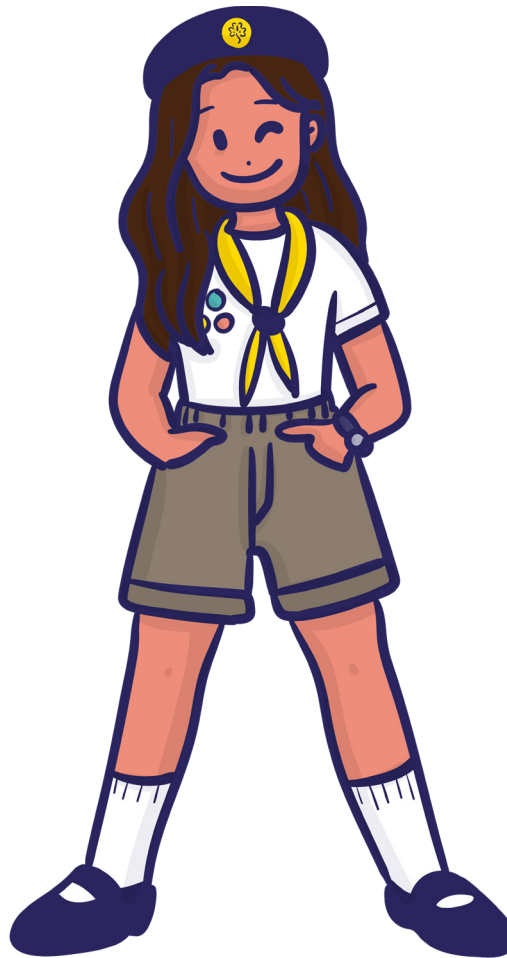
Responsible Action

Inspire participants to connect their STEM projects to real-world issues. Support them in taking ethical, meaningful action and help them see how their ideas can positively impact their communities and the world.



Wordly

Create an inclusive space by being sensitive to different backgrounds, needs, and ways of thinking. Adapt activities so that everyone feels seen and supported in their learning.



Gender Equality

Be intentional about promoting fairness and equal participation. Challenge stereotypes in STEM and encourage participants to see themselves as innovators, problem-solvers, and leaders.



Collaborative

Foster teamwork by encouraging shared ideas, responsibilities, and decision-making. Create opportunities for participants to take the lead and value every contribution.



Creative and Critical Thinking

Support innovation and experimentation. Encourage participants to ask questions, try new things, and learn through trial and error. Use your creativity to adapt activities and guide them through challenges with flexibility.

You can learn more about the [leadership mindsets!](#)

TO CREATE A SPACE TO GROW AND LEARN

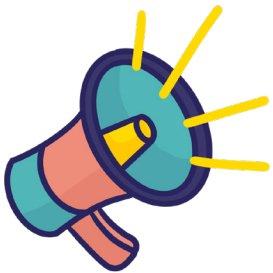


We ask leaders to intentionally create girl-focused, engaging and brave spaces - places where participants are safe enough to take risks, stretch, and speak up.

A brave space is:

- **Inclusive** – everyone can meaningfully participate and feels they belong.
- **Empowering** – everyone feels confident to be themselves.
- **Safe** – everyone is respected and free from discrimination and harm.

HOW TO FACILITATE A BRAVE SPACE



- Co-create clear group guidelines with participants—and name how you'll uphold them.
- State clearly and often that your space is for everyone who wishes to participate.
- Stay mindful of local and global events that may impact participants' wellbeing or sense of safety.
- Adapt activities to the group's context, lived experience, and diverse needs.
- Avoid generalisations and assumptions.
- Offer confidential, supportive ways for participants to seek help or raise concerns.
- Emphasise and respect confidentiality at all times.

ONLINE SAFETY

With the world changing all around us, Girl Guiding and Girl Scouting is a way for girls and young women to continue to connect and grow during this challenging time.

When taking part in any online activities, please remember to still follow your Association's policies and procedures for activities taking place outside your regular meetings, social media age restrictions and your Association's child protection policies. You can learn more on [online safety](#)!

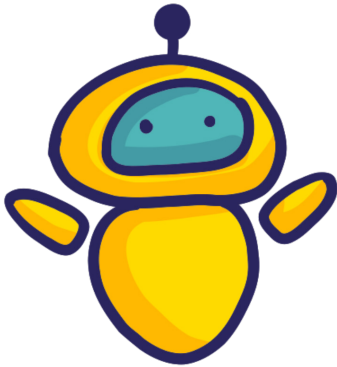
... AND OFFER REAL LEARNING EXPERIENCES

To ensure that every girl grows and thrives through this programme, the STEM Changemakers Activity Pack is designed to offer REAL learning experiences.

What this means	What it looks like in this pack	Your role as a facilitator
<p>R- Relevant</p>	<p>The activity connects to the lived experience, age, context, and interests of the participants.</p> <ul style="list-style-type: none"> In “STEM Avatars”, girls reflect on how they already use STEM in everyday life: at home, school, or in Guiding. Activities evolve across levels, ensuring age-appropriate progression—from awareness and empathy to leadership and innovation. 	<ul style="list-style-type: none"> Link each activity to real-life scenarios. Encourage personal reflection and storytelling. Adapt examples to local context and community challenges.
<p>E - Exciting</p>	<p>The activity feels fun, creative, and sparks curiosity. It includes different types of learning—movement, discussion, hands-on making, and reflection.</p> <ul style="list-style-type: none"> In “Past, Present, and Possible”, participants role-play time travelers exploring historical STEM revolutions using physical ropes and props. In “STEM Superpower Mission”, they imagine solving real-world problems with their own inventions—like cleaning water using recycled materials. 	<ul style="list-style-type: none"> Use music, movement, art, and storytelling to bring energy. Encourage play, role-play, and experimentation. Celebrate imagination and creativity—there are no wrong answers!
<p>A- Accessible</p>	<p>Every learner feels included, supported, and able to participate fully. Activities are designed to be adaptable to different learning needs and local resources.</p> <ul style="list-style-type: none"> Materials can be sourced locally or reused—for example, using bottle caps, paper, and cardboard to design STEM prototypes. Each activity includes tips for adapting to different age groups and learning needs. 	<ul style="list-style-type: none"> Offer flexible formats (digital/physical, group/individual). Adjust pacing or simplify language where needed. Make time for everyone’s voice and contribution.
<p>L- Learner-led</p>	<p>Participants are not just recipients of information - they shape the learning experience through choice, leadership, and action.</p> <ul style="list-style-type: none"> During the STEM Innovation Challenge, participants identify a real-world problem, design a solution, and lead the project. In Community Action tasks, they choose how to share their learning, whether with family, peers, or online. 	<ul style="list-style-type: none"> Let participants take the lead in decision-making and planning. Encourage peer learning, group reflection, and co-facilitation. Support action projects that reflect their passions and ideas.

SO LEARNERS CAN REACH THEIR FULLEST POTENTIAL

Our ultimate goal is for every participant to grow and thrive by feeling confident, curious, and ready to make a difference through STEM. With the support of this activity pack and the guidance of the Growing and Learning (GAL) framework, learners will be supported to:



- Recognise their own strengths, values, and STEM super skills.
- Build confidence to explore, experiment, and create.
- Apply their learning to real-world challenges through teamwork and innovation.
- Feel connected to a global Movement of girls using STEM to shape a more equal and sustainable world.





WANT TO LEARN MORE ABOUT THE GROWTH OUTCOMES?

Check out how each one connects to a real scenario from the STEM Activity Pack below!

Be confident to be herself.

A. Jamila leads a session on building water filters and explains why clean water matters globally.

Have integrity and make choices rooted in her values.

B. Naya’s camp activity materials are missing, so she proposes a new plan using cardboard and bottle caps to make a robot.

Be curious and creative.

C. Leila collects data on insects and plants during a hike and proposes tracking biodiversity using a citizen science app.

Be prepared to adapt to change.

D. Sita notices a teammate struggling with a design programme and helps her learn it so they can build together.

Respect and feel part of nature.

E. Zara volunteers to lead a mini water filter activity during badge day. She practices with her siblings and proudly leads her group.

Be able to form meaningful connections with others.

F. Kiran shares her solar garden light project, inspired by her grandmother’s village, and dreams of lighting up more communities.

Care about the world and know how she can make a difference.

G. Rania notices her team copying code from a website for the STEM4SDGs project. She encourages them to come up with original ideas.

Feel connected with something bigger than herself.

H. Amaara builds a windmill prototype using recycled materials and invents her own design to charge a mobile phone.

Let’s get started and grow together!



ACTIVITY PACK OVERVIEW



Welcome to the STEM Changemakers Adventure Quest!

This pack is designed to spark curiosity, build confidence, and empower girls with real-world STEM (Science, Technology, Engineering, and Maths) skills. Through hands-on activities, teamwork, problem-solving, and innovation, participants will grow their creativity, research ability, and leadership potential.

HOW IT WORKS

The activity pack is structured into **4 exciting levels**, each building new skills and confidence:



Understand Participants learn the basics of STEM by exploring real-world challenges and building empathy for the people affected.

Level 1



Empower Participants strengthen their critical thinking and teamwork skills by solving practical STEM tasks and sharing ideas.

Level 2



Explore Participants put their skills into action through experiments, investigation, and deeper discovery across STEM fields.

Level 3







The STEM4SDGs Innovation Challenge A creative, team-based challenge where girls use design thinking to develop a STEM solution linked to the Sustainable Development Goals (SDGs). This is where changemakers shine!

Level 4

NAVIGATING THE PACK: A GUIDE TO UNDERSTANDING THE CURRICULUM FLOW












To help leaders confidently deliver each activity and bring the STEM Changemakers journey to life, this guide explains the design elements you'll see throughout the pack. Each one plays a special role in supporting you as a facilitator.

<p>Setting the Stage</p> 	<p>This section introduces the big picture – why this curriculum matters and how it fits into the lives of the participants. It helps leaders understand the purpose, values, and themes behind the STEM Changemakers journey. Think of it as your orientation before the adventure begins.</p>
<p>Let's Begin</p> 	<p>This is a leader's overview for each section. It explains what the activity is about, how it connects to the larger goals, and what you should focus on. After reading this, you'll be able to explain the activity clearly to participants and guide them with confidence.</p>
<p>Before We Dive</p> 	<p>This is a prelude that sets the tone for the activity. It gives leaders a deeper understanding of why the activity matters and what it aims to spark in participants. Use this to bring meaning and energy into the room before you get started—it helps everyone see the bigger purpose.</p>
<p>Activity</p> 	<p>This section gives you a snapshot of what the activity involves – what participants will do, how long it takes, and what materials are needed. It helps you prepare ahead of time and understand what success looks like. Use this as your go-to reference when planning or introducing the session.</p>



ACTIVITY GUIDE

Follow and use the icons below when completing an activity:

<p>Activity name</p> 	Name of the Activity.
<p>Activity type</p> 	States whether the activity is a Compulsory , Optional , or Community Action activity.
<p>Number of points</p> 	Shows how many points are earned for completing the activity.
<p>Outcome</p> 	What the activity tries to achieve and what the Girls Guides and Girl Scouts would learn and experience.
<p>Time</p> 	A guide on how long it takes to complete the activity.
<p>Preparation</p> 	Suggested materials and environment for the activity.
<p>Ages</p> 	The suggested age group.
<p>What happens</p> 	How to run the activity.
<p>Take it further</p> 	Additional information or extra steps that participants can do with the activity. If they enjoyed this activity and have some more time to explore, you can provide some more information to challenge them to the next level.
<p>Tips</p> 	Suggestions to adapt the activity for younger or older members.
<p>Take Action</p> 	Simple, meaningful steps participants can take to apply and share what they've learned with others—whether in their community, at home, or online.

ACTIVITY LAYOUT

Level	Activity Name	Time	Type	Points
Let's get started	Brave Space/ MEL Activity	15-20 mins	Compulsory	30 Points



LEVEL 1: UNDERSTAND

Level	Activity Name	Time	Type	Points
Understand	STEM Avatars	45-60 mins	Compulsory	30 Points
Understand	Power Pairs	45-60 mins	Optional	20 Points
Understand	Past, Present, Future	45-60 mins	Optional	20 Points



LEVEL 2: EMPOWER

Level	Activity Name	Time	Type	Points
Empower	Traffic Light Challenge	30-40 mins	Compulsory	30 Points
Empower	STEM Trailblazers- Meet the Changemakers	45-60 mins	Optional	20 Points
Empower	STEM Trailblazers- Let's Play!	30-45 mins	Optional	20 Points
Empower	Human Library	Full Day Event	Community Action - Optional	50 Points



LEVEL 3: EXPLORE

Level	Activity Name	Time	Type	Points
Explore	A Day in the Life	Full day event	Compulsory	60 Points



LEVEL 4: STEM INNOVATION CHALLENGE

Level	Activity Name	Time	Type	Points
STEM4SDGs	Innovation Challenge	Full day event	Compulsory	60 Points
	Innovation Fair	Full day event	Community Action	50 Points



HOW TO EARN THE STEM CHANGEMAKER BADGE



Each level in this activity pack includes three types of activities:

- **Compulsory Activities:** These are the core activities that every participant must complete to progress through the levels. They cover essential STEM concepts and skills.
- **Optional Activities:** These are optional challenges that allow participants to deepen their learning, get creative, and explore STEM topics further.
- **Community Action Activities:** These focus on involving the community around the participants' to be part of the journey, encouraging leadership and social impact.

Each activity is worth a certain number of points, clearly marked with an icon. As participants complete activities, they collect tokens and track their points. At the end of each level, participants can total their points to see how far they've progressed and what badge or certificate they qualify for.



ALL COMPULSORY ACTIVITIES + STEM INNOVATION CHALLENGE



Level 1

Understand: STEM Avatars



Level 2

Empower: Traffic Light Challenge



Level 3

Explore: Two experiments from A Day In The Life



Level 4

STEM Innovation Challenge

Points required

150 points

Rewards

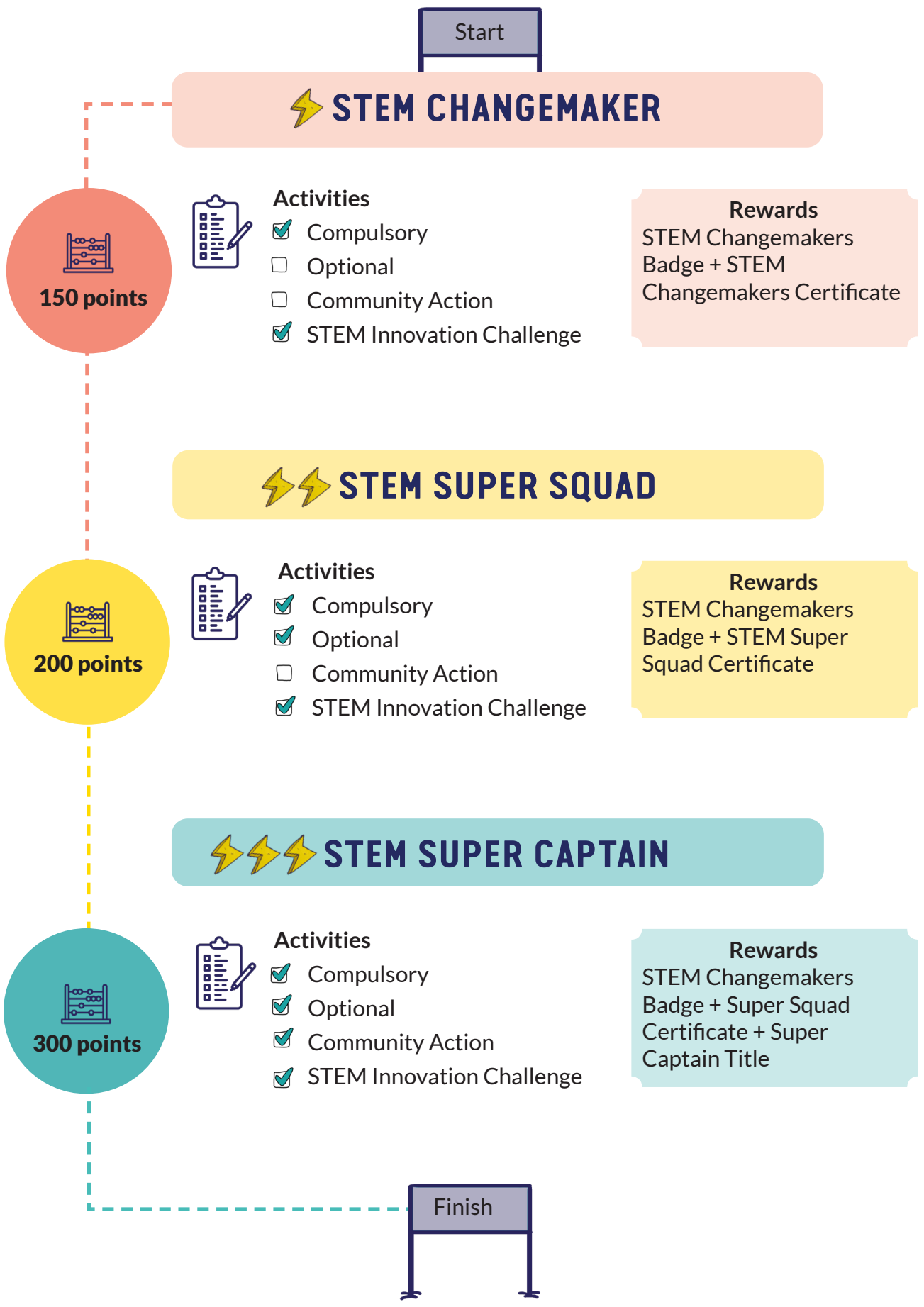
STEM Changemaker Badge + STEM Changemakers Certificate.

Participants can boost their points and earn additional rewards by completing the optional activities and community action tasks included in the pack.

This also gives them the chance to qualify for special titles like the STEM Super Squad or STEM Super Captain.






The breakdown below shows exactly how each title and reward can be earned:





TIMEFRAME AND PLANNING

To get the most from the activities, we recommend the following:

Level	Time Required
 STEM CHANGEMAKER	Approx. 10 hours total to complete all activities for this path. This can be done in 1 full-day camp setting.
 STEM SUPER SQUAD	Approx. 22 hours total to complete all activities for this path. This can be split across a 2-day camp or weekly sessions.
 SUPER CAPTAIN	Approx. 4 full days to complete all activities for this path. This can be done over a multi-day camp or weekly series.

Please take some time to review the activities in advance and consider the approach that will work best for your group. The activities are designed to be flexible and can be completed in various settings—whether as part of a camp, spread out over a series of regular meetings, or a combination of both. They can be run indoors or outdoors, allowing you to adapt them to your available space, resources, and the needs of your group.



WHAT IS STEM?

STEM is an abbreviation for Science Technology Engineering and Mathematics.

S is for **Science**. Science helps us understand the world better. Scientists are like detectives who ask why? and how? Science helps us to discover and describe the world around us. Scientists are like explorers who are super curious and ask a lot of questions.

T is for **Technology**. Technology means using tools and gadgets to make life easier and solve problems. People in the technology field invent and innovate so that they can improve the natural world Technologists make cool gadgets that make life easier.

E is for **Engineering**. Engineering is focused on creating, designing and building innovative structures, platforms, devices and systems. Engineers solve practical problems, make things more efficient and make our lives easier.

M is for **Mathematics**. Maths helps us make sense of the world using numbers. Mathematicians look at information to make sure there are no mistakes and that things are correct. They measure and predict.



HOW IS THE WORLD CHANGING— AND WHY DOES STEM MATTER?

Have you noticed how fast the world is changing?



New technology is everywhere.



Climate change is affecting the planet.



Robots, apps, and AI are changing how we live and work.

In this fast-moving world, we need new ways of thinking and solving problems. That's why STEM—Science, Technology, Engineering, and Mathematics—is so important. STEM helps us understand the world around us and gives us the skills to create, fix, and improve it.

We live in what's called the 21st century—a time when technology, communication, and ideas are moving faster than ever. To succeed in this world, we need more than just knowledge. We need **21st-century skills**. These are the skills that help us think better, work with others, and solve everyday challenges. These include:

- **Critical Thinking** – Learning how to make smart choices and solve problems.
- **Creativity** – Finding new and different ways to do things.
- **Collaboration** – Working well in teams and learning from others.
- **Communication** – Sharing ideas clearly through speaking, writing, or visuals.

STEM education gives young people the chance to grow all of these skills through projects, experiments, and teamwork. It teaches young people how to tackle real-world problems and empowers them to:

- **Think clearly and solve real problems:** They learn to understand challenges deeply and come up with smart, practical solutions.
- **Be curious and ask big questions:** STEM encourages them to explore the world with a sense of wonder and always ask “why” and “how.”
- **Try new things—even if they make mistakes:** Young people learn that failure is a part of learning, and experimenting helps them grow and discover new things.
- **Work well with others:** They gain skills to collaborate, share ideas, listen to different perspectives, and solve problems as a team.
- **Use technology and build skills for the future:** STEM helps them become confident with digital tools and prepares them for meaningful careers in a fast-changing world.





LEVEL 1: UNDERSTAND



The world is like a giant jigsaw puzzle — full of problems to solve and mysteries to explore. STEM is what helps us fit the pieces together and see the full picture.

This first part of the experience is all about sparking wonder and opening up possibilities. Participants are encouraged to ask questions, follow their curiosity, and realise that the way they see, explore, and engage with the world is already shaping their future.

AWAKENING AWARENESS, DISCOVERING STRENGTHS, AND SPARKING CURIOSITY

At this first level, participants begin their journey by looking inward — discovering the skills, strengths, and ways of thinking they already possess that connect with STEM. It's not about having all the answers — it's about realising that the journey has already begun.

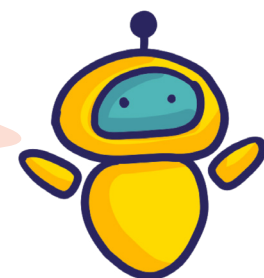
Understanding is the foundation. It's the moment participants realise that traits like curiosity, creativity, and resilience are not just personality traits, they are powerful STEM skills. Many young people don't see themselves in STEM because it often feels distant, complex, or meant for someone else. This level changes that.

To make this real, participants are introduced to the story of Mira, a 12-year-old Girl Guide whose everyday actions bring STEM to life. Mira is curious. She experiments, makes mistakes, solves problems, and tries again. Through her story, participants begin to see STEM not as something that only happens in labs or classrooms, but as something alive in their homes, communities, and Guiding adventures.

Mira's journey invites participants to reflect on their own. They begin to recognise that they too are already thinkers, makers, and solvers, and that STEM is not beyond them. It's within them.

By the end of this level, they will:

- Recognise the STEM skills they already use.
- Begin to build confidence in their abilities.
- See themselves reflected in STEM through Mira's story.
- Feel empowered to keep asking, trying, and growing.





EXPLORE AND READ MIRA'S STORY WITH PARTICIPANTS TO LEARN ABOUT STEM SKILLS AND EXPLORE YOUR OWN.

Meet Mira and her STEM super skills



Mira is a 12-year-old Girl Guide, just like many of us. But there's something truly special about her — Mira loves Science, Technology, Engineering, and Mathematics, also known as STEM. Whether she's at school, at home, or at her Guiding meetings, Mira is always exploring the world through STEM.

Because of her curiosity and passion, Mira has developed amazing abilities called STEM Skills. These are super skills that help her learn new things, solve problems, and come up with creative ideas. They give her the confidence to try new things and the power to work better with others. Mira uses her STEM skills everywhere — in class, at home, and even on exciting Guiding and Scouting adventures.



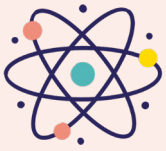
Over time, Mira has grown three special super skills that help her shine.



Super Skill 1: Experimentation

Mira is curious and loves to explore how things work. She's always asking, "What will happen if I try this?" She enjoys experimenting and testing her ideas to find out what works — and what doesn't.

One day, while helping her mother prepare a special snack, Mira had an idea. She suggested using flower petals to add natural colour. She mixed different ingredients and watched in wonder as some turned blue and others purple! The snacks looked beautiful and were a big hit with everyone. That's Mira the Experimenter — always testing, learning, and discovering!



Super Skill 2: Resilience

Mira doesn't give up when things get tough. Even when something doesn't work out the first time, she keeps going. That's what makes her resilient.

When she entered her school's science fair for the first time, Mira worked on a project about electricity. At first, it didn't go as planned. The circuit wouldn't work, and she felt frustrated. But instead of giving up, she tried different materials, asked questions, and kept learning. When that idea didn't work, she tried a new one – testing which fruit had the most vitamin C. And guess what? She succeeded! Mira learned that every mistake is just one step closer to success.



Super Skill 3: Creativity

Mira loves to create and invent. She draws, builds, and imagines new things that solve real problems. She brings ideas to life with whatever she has around her.

During a recent Guiding camp, Mira helped her friends prepare for the Mid-Autumn Festival. She showed them how to make glowing lanterns using recycled paper, wire, and LED lights. They weren't just beautiful – they were also safe! Mira's creativity turned the whole camp into a sparkling celebration.

These STEM skills – experimenting, resilience, and creativity – make Mira feel like a superhero. In fact, she imagines herself wearing a costume and using her STEM powers to help her school, her friends, and her community.

To stay motivated, Mira has created her very own STEM Avatar – a fun character that represents her super skills and reminds her of all she's capable of. She hangs it on the wall in her room. Every time she learns something new or solves a tricky problem, her avatar grows stronger and gains more skills.

MIRA'S PERSONAL PROFILE

Name: Mira Age: 12

Hobbies

- Watching “Minute Earth” and nature documentaries.
- Baking with natural colours and homemade frosting.
- Sketching ideas in her science journal.
- Collecting odd-shaped leaves and labeling them.



Girl Guiding Life

Loves camping, learning about nature, helping younger Guides, and trying science experiments.

STEM SUPER SKILLS



Experimentation

- **Power:** Tests, mixes, explores, and discovers what works!
- **Home:** Mixed vinegar and baking soda to explore chemical reactions and made safe cleaning sprays with lemon juice.
- **School:** For her science fair, she compared vitamin C content in fruits using an iodine starch test. Her classmates were amazed.
- **Guiding:** Helped design a nature colour scavenger hunt that used chemical reactions for colour change.



Resilience

- **Power:** Bounces back and keeps trying.
- **Home:** Tried building a baking soda-powered balloon 3 times before it finally inflated.
- **School:** Her original electric circuit model failed; she switched materials, rechecked her wiring, and made it work just in time for science presentations.
- **Guiding:** Learned knot-tying the hard way – but now teaches the troop!



Creativity

- **Power:** Thinks differently and builds things in fun ways.
- **Home:** Reused plastic containers to make mini terrariums and shared them with neighbours.
- **School:** Designed a poster explaining the water cycle using cartoon clouds and raindrops for a group project.
- **Guiding:** Created water filters from sand, gravel, and charcoal during an eco activity and decorated them with nature art.



Fun Facts

- Can name 8 types of clouds.
- Makes the best fruit slime in her class.
- Built bird feeders using recycled plastic bottles.
- Her favourite snack is sticky rice with mango.

Dream

- Dreams of becoming an environmental scientist: exploring and protecting nature.

MIRA'S STEM AVATAR

Superhero Name/ Game character: Eco-Mira



Mission Style

Nature explorer | Creative builder | Science Detective



Costume

Long lab coat with glowing blue threads, comfy sneakers, tool belt, and a solar-charged backpack. Reflective sash with the Girl Guide trefoil.



Superpowers

- **Power of Experimenting** – She can test and try solutions rapidly, adapting as needed.
- **Power of Resilience** – No matter how tough the challenge, Mira never gives up.
- **Power of Creativity** – Turns everyday materials into brilliant inventions.



Super Tools/Gadgets

- LED-lit magnifying glasses.
- Notebook that scans and saves science ideas.
- Bamboo themed pocket sized tool kit that recycles materials to create tools.



STEM Avatar Mission

At Guiding Eco-Camp, Mira and her patrol went to explore a nearby river. But when they got there, the water was dirty and full of trash. The plants looked sad, and the frogs were gone!

Mira quickly turned into Mira the Maker! She used her **cool magnifying glasses** and **science notebook** to test the water. She found out it had too much acid and plastic. Using her **Experimenting power**, she tried to clean the water with sand, gravel, and charcoal.

The first try didn't work. But she didn't give up! With her **resilience power**, she rebuilt her filter three times until it finally worked.

Then, with her creativity, Mira made the water clearer from **bamboo sticks**, leaves, and an old bottle cap. It actually cleaned the water!

By the end of the day, the team had learned how to test water, clean it naturally, and even make a frog home.



Level 1



Compulsory



STEM AVATARS



45-60 mins



11+ years



30 points

ACTIVITY 1



PREPARATION

- STEM super skills sheet.
- STEM Avatar Template.
- Art supplies: Crayons, markers.



OUTCOME

Participants explore their unique STEM strengths and create a superhero or game character that represents who they are – using either traditional art OR technology tools like ChatGPT.

WHAT HAPPENS ?

In this creative and empowering session, participants will discover their personal STEM strengths and reimagine themselves as **STEM superheroes or game characters**. They will reflect on their daily lives – at home, in school, and through Guiding/Scouting – and express how they already use key STEM abilities. The activity concludes with the design of their unique superhero/avatar using either art supplies or AI-powered tools like ChatGPT.

1. **Read aloud or display Mira's Profile and STEM Avatar.** Then, ask guiding questions for group reflection:
 - What STEM skills did Mira use in her story?
 - How do those skills help her at home, at school, and in Guiding?
 - If Mira is a superhero, what kinds of problems can she solve?
 - Can you see yourself in some of Mira's abilities?
2. **Hand out the "I Am a STEM Super Star" skill sheet.** Ask participants to read each "I Am" statement and circle **3 STEM Super Skills** that sound most like them. If they're unsure, suggest they ask a partner: "What STEM strength do you see in me?" This builds peer connection and encourages self-reflection.
3. Hand out the **STEM Avatar Worksheet** to the participants and guide them through the first section:

They should fill in:

- ✓ **Name, Age, Hobbies.**
- ✓ **A fun fact** about themselves – something cool or unexpected about them.
- ✓ **3 chosen STEM Super Skills from the STEM Super Skills sheet.**
 - **How they use them at home, school, and in Guiding.**
- ✓ Their **dream** – what they'd love to be or do when they grow up.
- ✓ Encourage participants to reflect personally and be imaginative!

4. Now it's time to bring their character to life! Guide them to fill out the second part of the worksheet:
 - **STEM Avatar Name** – What is their hero or game name?
 - **Costume** – *What do they wear? Is it stylish, practical, cultural? Don't limit your costume to your uniform?*
 - **Superpowers** – Translate their STEM skills into actual powers.
 - **Super Tools/Gadgets** – What unique items do they carry or use?
 - **STEM Avatar Mission** – Create a short, imaginative story where their superhero uses all 3 skills to solve a challenge (home, school, or camp).
5. Guide participants into bringing their STEM Avatars to life.

OPTION A: USE CHATGPT (ONLINE OPTION)

- Help participants generate a digital illustration of their STEM Avatar using ChatGPT, with guidance from a facilitator. Ideally, leaders can log in using their own personal accounts to support the activity. If available, ChatGPT Plus may be used to generate multiple avatars efficiently. **Safeguarding Note:** Participants under the age of 15 should not be encouraged or required to log in or create personal accounts. All access to ChatGPT should be managed by a responsible adult to ensure a safe and appropriate experience.
- **How to log in:**
 1. Visit <https://chat.openai.com/>
 2. Ask participants to customise this sample prompt using information from their STEM Avatar Worksheet. Allow participants to use ChatGPT to regenerate the image using their preferred styles: For example: Video game-style, Anime/Ghibli-style Pixar/Disney-style, Cartoon drawing-style, Comic book-style.

Sample prompt: Create a colourful illustration of a [Age] -year-old girl superhero called [Insert Name]. She is from [Country/Region]. She wears [Describe Costume: eg lab coat, tech shoes, Girl Guide sash]. Her superpowers include [List Your Superpowers]. She carries [Tools/Gadgets]. She looks confident and ready to help others. Style: Pixar or Ghibli.

3. Once ChatGPT shows the image, Right-click (or tap and hold) on the image. Click **Download** or **Save As**.
4. You can save it on your drive, or create a collage of the groups digital avatars or print them out for them to display.



OPTION B: DRAW OR PAINT YOUR STEM AVATAR (USE ART SUPPLIES)

Encourage them to get creative with their Avatars and use their imagination to draw their Avatar using art supplies:

- Participants draw or paint their Avatars using pencils, markers and paper. Encourage them to use recycled materials to create 3D effects on their art pieces.

Allow participants to share their STEM Avatars and discuss: What super skills did you choose? Where any of them a surprise for you? What STEM super skill do you use the most?





TAKE IT FURTHER

STEM Superpower Mission

Ask participants to explore this extension activity

Mission brief:

Something has gone wrong in your school, community, or planet! There's a **problem** and your STEM superpowers are needed to solve it. Your challenge is to use your **STEM super skills** to come up with a creative solution.

Choose your problem:

Pick **one** mission to solve:

- **Power out!:** The electricity is gone. How can we make light using simple, natural, or recycled materials?
- **Water worry:** The water is dirty. How can we clean it using safe, simple materials?
- **Lost info:** The school computer crashed. How can we design a better way to store or remember important info?
- **Wildlife in trouble:** Local animals are disappearing. How can we protect them or build something to help?

Your Mission Tasks:

1. **Pick 1–2 STEM Super Skills** you'll use (eg I am creative, I solve problems, I experiment).
2. **Plan your solution** – draw it, build a model, or write your idea.
3. **Explain** what problem you solved, what skills you used, and how your idea works.

Reflect together:

- What skill did you use most?
- What surprised you?
- How would you improve your solution?



TIPS

- Encourage participants to be creative and use methods like role playing, singing or dancing to share their stories.
- Encourage younger participants to draw and paint.
- Ask older participants to use Chat GPT and explore other cartoon styles.



TAKE ACTION

- Participants present their superhero stories to their family members or classmates.
- Encourage participants to teach the STEM Avatar activity to 2–3 younger peers or friends in their community.



Curiosity Super Skill

- I love asking “why?” and “how?”
- I want to know how stuff works.
- I ask lots of questions.
- I like discovering cool new things.
- I get excited when I learn something new.



Problem Solving Super Skill

- I like fixing things when they go wrong.
- I try different ways to solve tricky problems.
- I enjoy puzzles and brain games.
- I don't give up when it's hard.
- I keep trying until I figure it out.



Focus Super Skill

- I stick with things until I finish them.
- I keep going, even if it's tough.
- I work hard to get things done.
- I don't let little things distract me.
- I feel proud when I finish something.



Creativity Super Skill

- I use my imagination to make cool stuff.
- I love drawing, building, or inventing.
- I think of new and fun ideas.
- I can solve problems in fun ways.
- I like thinking outside the box.



Experimentation Solving Super Skill

- I like trying new things to see what happens.
- I learn by doing stuff myself.
- I don't mind making mistakes as they help me learn.
- I ask, “What if I try this?”
- I keep trying different ideas.



Team Player

- I like working with other kids to get things done.
- I share ideas and listen to my friends.
- I help my team do awesome work.
- I cheer my team on.
- We do better when we work together!



Tech Smart Super Skill

- I enjoy using gadgets and apps.
- I have fun with computers and technology.
- I try out new tech tools.
- I use tech to learn and create cool stuff.
- I'm smart with using devices.



Communication Super Skill

- I can share my ideas so others get them.
- I like talking, writing, or drawing what I mean.
- I listen carefully to others.
- I explain things in a simple way.
- I make sure everyone understands.



Time Management Super Skill

- I know how to plan my day.
- I get my work done on time.
- I keep my space neat and tidy.
- I decide what to do first.
- I stay organised.



Resilience Super Skill

- I keep trying, even when something is hard.
- I learn from things that didn't work out.
- I bounce back when I feel stuck.
- I don't give up easily.
- I believe I can do it!



Analytical Solving Super Skill

- I think carefully before I act.
- I break big problems into small ones.
- I look for patterns and clues.
- I notice how things fit together.
- I like figuring things out step by step.



Detailed-Oriented Super Skill

- I notice small things others might miss.
- I check my work to make sure it's right.
- I try to do everything carefully.
- I fix little mistakes.
- I like doing a neat and tidy job.



Research Super Skill

- I find out facts when I'm curious.
- I look things up to learn more.
- I like asking questions and finding answers.
- I enjoy reading and discovering cool info.
- I want to know more about the world.



Adaptability Super Skill

- I stay calm when things change.
- I can try a new plan if I need to.
- I do my best, even when it's different.
- I can work in new places or ways.
- I go with the flow and still do great!



Collaboration Super Skill

- I enjoy working with different people.
- I respect everyone's ideas.
- I learn cool things from others.
- I help everyone feel part of the group.
- I believe teamwork makes us stronger.



STEM Avatar Template



Name: _____

Age: _____

Hobbies. What do you love to do in your free time?

Fun fact. Share something cool or surprising about you:

STEM super skill 1:

How do you use it at home:

STEM super skill 2:

How do you use it at school:

STEM super skill 3:

How do you use it Guiding/
Scouting:

Dream. What do you dream of doing or being when you grow up?

STEM Avatar Imagine your STEM superhero character!
Give them a name or title.



Name: _____

Costume. What does your superhero wear?

Super powers
Imagine your STEM super skills as super powers.

Super tools/Gadgets
What amazing tools or gadgets do they use?

STEM Avatar Mission
Describe a short imaginative story where your avatar used their superpowers.

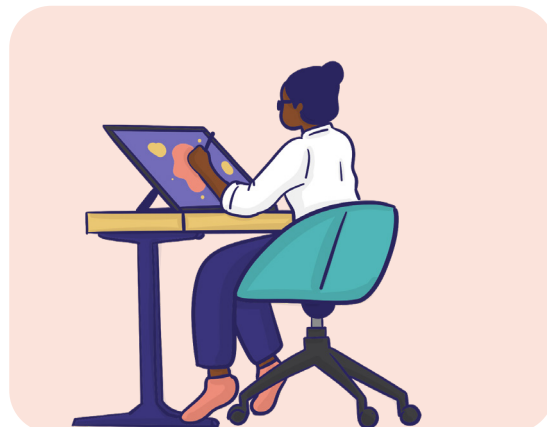
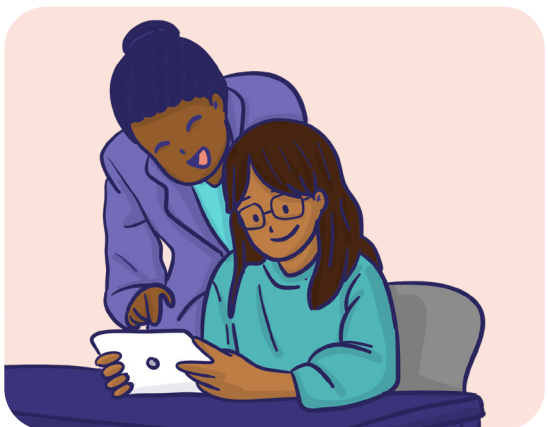


UNDERSTANDING STEM SKILLS AND CAREERS

STEM helps us understand how things work, solve problems, and create new ideas that shape the world around us. STEM careers are wide and exciting! You could become a software developer, a marine biologist, a civil engineer, a data analyst, or even a climate change researcher. Some STEM jobs haven't even been invented yet! What matters most is building the right skills today so you're ready for the world of tomorrow.

But STEM isn't just for scientists in labs or engineers building rockets – it's for everyone!

STEM skills like **critical thinking, problem-solving, creativity, teamwork, and curiosity** are useful in all kinds of careers. Whether you're a doctor using technology to treat patients, a farmer using irrigation systems to grow crops, a teacher using digital tools in the classroom, or an artist designing animations—**STEM is part of the story.**



No matter the career path, STEM skills equip individuals with the tools to adapt, solve real-world problems, and lead innovation. In a rapidly evolving world, these abilities aren't just for scientists and engineers – they are essential for everyone.

Now that we've explored what STEM is and how it fits into so many parts of life, let's help everyone see how STEM connects to real careers and real-world challenges.

This next activity is called **Power Pairs**. It's a fun, interactive way for participants to discover surprising connections between **STEM skills** and **different careers** – even ones they might not expect!



Level 1



Optional

ACTIVITY 2



POWER PAIRS



45-60 mins



11+ years



20 points



PREPARATION

- Career Cards.



OUTCOME

Participants reflect on their strengths and experiences, connect them with STEM careers.

WHAT HAPPENS ?

1. Begin by reminding the group about the **STEM Avatars activity** they previously completed.
 - Ask each participant to **recall the super skills** they chose (eg Curiosity, Problem-Solving, Focus).
 - You can write some of the common skills on a board or flipchart to jog their memory.
2. Divide the participants into **smaller groups of 3–5 people**.
 - *Tip:* Unless the group is large, stick to groups of 3 for deeper engagement and participation.
3. Prepare and introduce two card decks. (You can refer to the appendix for these pre-prepared decks):
 - **Card Deck A:** Careers in STEM (with descriptions).
 - **Card Deck B:** Another set of different careers (also with descriptions).
4. Each group will randomly **pick one card from Deck A** and **one from Deck B**.
5. Each card lists a **few career options**. Ask the group to:
 - **Discuss and select ONE career from each card** that interests them the most.
 - So, each group will end up with **two careers** in total – one from each deck.
6. Once the careers are chosen, each group will:
 - Discuss **how the super skills from the STEM Avatars activity** can be applied in the two careers.
 - Choose **1 super skill** (total, not per career) that they think are most important or relevant for the two selected careers.



7. For **each career**, the group must come up with:
 - **1 real-world examples** of how the selected super skills could be used in that career.
 - That's a total of **2 examples**: 1 for Career A and 1 for Career B.
 - **Read this example aloud to the participants:**

Career: Robotics Engineer

 - a. *Super Skill: Problem Solving*
 - b. "I'm a robotics engineer. One day, the robot I'm working on stops moving. I use problem solving to figure out what's wrong. I check the robot's wires and look at the code. I try a few things until I find the mistake. Then I fix it so the robot can work again."
3. Each group presents their ideas to everyone.
 - Begin with the career from **Card Deck A**, then move to **Card Deck B**.
 - Group members take **turns presenting** one example each, ensuring everyone has a chance to speak.
 - Encourage confident, clear sharing.
9. After all groups have pitched, lead a group reflection:
 - What super skills came up the most?
 - Did anyone learn something new about a career they hadn't thought of before?
 - How do our STEM skills help us succeed in different careers?



TAKE IT FURTHER

Encourage participants to choose additional skills and careers they would like to explore from the cards.



TIPS

- For younger participants: Focus on one career per group to reduce complexity.
- For older participants: Let them create short skits or mock interviews acting as professionals in their chosen careers.



TAKE ACTION

- Participants present their favourite career + super skill to another age group, explaining why it inspired them.
- Display each group's career and skill matches on posters or table cards for others to explore.



Career Cards

DECK 1 CARDS

HEALTHCARE

HELPING PEOPLE STAY HEALTHY AND SAFE

- **Doctor** – Helps people feel better when they are sick and gives them medicine.
- **Nurse** – Takes care of patients and helps doctors at clinics or hospitals.
- **Paramedic** – Helps people during emergencies and rides in the ambulance.
- **Therapist** – Talks with people who feel sad, angry, or worried and helps them feel better.
- **Medical Illustrator** – Draws pictures of the human body for books and science.
- **Genetic Counselor** – Helps families understand health problems that come from their genes.
- **Laboratory Scientist** – Works in labs to test blood, find diseases, and help with treatments.
- **Public Health Worker** – Teaches people how to stay healthy and stop diseases from spreading.
- **Health Data Analyst** – Studies health information to help hospitals make good decisions.

TECHNOLOGY

WORKING WITH COMPUTERS AND SMART MACHINES

- **Software Developer** – Builds computer programmes, websites, or games.
- **Robotics Engineer** – Designs and builds robots that can help people do tasks.
- **Artificial Intelligence Engineer** – Creates smart machines that can learn and make decisions.
- **Cybersecurity Specialist** – Protects computers from hackers and keeps information safe.
- **User Experience Designer (UX Designer)** – Makes websites and apps easy and fun to use.
- **Web Developer** – Builds websites you visit online.
- **Computer Programmer** – Writes code that tells computers what to do.
- **Virtual Reality Developer** – Creates 3D worlds you can explore with special goggles.
- **Mobile App Developer** – Makes apps for phones and tablets.
- **Data Scientist** – Uses numbers and computer tools to solve big problems.

DECK 1 CARDS

SPACE

STUDYING PLANETS, ROCKETS, AND STARS

- **Astronaut** – Travels to space to do experiments and explore.
- **Astrophysicist** – Studies stars, black holes, and how the universe works.
- **Satellite Engineer** – Designs and builds machines that orbit the Earth.
- **Scientific Illustrator** – Draws pictures of space, rockets, and planets to help people learn.
- **Space Lawyer** – Helps make rules about who can go to space and how we use it.
- **Mission Control Specialist** – Helps astronauts from Earth and watches over space missions.
- **Aerospace Technician** – Helps build and test rockets and space tools.
- **Astrobiologist** – Studies if there might be life on other planets.
- **Space Weather Scientist** – Watches solar storms and how they affect Earth.
- **Space Tourism Specialist** – Works on future space trips where people can visit space for fun.

ENVIRONMENT

PROTECTING THE EARTH, ANIMALS, AND NATURE

- **Environmental Scientist** – Studies how people affect nature and works to protect the planet.
- **Climate Scientist** – Studies how the Earth's weather is changing and how to fix it.
- **Marine Biologist** – Studies fish, whales, and ocean life.
- **Sustainability Specialist** – Helps people use energy and resources without harming nature.
- **Wildlife Biologist** – Studies wild animals and helps protect them.
- **Environmental Engineer** – Solves problems like pollution or dirty water.
- **Park Ranger** – Protects forests and animals and teaches visitors about nature.
- **Recycling Coordinator** – Helps communities reuse trash to save resources.
- **Solar Technician** – Installs solar panels that turn sunlight into electricity.
- **Conservation Scientist** – Helps protect forests, land, and endangered animals.

DECK 1 CARDS

MATHEMATICS

SOLVING PROBLEMS USING NUMBERS

- **Statistician** – Uses numbers to find patterns and answer important questions.
- **Actuary** – Uses maths to figure out risks, like how likely something is to happen.
- **Mathematics Teacher** – Teaches students how to use maths in everyday life.
- **Data Analyst** – Looks at charts and graphs to help people make smart decisions.
- **Cryptographer** – Makes secret codes and keeps information safe.
- **Mathematical Modeler** – Uses maths to test how things might work in real life.
- **Game Designer (with math focus)** – Uses maths to make games fair and exciting.
- **Operations Research Analyst** – Finds the best ways to do jobs using numbers and logic.
- **Financial Analyst** – Uses maths to help people and companies make money choices.
- **Maths Communicator** – Writes books or makes videos to help others enjoy and understand maths.

ENGINEERING

BUILDING, DESIGNING, AND INVENTING

- **Civil Engineer** – Designs roads, bridges, and buildings.
- **Mechanical Engineer** – Builds machines like engines and tools.
- **Electrical Engineer** – Works with electricity to power homes, gadgets, and cities.
- **Chemical Engineer** – Uses chemistry to make safe products like shampoo or medicine.
- **Aerospace Engineer** – Designs planes, rockets, and spaceships.
- **Environmental Engineer** – Fixes problems like pollution and helps protect nature.
- **Audio Engineer** – Makes sound work well for music, TV, or concerts.
- **Agricultural Engineer** – Builds machines to help grow and harvest food.
- **Toy Designer** – Creates fun, safe toys for kids to play with.
- **Water Resources Engineer** – Designs ways to bring clean water to homes and farms.

DECK 2 CARDS

FASHION

CREATING CLOTHES AND STYLE

- **Fashion Designer** – Draws and makes new clothing styles people wear.
- **Costume Designer** – Designs clothes for actors in movies, plays, and shows.
- **Textile Designer** – Creates patterns and fabrics for clothing and home items.
- **Fashion Illustrator** – Draws pictures of clothes and fashion ideas.
- **Fashion Photographer** – Takes pictures of clothes and models for magazines and ads.
- **Pattern Maker** – Draws the shapes used to cut and sew clothes.
- **Sewing Technician** – Uses sewing machines to make clothes in factories or studios.
- **Sustainable Fashion Designer** – Designs clothes that don't harm the planet.
- **Fashion Stylist** – Picks outfits for people to wear at shows, events, or photoshoots.
- **Footwear Designer** – Creates shoes that are stylish and comfortable.

BUSINESS

TURNING IDEAS INTO JOBS AND SERVICES

- **Entrepreneur** – Starts and runs a new business based on an idea.
- **Marketing Specialist** – Helps people learn about a product and why they should buy it.
- **Financial Analyst** – Studies money and helps businesses make smart choices.
- **Sales Representative** – Talks to customers and helps them buy what they need.
- **Human Resources Officer** – Helps hire new workers and keeps employees happy.
- **Accountant** – Tracks money in and out for businesses or people.
- **Customer Service Representative** – Helps people who have questions or problems with products.
- **Business Analyst** – Looks at how a company is doing and suggests ways to improve.
- **E-commerce Manager** – Runs online stores that sell products on the internet.
- **Operations Manager** – Makes sure everything in a company runs smoothly.

DECK 2 CARDS

SPORTS

PLAYING, COACHING, AND SUPPORTING ATHLETES

- **Professional Athlete** – Trains hard and plays sports as a full-time job.
- **Coach** – Teaches players how to get better at their sport.
- **Physical Therapist** – Helps athletes recover from injuries.
- **Sports Psychologist** – Helps athletes stay calm, focused, and confident.
- **Sports Referee** – Watches games and makes sure everyone follows the rules.
- **Athletic Trainer** – Works with teams to keep players healthy and fit.
- **Sports Broadcaster** – Talks about games on TV, radio, or online.
- **Statistician (Sports)** – Uses numbers to help teams understand performance.
- **Sports Agent** – Helps athletes get contracts and manage their careers.
- **Event Coordinator (Sports)** – Plans sports games and tournaments.

ARTS & MEDIA

TELLING STORIES WITH IMAGES, WORDS, AND SOUND

- **Illustrator** – Draws pictures for books, comics, and magazines.
- **Animator** – Makes drawings move in cartoons and video games.
- **Actor** – Pretends to be different people in movies, plays, or shows.
- **Music Producer** – Helps singers and bands record songs and albums.
- **Photographer** – Takes pictures for art, news, events, or fun.
- **Film Director** – Tells actors what to do and makes sure a movie looks great.
- **Graphic Designer** – Designs posters, ads, and logos using art and computers.
- **Podcaster** – Talks about interesting topics in shows you can listen to online.
- **Video Editor** – Puts together video clips to tell a story or make a movie.
- **Sound Engineer** – Makes sure music and sound effects in shows sound great.

DECK 2 CARDS

CULINARY

COOKING AND CREATING DELICIOUS FOOD

- **Chef** – Cooks meals in restaurants and creates new recipes.
- **Pastry Chef** – Makes desserts like cakes, cookies, and pastries.
- **Nutritionist** – Teaches people what to eat to stay healthy.
- **Food Scientist** – Studies how to make food safe, tasty, and long-lasting.
- **Recipe Developer** – Invents new dishes for books or restaurants.
- **Baker** – Makes bread, buns, and sweet treats in bakeries.
- **Food Stylist** – Makes food look perfect for photos and ads.
- **Caterer** – Prepares meals for parties and special events.
- **Restaurant Manager** – Makes sure everything runs well in a restaurant.
- **Butcher** – Prepares meat for cooking and selling.

EDUCATION

HELPING PEOPLE LEARN IN FUN AND CREATIVE WAYS

- **Classroom Teacher** – Teaches subjects like maths, science, or reading in school.
- **Museum Educator** – Shares cool facts about history, animals, or art with visitors.
- **Curriculum Designer** – Creates fun lessons, books, and games for learning.
- **Children's Book Author** – Writes stories that help kids learn and grow.
- **Educational YouTuber** – Makes fun videos to teach things like science or maths online.
- **Nature Educator** – Teaches kids about plants, animals, and the outdoors.
- **Learning App Designer** – Builds apps that help kids learn through games.
- **Special Education Teacher** – Helps students with different learning needs succeed.
- **Drama or Art Teacher** – Teaches kids how to express themselves through art or acting.
- **Education Game Creator** – Makes board games or digital games that teach new skills



THE EVOLUTION OF STEM

An **Industrial Revolution** is a time in history when big changes happen in the way people live and work, mostly because of new inventions and technologies. These revolutions usually make life faster, easier, and more connected but they also mean people need new skills to keep up. STEM—Science, Technology, Engineering, and Maths—has played a big role in every industrial revolution by helping people create, improve, and understand these new inventions.

1 The **First Industrial Revolution** (late 1700s to early 1800s) started with machines powered by water and steam. This made farming and making clothes quicker. People needed skills in basic mechanics and how to run these machines.

2 The **Second Industrial Revolution** (late 1800s to early 1900s) brought electricity, steel, and the idea of factories using assembly lines. Cars, trains, and telephones became common. Here, more advanced engineering and science skills were needed to build and fix these new things.

3 The **Third Industrial Revolution** (mid-1900s to early 2000s) introduced computers, electronics, and the internet. This changed how we communicate, learn, and work. People needed digital skills like coding, using computers, and understanding networks.

4 Now, we're in the **Fourth Industrial Revolution**, which involves artificial intelligence, robotics, biotechnology, and smart devices. This revolution blends science and technology in powerful ways, and needs new skills like data analysis, critical thinking, and innovation.

Each revolution built on the last, and as the world keeps changing, STEM helps people keep solving problems, creating new things, and improving life for everyone.

Start with wonder: Spark curiosity

Begin your session by asking participants a few simple but powerful questions:

- Have you ever wondered how people lived before electricity or the internet?
- Can you think of an invention that changed the world?
- What do you think the world will look like in 30 years?
- How do you think STEM (Science, Technology, Engineering, and Maths) helps us solve problems today?

These questions are not just ice breakers — they help connect participants to the idea that **STEM is all around them** and is constantly evolving to meet the world's needs.



PURPOSE OF THE ACTIVITY

This activity takes participants on a **journey through time**, helping them explore how innovation, technology, and human problem-solving have changed across history – from steam engines to smart AI.

The goal is to help participants **understand the past, recognise the present, and imagine the future** through the lens of the **Four Industrial Revolutions**.

It also helps participants:

- Discover how **STEM skills have evolved** with time.
- Explore how **STEM impacts society** and daily life.
- Begin to **see themselves as future innovators**, creators, and leaders in a fast-changing world.

By seeing where we've come from, they begin to understand where we're headed – and why STEM is so important for shaping a better, smarter, and more sustainable future.

Why it matters

We're now in the era of the **Fourth Industrial Revolution (4IR)** – a time when **AI, robotics, biotechnology, renewable energy, and big data** are changing how we live, learn, and work.

By understanding the revolutions of the past, participants will:

- Build a **timeline of progress**.
- Discover **what skills and inventions drove each era**.
- Reflect on **what the next revolution might bring**.
- Realize that **they have a role to play in shaping the future**.

This activity reinforces that **STEM is not just for scientists** – it's for *problem-solvers, creators, and changemakers* like them.





PAST, PRESENT AND POSSIBLE

Optional

45-60 mins

11+ years

20 points

PREPARATION

- 4 ropes (to represent each of the four Industrial Revolutions)
- Pegs or clips
- Space to hang ropes at eye level (indoors or outdoors)
- Printed cards:
 - Invention Cards
 - Revolution Time
 - Marker Cards
 - Highlight Cards
 - STEM Skills Cards

OUTCOME

To explore the evolution of STEM across the four Industrial Revolutions and understand how technology, skills, and inventions have shaped, and continue to shape, society.



WHAT HAPPENS ?

1. Create the timeline space

- Hang 4 horizontal ropes (or use tables, walls, or floor tape) — each rope represents one Industrial Revolution. You can choose to prepare the room in advance or involve the participants in doing it.
- Space them out clearly (oldest to newest).
- Label each rope 1st, 2nd, 3rd, and 4th — OR let participants figure this out themselves.
- Attach pegs or clips along each rope to hold cards.

If outdoors, use trees, posts, or tents to tie the ropes. Indoors, tape ropes between chairs or use a bulletin board. You can also improvise by sticking/pinning cards on a flat surface like a wall.

2. Introduce the activity

Tell participants:

“Today, you are not just learners — you are Time Travellers! You will journey through the past 250 years of innovation and discovery to explore how STEM has shaped the world we live in today. Each rope is a different era of human history called an Industrial Revolution. You’ll use the clue cards to figure out what belonged to each time and how STEM helped us grow.”





3. Form teams & distribute cards

- Split participants into 4 teams. If the group is small, you can do the activity together as one group.
- Each team will stand by a designated rope labelled with an Industrial Revolution (eg “1st,” “2nd,” “3rd,” “4th”). This will be the revolution they’re responsible for exploring.
- Give each team a shuffled, complete set of cards from the appendix. These include the Revolution Time Marker and Revolution Highlight Cards.
- Teams will work together to examine each card, discuss its meaning, and figure out how it connects to their assigned Industrial Revolution.

Card types they must place for each rope:

- **1 Revolution Time Marker Card:** This card tells you which Industrial Revolution you’re exploring and when it happened. Place it first to mark the era in history.
- **1 Highlight Card:** This card highlights what made each Industrial Revolution distinct. From its nickname to key features, it helps you understand what set that period apart.
- **Any Invention Cards they think belong to that era:** These show cool inventions that were made during each Industrial Revolution. Look at the picture and think: when would this have been useful or brand new?
- **Any STEM Skills Cards they believe fit that time:** Each Industrial Revolution needed different skills. This card tells you what kind of STEM thinking or ability people had to use in that era.

4. Timeline building

- Allow participants time to debate, match, and place their cards on each rope.
- Encourage them to justify their choices and work collaboratively.
- Facilitators can support by asking questions, not giving answers:
 - “Why do you think that invention fits here?”
 - “What was happening in the world at that time?”
 - “Would people have needed that STEM skill during that revolution?”

5. Group sharing & timeline reveal

- Invite each group to briefly share part of their timeline.
- Ask:
 - a. “Why did you place this invention/skill in this revolution?”
 - b. “Was there anything confusing or surprising?”
- After sharing, reveal the correct answers (refer to the answer key in the appendix).
- Help the group rearrange cards where needed.

6. Reflection & discussion

Use the following questions to guide group reflection:

- What surprised or challenged you about the timeline?
- Did any inventions seem older or newer than you expected?
- How do you think life changed for people during each Industrial Revolution?
- What role did STEM play in those changes?





TAKE IT FURTHER

- Research the impact of each invention (eg how did the telephone change communication?).
- Predict inventions for the 5th Industrial Revolution and create a Future Timeline Rope with imagined inventions and STEM skills for the next 100 years. What might the 5th Industrial Revolution look like?
 - * What will we invent?
 - * What skills will we need?
 - * How will we use STEM to solve new challenges?



TIPS

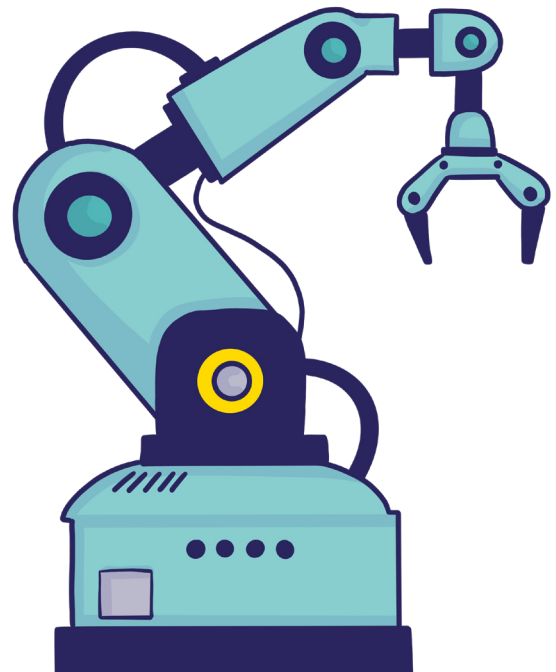
For younger members: pre-select two revolutions instead of four, use fewer cards, such as only including inventions and their corresponding years, and offer guided questions like, “Which inventions do you think are the oldest?” or “Which one do we still use today?”

Older members can use phones or tablets to create a digital timeline or a short presentation video summarizing their timelines.



TAKE ACTION

- Participants can share one cool invention from the timeline with a classmate, parent, sibling, or grandparent and explain which era it came from.
- Participants can ask a friend, “Do you know what the 4 Industrial Revolutions are?” and share one surprising thing they learned.



Past, Present, Future Timeline Cards

Revolution Time Marker Cards



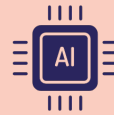
**1st Industrial
Revolution**
1760-1840



**2nd Industrial
Revolution**
1870-1914



**3rd Industrial
Revolution**
1960-2000



**4th Industrial
Revolution**
2010-Now



Highlight Cards

The Age of Machines

Machines take over jobs people used to do by hand. People move from farms to cities to work in factories, learning new skills like fixing machines and working with metal and coal.

The Power-Up Age

Everything gets faster and brighter! Factories use assembly lines to make things quickly. People learn how to use tools, fix machines, and understand how electricity works.

The Computer Boom

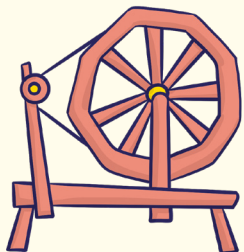
Technology gets smarter and smaller. The internet is created, letting people send messages and find info fast. People learn skills like typing, using software, fixing electronics, and writing computer code.

The Smart Tech Era

We're more connected, and apps and devices control many things. STEM skills like coding, using apps, and solving problems with technology are important.

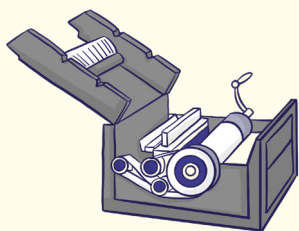
Inventions Cards

Invention Cards: 1st Industrial Revolution



Spinning Jenny

This machine could spin lots of threads at once, helping people make clothes faster. It changed the way fabric was made in factories.



Cotton Gin

This machine quickly pulled seeds out of cotton, helping farmers do in minutes what used to take hours.



Steam train

The steam engine used hot steam to power trains and machines. It helped people travel and move goods faster than ever before.

Invention Cards: 2nd Industrial Revolution



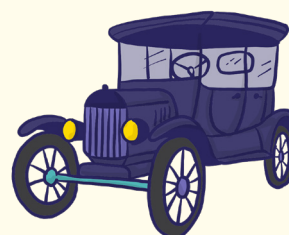
Light Bulb

The light bulb helped people see in the dark without using candles. It brought safe and bright light to homes and streets.



Telephone

The telephone let people talk to each other even when they were far apart. No more waiting for letters!



Cars (Model T)

The Model T was one of the first cars regular people could buy. It made travel easier and changed how we get around.

Invention Cards: 3rd Industrial Revolution



Microchips

Microchips are like mini brains for computers and phones. They help machines think and work fast.



Personal Computers

Personal computers made it easy for people to type, draw, and explore the internet from home or school.



Email

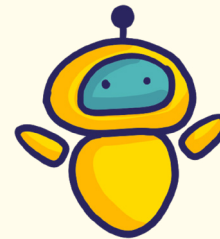
Email lets you send messages to anyone in the world in just seconds—way faster than mailing a letter!

Invention Cards: 4th Industrial Revolution



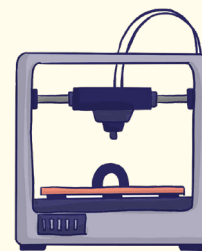
VR/AR Games

These cool games let you feel like you're inside a different world! They use science and tech to create fun, interactive experiences.



Artificial Intelligence (AI) like Siri

AI like Siri can understand questions, give answers, and even tell jokes!



3D Printing

3D printers can build real objects from digital designs. You can print toys, tools, and even body parts.



STEM Skills Cards

**Using simple
machines**

**Learning to
code**

**Working with
steam power**

**Fixing
electronics**



**Using
electricity**

**Creating with
AI and robots**

**Working on
assembly lines**


**Using smart
tech**


Correct Timelines

Revolution	Time Period	What Changed	Cool STEM Invention	New STEM Skills	What Stood Out
 1st - Age of Machines	c. 1760-1840	Machines replaced hand work	<ul style="list-style-type: none"> • Spinning Jenny • Steam Engine • Cotton Gin • Steam Train 	<ul style="list-style-type: none"> • Factory work • Fixing machines • Working with iron and coal 	Machines take over jobs people used to do by hand. People move from farms to cities to work in factories, learning new skills like fixing machines and working with metal and coal.
 2nd - Power-Up Age	c. 1870-1914	Electricity and mass production	<ul style="list-style-type: none"> • Light Bulb • Telephone • Steel Bridges • Cars (Model T) 	<ul style="list-style-type: none"> • Using machines • Electric skills • Working on assembly lines 	Everything gets faster and brighter! Factories use assembly lines to make things quickly. People learn how to use tools, fix machines, and understand how electricity works.





Revolution	Time Period	What Changed	Cool STEM Invention	New STEM Skills	What Stood Out
 <p>3rd – Computer Boom</p>	c. 1960–2000	Computers and internet changed life	<ul style="list-style-type: none"> • Microchips • Personal Computer • Email • Early Robots 	<ul style="list-style-type: none"> • Typing • Using computers • Fixing electronics 	<p>Technology gets smarter and smaller. The internet is created, letting people send messages and find info fast. People learn skills like typing, using software, fixing electronics, and writing computer code.</p>

 <p>4th – Smart Tech Era</p>	2010–Now	Smart tech, AI, and digital life	<ul style="list-style-type: none"> • AI Assistants • 3D Printing • VR/AR Games • Smart Homes 	<ul style="list-style-type: none"> • Coding • Using apps • Solving tech problems 	<p>We’re more connected, and apps and devices control many things. STEM skills like coding, using apps, and solving problems with technology are important.</p>
---	----------	----------------------------------	--	---	--





LEVEL 2: EMPOWER



Across the world, girls and women are still underrepresented in science, technology, engineering, and mathematics (STEM) — and not because of a lack of talent or interest. The real barriers lie in stereotypes, outdated systems, unequal access to education and opportunities, and deep-rooted cultural norms. These challenges shape how girls see themselves, what they believe they can achieve, and whether they feel they truly belong in STEM spaces.



Globally, only 28% of the STEM workforce is made up of women.

This number hasn't shifted much in over a decade, and in some countries, the percentage is even lower. This is a major concern — not only for gender equality but for the future of innovation, sustainability, and inclusive growth.

STEM careers are the jobs of tomorrow. They're the key to solving real-world problems like climate change, access to clean water, energy, health, and digital inclusion. If girls are left out of these conversations, we lose half the world's ideas and solutions.

But there is hope — and power — in changing the story.

This section of the curriculum helps participants explore what holds girls back from STEM — and what can lift them up. Through hands-on, reflective, and collaborative activities, participants will:

- Identify and unpack gender stereotypes and biases in STEM.
- Learn from the stories of women trailblazers who dared to dream and break barriers.
- Explore how societal norms shape their own experiences and aspirations.
- Reimagine more inclusive, fair, and empowering STEM environments for all.

They will begin to see themselves not just as learners, but as **advocates, innovators, and leaders** — equipped with the knowledge and skills to create a more equal future for girls in STEM.

WHY THIS MATTERS

When girls see role models in science, tech, engineering and maths, they begin to believe: "That could be me."

- When girls challenge bias in their schools or communities, they make it easier for others to step into STEM spaces.
- When girls develop their STEM confidence and curiosity, they become part of the solution — building a better world for everyone.

This section is both reflective and bold. It asks participants to:

- Share and challenge their beliefs and assumptions
- Learn from real-world stories and role models
- Use creativity to rewrite more inclusive STEM narratives





BREAKING BARRIERS — THE TRAFFIC LIGHT CHALLENGE

Many girls around the world still face messages that suggest **they don't belong in science, technology, engineering, or maths (STEM)**. These messages can come from family, teachers, media, or society in general. Even when a girl is curious or talented, **she might not feel supported or encouraged** to follow her interests in STEM.

These barriers are not just individual moments — they are part of larger patterns that make it harder for girls and women to enter and succeed in STEM careers.

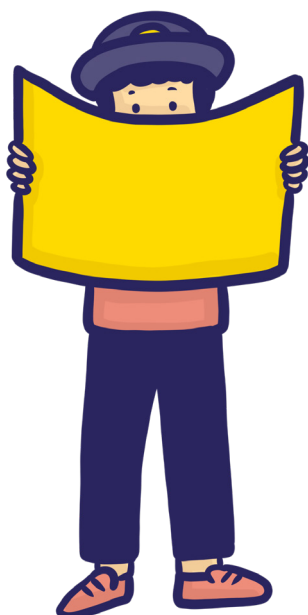


Barriers girls face in STEM

- **Stereotypes** – These are fixed beliefs about what people can or can't do. For example, the idea that boys are naturally better at maths or that girls don't enjoy coding.
- **Lack of Role Models** – When girls don't see women in STEM careers, it becomes harder for them to imagine themselves in those spaces.
- **Unconscious Bias** – Sometimes people treat girls differently in STEM without even realising it, like calling on boys more in science class or assuming tech jobs are for men.
- **Discrimination** – This is when someone is treated unfairly because of their gender. A girl might be excluded from a project or told she's not capable, simply because she's a girl.

This activity helps participants explore these issues using a fun and interactive method using the **Traffic Light System**:

- **Red:** Harmful or biased moments — like when a girl is told she can't do something because of her gender.
- **Yellow:** Unclear or uncertain moments — maybe the situation is mixed or confusing.
- **Green:** Empowering and supportive moments — when someone is included, encouraged, or treated fairly.



Why it's important

By doing this activity, participants will:

- Learn how stereotypes and bias affect real people
- Practice recognising and challenging unfair situations
- Imagine how we can build a world where **everyone has a place in STEM**

This activity will help participants become more aware of the barriers girls face — and how we can all be part of breaking them down.





Level 2

ACTIVITY 1



TRAFFIC LIGHT CHALLENGE



Compulsory



30-40 mins



11+ years



30 points



PREPARATION

- Prompts in appendix (Red, Yellow, Green)
- Coloured paper, tape, or chalk to mark out a triangle with red, yellow, and green corners
- Space for movement
- Whistle or bell (optional)



OUTCOME

To help participants understand gender equality in STEM through movement, discussion, and critical thinking.

WHAT HAPPENS ?

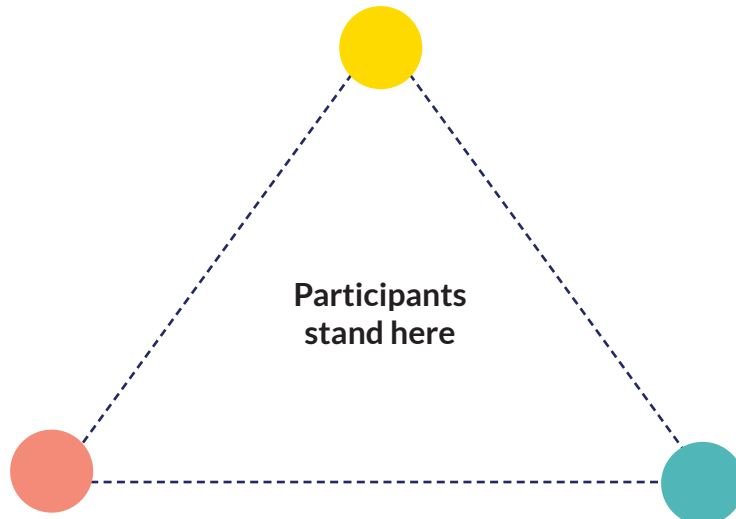
1. **Create a Brave Space:** Begin by establishing and creating a brave space with participants, for more tips on how to do this, check out page 6.

2. Read out the following introduction to the participants:

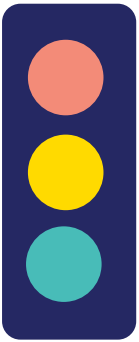
3. **Set up the room:**

Use red, yellow (orange), and green paper, chalk, cones, or tape to create a large triangle with each corner labelled as:

- * **Green = GO** (Positive, inclusive, supportive).
- * **Yellow = UNSURE** (Mixed or confusing).
- * **Red = STOP** (Bias, stereotype, exclusion).



4. **Gather everyone in the centre** of the triangle (where all the colour zones meet). As the facilitator, you will stand outside the triangle and read a prompt aloud for everyone to hear. Shuffle through the prompts to ensure fun and engagement.
5. **Explain the Traffic Light Zones:**



RED – STOP:

“This means something harmful is happening. It could be a stereotype (an unfair belief), discrimination (being treated unfairly because of gender), or exclusion (being left out).”

YELLOW – UNSURE:

“This means the message or situation is confusing or mixed. You’re not sure if it’s fair or unfair, supportive or harmful.”

GREEN – GO:

“This means something positive is happening – someone is being supported, included, or encouraged in a fair way.”

Encourage participants to ask questions if they don’t understand a term. Refer to the introduction for more on the gender barriers.

6. After hearing the prompt, **participants have 30 seconds to think and then move** to the colour zone they believe best represents the scenario or statement. They must quickly **walk or run** to the colour zone they think the statement fits:
 - Green = Positive, inclusive action or support.
 - Yellow = Mixed or confusing.
 - Red = Stereotype, bias, or discrimination.
7. Once participants have chosen a colour, **ask 2–3 volunteers to explain their choice:**
8. Then, reveal the recommended answer and offer a short, friendly explanation that helps everyone better understand the meaning behind the prompt. Remind them that this is a safe and brave space to learn, and it’s okay if their opinions differ.
9. Bring participants back together in a circle and ask:
 - Which prompt was most surprising to you?
 - How do stereotypes or bias affect girls who want to be in STEM?
 - What can we do to make STEM more welcoming for everyone?
 - What’s one way you can be an ally at school, home, or in your community?





TAKE IT FURTHER

- After the game, invite participants to create a group pledge or poster about how they will stand against bias and support inclusion in STEM.
- Let participants act out real-life examples of bias and then replay the same scenes showing how to respond in a more inclusive or supportive way.



TIPS

Create scenarios or prompts that are relatable or common within your context

For younger participants:

- Use simpler words or images for each zone (eg smiley, unsure, sad faces).
- Offer example responses or sentence starters for their explanations.

For older participants:

- Lead a discussion about how gender bias shows up on social media, in tech careers, or in classrooms.



TAKE ACTION

- Participants share one red or yellow zone scenario with a friend or family member and ask, "What would you do in that situation?"
- Participants write or draw one thing they learned about inclusion and one thing they want to do differently and share it.



Traffic Light Challenge Prompts



Green Light Prompts (GO: Positive and Inclusive)

Yellow Light Prompts (THINK: Mixed or Confusing)

Red Light Prompts (STOP: Biased or Exclusionary)

<p>A science teacher says, “We need girls and boys to help design the robot – everyone brings different strengths!” <i>This means everyone gets to join in and share ideas, because different people are good at different things.</i></p>	<p>The school has a science team, but it’s all boys this year. <i>Maybe no one meant to leave girls out, but it still makes you wonder if everyone had a fair chance to join.</i></p>	<p>A boy says, “Girls don’t like building things – that’s boring for them.” <i>Saying only boys like building things isn’t true—and it can stop girls from trying fun things.</i></p>
<p>A school makes posters of famous female scientists to inspire students. <i>Seeing girls in science shows that they belong there too and can do amazing things.</i></p>	<p>An adult says, “Girls can do STEM, but it’s really hard work.” <i>It sounds like a compliment, but it might make girls feel like STEM is too hard for them.</i></p>	<p>Only boys are allowed to represent the school at a tech competition. <i>Not letting girls join is unfair and teaches that only boys can do certain things, which isn’t right.</i></p>
<p>You earn a Girl-led Action Climate Change (GLACC) badge for designing a simple recycling machine <i>Using STEM to help the planet means you can be a leader and make your community better.</i></p>	<p>A girl joins a coding class but doesn’t speak up because she feels outnumbered. <i>When there aren’t many girls in a group, it can make others feel shy or unsure about speaking up.</i></p>	<p>A classmate laughs when a girl says she wants to be a game designer. <i>Laughing at someone’s dream just because of their gender is hurtful and can make them give up.</i></p>
<p>Your class votes for a girl to lead the science project because she has great ideas. <i>It’s important to notice when someone has good ideas and support them as a leader.</i></p>	<p>A teacher encourages boys more than girls during maths class but doesn’t realize it. <i>Even if the teacher doesn’t mean it, giving more attention to boys can make girls feel less confident.</i></p>	<p>A teacher tells a girl, “Maybe you should pick something easier than physics.” <i>Telling girls to choose ‘easier’ subjects makes it seem like they can’t handle big challenges—when they can!</i></p>
<p>A girl shares her dream of being an astronaut, and everyone encourages her. <i>When others cheer you on, it helps you believe in yourself and go after your dreams.</i></p>	<p>A student says, “I think girls can be engineers... if they really try.” <i>This seems kind, but it suggests girls aren’t as good unless they work extra hard.</i></p>	<p>A magazine on inventors shows only men and doesn’t mention women at all. <i>If we only see men in science stories, girls might think there’s no place for them—when that’s not true.</i></p>



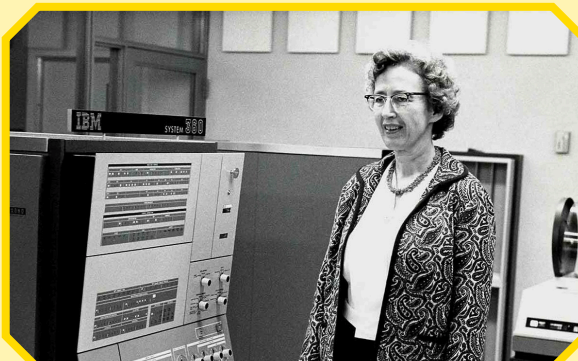
CELEBRATING THE STORIES AND STRENGTH OF WOMEN IN STEM

When you think about scientists, inventors, or technology experts, who comes to mind? Too often, we only hear about a few famous names, most of them men. But the truth is: **women and girls have always been part of STEM**, even when their stories were left out of history books.

There should be **no shortage of inspiring role models** for girls who dream of using STEM to change the world.



Marie Curie, the first person ever to win two Nobel Prizes, who discovered new elements and helped invent the X-ray.



Grace Hopper, who helped build the early foundations of computer programming — including the very idea of “debugging” a computer.



Katherine Johnson, a Black American mathematician whose calculations were vital to NASA’s first spaceflights.



Barbara McClintock, a groundbreaking geneticist, made major discoveries about how genes move — but her work was ignored for years simply because she was a woman.

These women made amazing contributions — but their journeys weren’t always easy. They faced bias, stereotypes, and obstacles simply because they were women. And sadly, many girls and women today still face similar challenges in STEM.

WHAT ARE STEM TRAILBLAZERS?

STEM Trailblazers is a set of activities that helps you discover the powerful stories of women in STEM – their achievements, the barriers they overcame, and how they are changing the world. Many never get credit for their discoveries or leave the field because of bias

When girls see role models who look like them and hear stories that reflect their lives – **they begin to believe, "Maybe I can do that too."**

Participants will:

- ✓ Reflect on their own STEM strengths
- ✓ Celebrate role models
- ✓ Imagine what kind of changemaker they could be

Whether you love building, coding, teaching, designing, or imagining – **there's a place for you in STEM.**

These activities will help you:

- ✓ **Learn** from the stories of women trailblazers
- ✓ **Identify** moments of bias and challenge them
- ✓ **Reflect** on what makes a space inclusive
- ✓ **Imagine** your own STEM journey





STEM Trailblazers—Meet the Changemakers



Optional



45-60 mins



11+ years



20 points



PREPARATION

- Story cards.
- Cardboard (old boxes, cereal boxes, or other sturdy recycled materials).
- Scrap paper or one-sided printed sheets
- Markers, pens, coloured pencils
- Scissors and glue
- Envelopes or small recycled pouches (optional for storage)
- A large box for storing final card sets



OUTCOME

To help participants learn about real women changemakers in STEM fields while reusing materials creatively to design a fun and educational card game.

WHAT HAPPENS ?

1. Begin by explaining to the participants that they will work in groups to create a **STEM Trailblazers Card Game**. The goal is to learn about inspirational women in STEM by crafting game cards using recycled materials.
2. **Group setup:** Split participants into **5 groups** and distribute a story set with 5 women in STEM to each group. (Create a group/pair distribution that works according to the numbers you have).
3. **Story exploration:** Ask them to read the stories of each woman and get ready to create the card games in their respective groups.
Design the Game Cards: Each group will create 10 cards total (2 for each woman: 1 profile card + 1 clue card). Cards must follow the colour of their story card (5 unique group colours).
Colour coding:
 - Each **individual story has its own colour**, and all cards related to that woman should use the **same colour** for easy identification.
 - For example, if a woman's story is in green, both her profile card and clue card should be green.
4. **Card construction process:**
 - a. **Cut recycled cardboard:**
 - Cut **10 cards** per group from sturdy recycled cardboard (eg cereal boxes). Cut them the size of A6 (105 mm × 148 mm); A4 paper folded twice.
 - Each woman will have 2 cards (1 profile + 1 clue), totalling 10 cards per group.
 - b. **Cut writing paper:**
 - On scrap paper, trace the card shape and cut 10 pieces to fit.
 - Make sure they match the size of the cardboard for a neat fit.
 - c. **Attach paper to cardboard:**
 - Stick paper to both profile and clue cards using glue.
 - Make sure the paper fits well and is secure but flexible enough to flip.
 - Let the cards dry for at least 5 minutes.

5. SET A: Changemaker ProfileCards (5 per group)

a. Side A (front):

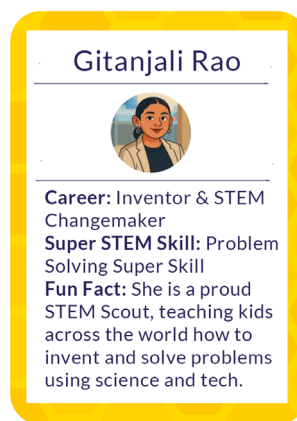
- Write the words “STEM Trailblazer” in the centre.
- Decorate the card using the same colour as the woman’s story card.

b. Side B (back):

Write the following (from the story):

- **Name** (in bold at the top).
- **Career** (eg “Engineer,” “Inventor”).
- **Super STEM skill** (Refer STEM Skills in appendix).
- **Fun fact** – A unique detail about her work or life.

Paste the avatar (cut from the appendix) of the woman on the card.



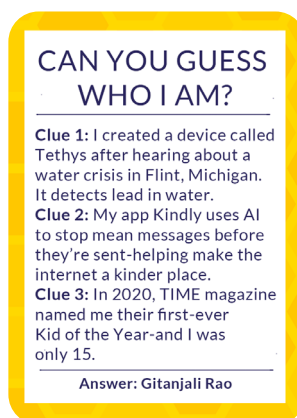
6. SET B: Changemaker Clue Cards (5 per group)

a. Side A (front):

- Write “Clue Card” in the centre.
- Decorate with the same colour as her profile card/story card.

b. Side B (back):

- Write **three clues** describing the woman and her work, based on her story.
- Example: “I created a device called Tethys after hearing about a water crisis in Flint, Michigan. It detects lead in water.”
- At the bottom of the card, write the **changemaker’s name** for game reference.



7. Sorting and storage:

- Pair each **Profile Card** with its matching **Clue Card**.



- Collect cards from all the groups and sort the pairs cards by colour.
- Place completed cards in envelopes, pouches, or labelled zip bags. Use one pouch, envelope or zip bag for each colour of cards. You will have 10 cards in each.
- Use a large, recycled box or decorated container labelled: “**STEM Trailblazers!**” to store all the card sets for the game.

8. Group presentation & reflection: Each group presents their 5 changemakers using these prompts:

- What’s the name of the changemaker?
- What does she do?
- What did you learn from her story?

9. Reflect, and discuss. Answers from this will be presented at the end:

- What inspires you about the stories we explored today?





TAKE IT FURTHER

Assign follow-up research: Find another STEM changemaker from your community and make a card.



TIPS

- For **younger participants**, pre-cut cards and offer printed clues or avatars for sticking.
- For **older groups**, add a challenge to design their own avatars or add QR codes linking to video profiles.



TAKE ACTION

- Participants can take home one card and share the story with a sibling, parent, or friend.
- Participants can post or say one fun fact about a STEM woman during a class or with their family.





STEM TRAILBLAZERS - MEET THE CHANGEMAKERS

Story Cards

Story Card A



Samaira Mehta – Founder of CoderBunnyz, a board game company teaching coding to children

Samaira Mehta is an American coder and board game designer. She is the founder and chief executive officer of CoderBunnyz, a company that produces a board game of the same name for teaching children how to code. Coding is the process of writing instructions for a computer to perform.

These instructions are written in a programming language that a computer can understand and perform. Coding is an important skill in computer science and plays a big role in developing software, applications, websites, and other technological solutions.

She began coding when she was 6 years old with her father as her teacher. She created the board game CoderBunnyz, with the help of her little brother, to teach other children how to code. She designed the game over the course of a year. After she came up with the game's design, she worked with graphics designers and game manufacturers in China and New Zealand. The name "CoderBunnyz" combines her interest in board games and coding with bunnies, her favorite animal. The game provides instruction on basic concepts in artificial intelligence and Java.

Samaira didn't stop at one game. She went on to develop CoderMindz, the first board game that introduces kids to the concepts of artificial intelligence (AI), and CoderMarz, a game focused on space exploration and coding on Mars – all of them teaching real computer science skills in a way that's fun and easy to understand.

Her mission is simple but powerful: to make coding inclusive, creative, and exciting for everyone – especially kids from underrepresented backgrounds. Samaira has spoken to over 75,000 students across the U.S., and through her initiative "Yes, One Billion Kids Can Code," she's aiming to give every child around the world the opportunity to learn technology and unlock their full potential.

She believes that no one is too young to learn, lead, or launch a business – and her story is proof.





Debbie Sterling – Founder and CEO of GoldieBlox, creating STEM-focused toys and media to inspire girls

Debbie Sterling is the founder and CEO of GoldieBlox, a company that creates books, toys, and media to help girls see themselves as future inventors, engineers, and leaders. She's known for creating the world's first girl engineer character, Goldie, and Ruby Rails, a girl coder. Through storytelling and building, these characters show that girls can solve problems, invent amazing things, and lead boldly. Growing up, Debbie

loved pink, ponies, and princesses, but she also loved drawing, inventing, and figuring out how things worked. It wasn't until high school that someone mentioned "engineering" – a word she had never heard before. The idea that she could use maths, science, and creativity to build real things sparked something in her.

She went on to study engineering in college, where she was often one of the only women in the room. Despite feeling like she didn't fit in and being underestimated, she kept going. After college, Debbie noticed something troubling: toy aisles were divided – boys got robots and building kits, while girls got makeup sets and fashion dolls.

She wanted to change that. That's how GoldieBlox was born – with a mission to help girls see that they, too, can be builders. Her first product was a storybook and building set where girls could read about Goldie, then build real machines to solve problems – just like engineers do. Today, GoldieBlox is a global brand, and Debbie continues to inspire a generation of girls to dream bigger, build boldly, and know they belong in STEM.



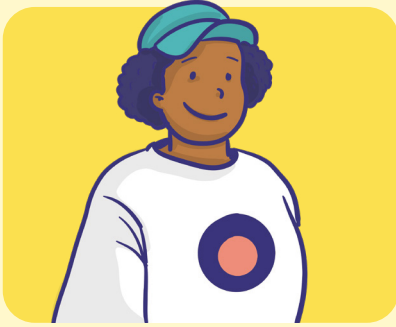
Dr. Tu Youyou – Chinese scientist who discovered artemisinin, a groundbreaking antimalarial drug, earning her a Nobel Prize in Medicine.

Dr. Tu Youyou, a Chinese scientist, used traditional Chinese medicine to solve a global health problem: malaria. She was born in Ningbo, China, in 1930. As a child, she was often sick, which motivated her to study medicine and help others.

After studying pharmacology, Tu joined a research project in the 1960s to fight malaria. In the 1960s, malaria was killing millions, and existing treatments weren't working.

Inspired by traditional Chinese medicine, she searched ancient texts and discovered that the sweet wormwood plant had been used to treat fevers. Through determination and experimentation, she extracted artemisinin, a compound that became the world's most effective malaria treatment.

Despite limited resources and challenges as a woman in science, Dr. Tu's work saved millions of lives, showing how combining local knowledge and science can come together to solve global challenges. In 2015, she became the first Chinese woman to win the Nobel Prize in Medicine.



Dr. Gladys Kalema-Zikusoka – Ugandan wildlife veterinarian and founder of Conservation Through Public Health, working to protect gorillas.

Gladys Kalema-Zikusoka is a wildlife veterinarian from Uganda who has spent her life protecting endangered animals, especially mountain gorillas. But her journey started when she was just a child. Growing up in Kampala, Uganda, Kalema-Zikusoka loved animals and was always fascinated by wildlife. At the age of 12, she started a wildlife club at her school and organised trips to

Queen Elizabeth National Park, where she saw the majestic gorillas for the first time. This sparked her interest in becoming a veterinarian.

She pursued her dream and won a scholarship to study veterinary medicine at the Royal Veterinary College in London. After graduating, Kalema-Zikusoka became Uganda's first wildlife veterinary officer at just 25. Her work was groundbreaking as she researched how diseases passed from humans to gorillas, putting the gorillas in danger. This led her to found Conservation Through Public Health (CTPH) in 2003.

CTPH helps protect gorillas from diseases and also works with local communities to improve their health, so they can live alongside wildlife. Her work has been celebrated globally, and in 2021, she was named a Champion of the Earth by the United Nations for her contributions to environmental science and innovation. Kalema-Zikusoka's story proves that following your passion for animals, even from a young age, can lead to life-changing work for both humans and wildlife.



Emily Calandrelli – MIT engineer, science communicator, and host of Netflix's "Emily's Wonder Lab."

Emily Calandrelli is a science communicator, MIT-trained engineer, author, and the host of Netflix's "Emily's Wonder Lab." She's also the 100th woman to fly to space – and a leading voice for girls in science.

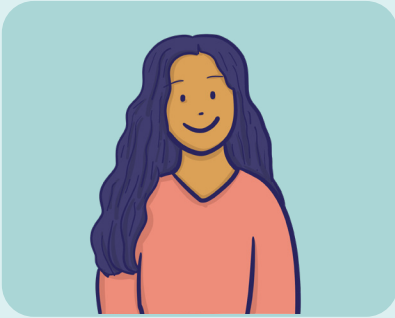
Her journey began with a big dream: becoming an astronaut. She followed that dream all the way to MIT, where she earned degrees in Mechanical, Aerospace, and Aeronautics and Astronautics Engineering. She worked with NASA on space missions, helping create technology for space travel.

But Emily discovered that she didn't just want to do science – she wanted to share it. So she became a science communicator, using TV shows, books, and social media to make science fun, especially for kids.

On Emily's Wonder Lab, she shows how science experiments can be exciting, colorful, and hands-on. She also writes books like "Ada Lace," featuring a curious girl scientist, and uses her platform to talk about important issues like climate change, space tech, and representation in STEM.

Emily believes that science belongs to everyone – and that it's important for girls to see women leading in labs, space missions, and classrooms.

Story Card B



Bhavishyaa Vignesh – Teen innovator and TEDx speaker passionate about space tech and AI

Bhavishyaa Vignesh is a young inventor who is already making life easier, one app at a time. At just 13 years old, she's creating smart tools that help people make the most of what they already have—and she's doing it with coding, creativity, and care.

As a little girl, Bhavishyaa loved exploring. Her parents signed her up for all sorts of fun things—music, dance, art, maths. Her journey began with a simple robot ball. Instead of just playing with it, she programmed it to do tricks — and that opened her eyes to the power of code. Soon, she was building her own games and apps and teaching other kids how to do it too. So far, she's taught over 500 children through her virtual coding and space tech camps.

One of her most exciting creations is the Tasty Toolbox — an app that helps people find recipes based on what ingredients they already have at home. Whether someone is vegetarian, vegan, or has dietary restrictions, the app suggests healthy meals and helps reduce food waste.

Bhavishyaa also serves as a teen ambassador for the Canadian Association for Girls in Science, where she encourages more girls to get curious about space, science, and technology. Her dream is to make sure girls know that tech isn't just for boys — it's a tool for anyone who wants to solve problems and build a better world. Her dream is to help break the barriers that hold girls back from exploring STEM—that's short for Science, Technology, Engineering, and Maths.



Dr. Maryam Mirzakhani – Iranian mathematician and the first woman to win the Fields Medal for her work on Riemann surfaces and dynamics.

Dr. Maryam Mirzakhani was a maths genius from Iran. She was born in 1977 in the city of Tehran. As a child, she loved reading stories and wanted to be a writer. But later, her teachers noticed she was great at solving tricky maths problems. They encouraged her to explore maths more.

Even though not many women in her country studied maths, Maryam didn't give up. She worked hard and represented Iran in international maths competitions, winning gold medals.

She moved to the United States and became a professor at Stanford University, one of the best universities in the world. Maryam became the first woman ever to win the Fields Medal — which is like the Olympics gold medal for maths!

Maryam said doing maths felt like being “lost in a jungle” where you explore and solve puzzles to find your way. She showed the world that girls can be amazing mathematicians and inspired many to follow their dreams.



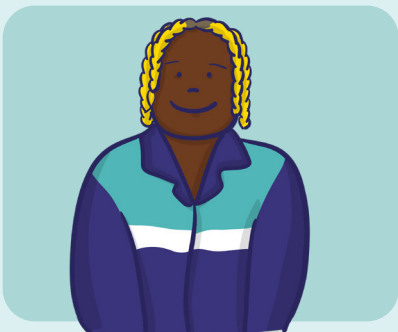
Anne-Marie Imafidon – Computer scientist and founder of Stemettes, promoting STEM careers for girls and young women.

Anne-Marie Imafidon is a brilliant tech expert from London, born to Nigerian parents who believed education was very important. She was always ahead of her time – by age 10, she passed tough school exams in maths and computing, tests that 16-year-olds usually take!

By age 13, she had advanced computing certificates, and by 20, she graduated from the famous University of Oxford with a degree in maths and computer science.

But Anne-Marie noticed that in her field – especially in STEM (Science, Technology, Engineering, and Maths) – there were very few girls. So, in 2013, she started Stemettes, an organisation that helps girls learn about and get excited about STEM through workshops, games, and mentoring.

Anne-Marie wants every girl to believe she can be a leader in technology and maths. She travels the world speaking about diversity in STEM and has won many awards, including being named one of the BBC's 100 Most Influential Women.



Nzambi Matee – Kenyan materials engineer who developed a process to convert plastic waste into durable building materials.

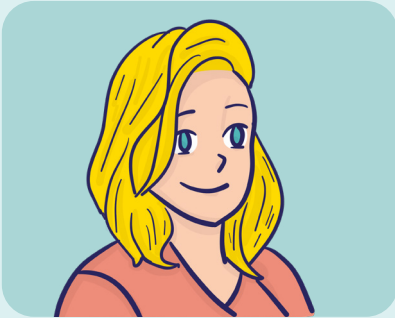
Nzambi Matee is an engineer and inventor from Kenya, but her story began in a very different field. Growing up, Matee was always curious about the world around her. She was especially interested in the environment and how things worked. After finishing high school, she went on to study material science in college. However, it was the sight of plastic bags and bottles

littering Nairobi's streets that sparked her journey into environmental activism.

In 2017, Matee decided to make a change. She quit her job as a data analyst in the oil industry and began working in her mother's backyard to create something that could help tackle the city's plastic waste. After months of testing, she invented a machine that turned recycled plastic into paving stones. These stones are not only useful but also help keep plastic out of landfills and streets. She called her company Gjenje Makers.

Today, her company produces thousands of plastic paving stones every day, turning waste into a valuable resource. Through her work, she has also created jobs and improved the lives of local people.

Matee encourages young people to think about solutions to local problems, and she believes that small changes can make a big difference.



Camille François – Cybersecurity expert specialising in digital disinformation and online threats.

Camille is a cybersecurity and disinformation expert. That means she works to protect people and countries from dangerous things that happen online, like false information (called disinformation), hacking, and cyberbullying. Her job is a mix of detective work, technology, and social science.

Camille grew up in France and was always curious about how people used technology and the internet. She noticed that while the internet helped people connect and learn, it could also be used to spread lies and cause harm. This made her want to study how to keep people safe online.

Camille has worked with governments, social media companies, and researchers to spot fake accounts and stop the spread of harmful content. She was a lead investigator at a company called Graphika and has worked on major investigations into online threats from foreign governments.

Today, she teaches at Columbia University and helps build tools that protect online communities. She's showing how tech can be used to keep people safe, not just entertained.

Story Card C



Gitanjali Rao – Inventor and TIME's first-ever Kid of the Year (2020), known for developing devices to detect lead in water and combat cyberbullying.

Gitanjali is a real-life young inventor who uses science and technology to solve problems that help people around the world. Since she was very young, she loved building things, asking questions, and doing science experiments. When she was just 4 years old, her uncle gave her a science kit that changed everything.

Her first major invention came when she was just 10, after hearing about the water crisis in Flint, Michigan. People were drinking water contaminated with lead, and it broke her heart. Instead of waiting for adults to fix it, she invented Tethys, a small device that detects lead in water using sensors and shares the results through a mobile app.

She didn't stop there. Seeing how cyberbullying was hurting kids online, she built Kindly, an app that uses artificial intelligence to spot mean messages and suggest kinder alternatives. She also created Epione, a device to help doctors detect early signs of opioid addiction. Gitanjali is a proud STEM Scout and has reached over 70,000 students through workshops, schools, and mentorship programs, teaching them how to turn ideas into inventions.

Gitanjali says her goal is to create "a global community of young innovators to solve problems." She encourages other kids to embrace STEM and become changemakers.



Dr. Purnima Devi Barman – Indian biologist known for her conservation efforts to protect the greater adjutant stork.

Dr. Purnima Devi Barman is a wildlife biologist from Assam, India, who fell in love with birds when she was just a little girl. When she was five, she went to live with her grandma near the Brahmaputra River. Her grandma showed her the wetlands and fields, teaching her bird songs and stories.

She especially loved the greater adjutant, a big, tall bird from the stork family that most people thought was ugly or dirty. These birds were endangered, which means there were only a few left. People didn't like them nesting in their trees and were tearing the nests down.

But Purnima didn't give up on them. She started teaching people in villages about how special these birds were. She even formed a group of local women called the "Hargila Army" – "Hargila" means greater adjutant in the local language. These women help protect the birds and teach others to care too.

Now, because of Purnima and the Hargila Army, more people are planting trees for the birds and celebrating them in festivals. Her story shows that love and teamwork can help save nature.



Dr. Tessa Lau – Founder of Dusty Robotics, developing robots automate construction tasks.

Dr. Tessa Lau is known as the "Robot Whisperer." She's the founder of Dusty Robotics, a company that builds construction robots to help workers build faster, safer, and more accurately. Tessa grew up loving puzzles, and that curiosity led her to computer science. She spent more than a decade at IBM Research creating smart systems that helped companies work better.

But she had a bigger dream – to build robots that helped everyday people, not just big businesses. At Willow Garage, she helped develop personal robots, and later co-founded Savioke, a company that made delivery robots for hotels. These robots could deliver towels and snacks without human help!

But her biggest inspiration came during her home renovation. She noticed something strange: the workers on the construction site kept making mistakes, even though they were trying really hard. This was because they were using old tools like chalk lines and paper blueprints – tools that made it hard to be accurate. That gave Tessa the idea to build robots that could help in construction.

In 2018, she founded Dusty Robotics. Their main robot, the Field Printer, draws building layouts directly onto construction sites using computer models. This eliminates errors, saves time, and makes the work environment safer. Dr. Tessa Lau says her goal is to build technology that gives people tools that make their work faster, easier, and even more fun.

She's a scientist, an inventor, a robot-maker, and a dreamer. And she's proof that girls who love computers, machines, and big ideas can build the future – one robot at a time.



Mae Jemison – First African-American woman in space and a physician, engineer, and advocate for science education.

Dr. Mae Jemison made history as the first African-American woman to travel to space, serving as a mission specialist aboard NASA's Space Shuttle Endeavour.

Growing up in Chicago, Mae was curious about the world and everything in it. She loved science fiction, read books about astronauts, and wanted to explore space. But she also loved dance, especially ballet and modern styles.

While some people told her she had to choose between science and art—or that a Black girl couldn't become an astronaut—Mae refused to believe those limits.

She earned a degree in chemical engineering from Stanford University and later a medical degree from Cornell University. At 31 years old, she was selected by NASA, and five years later, she launched into orbit, where she conducted experiments on weightlessness and bone cells in space.

After leaving NASA, Mae didn't stop exploring. She founded the Jemison Group, a technology consulting company, and started The Dorothy Jemison Foundation for Excellence, named after her mother. Through programs like The Earth We Share, she inspires students to pursue their dreams.



Ula Maria – Landscape architect and winner of the RHS Young Designer of the Year award.

Ula is a landscape architect. That's someone who designs outdoor spaces like gardens, parks, and green spaces in cities. But she doesn't just make them pretty – she designs places that help people feel calm, connected to nature, and happy to be outside.

Ula grew up in Lithuania, surrounded by wildflower meadows and forests. Her childhood was filled with adventures in nature – swimming in rivers, picking berries, and watching plants grow in her grandmother's garden. These memories stayed with her and made her want to design natural spaces for others to enjoy.

Ula moved to the UK to study landscape architecture. In 2017, she won the RHS Young Designer of the Year award at the famous Chelsea Flower Show, one of the biggest garden design competitions in the world. Her gardens are full of emotion, storytelling, and natural beauty. She now creates peaceful spaces for people in cities, hospitals, and homes, helping bring nature into everyday life.

Story Card D



Orla Murphy – Engineer at Jaguar Land Rover and winner of the IET Young Woman Engineer of the Year award.

Orla Murphy is an audio engineer – that means she works with sound! She works at Jaguar Land Rover, a car company, where she helps design car software and make sure things like radios and warning sounds work perfectly.

Orla grew up in the countryside in Ireland. One of her favorite childhood memories is when her family’s tractor got a radio. It made her super excited about sound and machines.

At school, she loved maths and science. When she was 16, she led a science project about bubbles, and she won two big prizes in a national science competition. That’s when she realised science and engineering could be her career.

Later, Orla worked on a cool project: a driving simulator, kind of like a video game, where people can practice driving using real car controls and big screens around them. She also helps cars get software updates no matter where they are in the world – like a phone updating its apps!

Orla loves solving problems and learning new things because technology keeps changing. She believes engineering is a fun job where you get to create and fix things all the time.

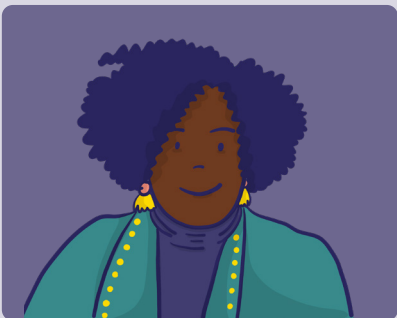


Tiahni Adamson – Marine biologist and environmental advocate focusing on ocean conservation and Indigenous knowledge.

Tiahni Adamson is an environmental scientist and marine biologist from Australia who is deeply passionate about protecting the planet and honoring her heritage. A proud Aboriginal woman from the Kaurareg Nations in the Torres Strait, Tiahni blends Indigenous knowledge with Western

science to tackle some of the biggest environmental challenges of our time—like climate change, ocean pollution, and biodiversity loss. As a child, Tiahni was raised with a deep respect for land and sea. Her community taught her how to listen to nature and live in balance with it—wisdom that had been passed down for generations. But she also saw how the environment was changing, how pollution was hurting sea creatures, and how climate change was threatening both ecosystems and Indigenous ways of life. That lit a fire in her heart.

Tiahni studied marine biology at Flinders University and went on to work in climate adaptation, environmental restoration, and community-led science projects. One of her exciting focus areas is researching how seaweed can reduce methane emissions from livestock –a groundbreaking solution that could help reduce harmful greenhouse gases from farming. Today, she is a First Nations Lead at CH4 Global, a company using seaweed-based feed to cut emissions. Tiahni is also a fierce advocate for including Indigenous voices in science, ensuring that climate solutions respect the knowledge of the people who have cared for the land for thousands of years. Her work shows the world that real change happens when modern science listens to ancient wisdom.



Kimberly Bryant – Electrical engineer and founder of Black Girls Code, aiming to increase the number of women of colour in tech.

Kimberly Bryant grew up in Memphis, Tennessee, during the 1970s. She excelled in maths and science but often felt isolated because there were few women of colour in her classes. She studied electrical engineering and worked in biotech, but she noticed the same lack of diversity in the tech industry.

She noticed a problem: not many girls of colour were involved in technology and coding. She decided to change that. In 2011, Kimberly founded Black Girls Code after her daughter attended a tech camp and was the only Black girl there. Kimberly wanted to create a supportive space where girls of colour could learn coding and technology skills.

Black Girls Code, is a nonprofit that teaches young girls of colour how to code, build apps, and create technology. Her organisation empowers girls to see themselves as future tech leaders. Through her leadership, Kimberly has inspired thousands of girls to enter the tech field, showing that diversity and inclusion lead to innovation.

Today, Black Girls Code has reached thousands of girls, empowering them to create apps, build robots, and lead in tech. Kimberly's work inspires a new generation of innovators to break barriers and bring diversity to technology.



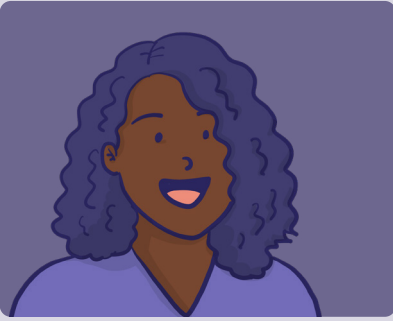
Dr. Fei-Fei Li – AI pioneer and co-creator of ImageNet, a critical dataset for computer vision.

Dr. Fei-Fei Li grew up in a small town in China. As a young girl in China, she loved school, but when she was a teenager, her family moved to the United States. Fei-Fei didn't speak much English at first and had challenges fitting in but worked hard to learn. She didn't let this hold her back.

She loved science and computers and dreamed of making them smarter. With hard work and determination, she became one of the world's leading computer scientists. She became one of the top experts in artificial intelligence (AI). Fei-Fei led the creation of ImageNet, a project that helped computers "see" and understand pictures, just like people do. Today, her work helps make technologies like self-driving cars, smart cameras, and medical tools that detect diseases.

Dr. Fei-Fei Li inspires young people, especially girls, to be changemakers by using technology to solve global challenges. Her leadership proves that anyone, no matter their background, can change the world with innovation and kindness.

Her dream is to help break the barriers that hold girls back from exploring STEM— that's short for Science, Technology, Engineering, and Maths.



Trachette Jackson – Mathematical biologist researching cancer modeling and recipient of numerous academic honors.

Trachette is a mathematical biologist. That means she uses maths to understand how diseases like cancer grow and how treatments can work better. She writes equations and builds computer models that help doctors test ideas before trying them on real patients.

Growing up, Trachette loved maths but didn't know she could use it to study biology. In college, she discovered mathematical biology, and it blew her mind – she could help people and solve real health problems with numbers and formulas!

Today, Dr. Jackson is a mathematical biologist who writes equations and builds computer models to understand how cancer grows and spreads. This helps scientists and doctors test new treatments faster and more safely. She's solving the problem of how to treat cancer more effectively using the power of maths. By turning complex science into patterns and predictions, she helps find better ways to save lives.

Dr. Jackson also works to bring more girls and students of colour into maths and science, showing that brilliance comes in every background.

Story Card E



Laila Shabir – Founder of Girls Make Games, an organisation that empowers girls to design and develop video games.

Laila didn't grow up with video games in her home. She was raised in a conservative Pakistani family living in the United Arab Emirates. Her parents strongly emphasised education, especially for girls. They believed that knowledge could open any door, and they worked hard to ensure Laila and her siblings had access to the best education possible.

Laila took that to heart. She studied hard and got a full scholarship to MIT, one of the best universities in the world! She studied economics and got a job in finance, working with money and numbers. But deep inside, she wanted to do something more meaningful – something that helped people.

While exploring ways to shift into a more meaningful career, Laila noticed something striking: although many girls loved video games, very few were involved in making them. She saw that the gaming industry lacked diversity – not just in its characters, but behind the scenes too. In 2014, she launched Girls Make Games, starting with a summer camp that taught girls how to design, code, and build their own video games. It quickly grew into a global movement, reaching nearly 6,000 girls across 61 cities. At the camps, girls learn storytelling, coding, animation, and game design – and pitch their final creations to real game developers. The winning games are even published for the world to play.

Laila is leading a movement to make sure more girls become the creators of the games they love. She believes that the future of video games should be for everyone – and that with each game made by a girl, the world becomes a little brighter.



Norah Magero – Kenyan mechanical engineer and renewable energy expert, co-founder and CEO of Drop Access, known for developing the VacciBox, a solar-powered portable refrigerator.

Norah Magero is a mechanical engineer and energy expert from Kenya. She builds things that help people, especially in places without electricity. She's the co-founder of Drop Access, a group that brings energy solutions to rural communities.

Norah created the VacciBox, a small fridge that runs on solar power (energy from the sun). It keeps vaccines and medicines cold in remote villages where there's no electricity. This is super important because vaccines stop diseases, but they only work if they're kept cold! She got the idea after moving to a rural area called Makueni and seeing how hard it was to store farm food and medicine. Her first fridge project failed, but Norah says failure teaches you how to try again – and do better.

Even as a new mom, she kept going. She says, "Failure does not mean your story is done." Her hard work paid off when she won the Africa Prize for Engineering Innovation, becoming the first Kenyan and second woman to win.



Dr. Nita Patel – Senior Director of Vaccine Development at Novavax and Head of Antibody Discovery and Vaccine Development

Dr. Nita Patel is a scientist who helped lead the team that made the Novavax COVID-19 vaccine. A vaccine is something doctors give us to protect us from getting sick from diseases. She's a vaccinologist, which means she studies how to make vaccines to stop diseases from spreading.

Dr. Patel was born in a small farming village called Sojitra in India. When she was just four years old, her father got very sick with a disease called tuberculosis (TB). TB is a serious infection that makes it hard to breathe. He got so sick that he couldn't work again. That moment changed her life. Her dad told her, "You should become a doctor and find a cure." Inspired by her father's words, Nita studied hard and went on to earn degrees in microbiology (the study of tiny living things) and biotechnology (using science to help living things, like making medicines). She worked at a company called MedImmune, where they made vaccines for TB and other illnesses.

Later, she joined a company called Novavax. There, she led an all-women team that worked day and night to help fight COVID-19. She worked 18-hour days but said she didn't feel tired because she loved her work. Dr. Patel's team used something called recombinant DNA (a special science method for making vaccines) to help people all over the world. Today, she is a senior director at Novavax, helping protect people from diseases.



Xiaoyuan Ren – Environmental engineer and founder of MyH2O, addressing water quality issues in rural China.

Xiaoyuan Ren is an environmental engineer from China. Growing up, Xiaoyuan Ren always knew that clean water was essential to life. But when she learned that millions of people in rural China did not have access to safe drinking water, she was determined to make a difference. As a child, she saw her own family struggle with water pollution and knew she needed to help others.

Ren went on to study environmental engineering at the Massachusetts Institute of Technology (MIT), where she began researching the lack of clean water in rural China. Inspired to find a solution, she founded MyH2O, an app that helps people in rural China find clean drinking water by testing the water quality across thousands of villages.

Through MyH2O, volunteers gather data and track water quality in real time, helping thousands of people access safe water. Ren's work shows how one person's dedication to solving a big problem—like water pollution—can impact many lives. She encourages young people to think about the environment and use their knowledge to create solutions that help others.





Kiara Nirghin – Young inventor who developed a super-absorbent polymer to combat drought, winning the Google Science Fair.

Kiara Nirghin is a talented AI technologist who became famous for her innovative research in artificial intelligence (AI). But Kiara's journey into the world of technology and environmental science started when she was just a teenager. While still in high school, Kiara was deeply concerned about

droughts and climate change and wanted to find a way to help people who were affected by these issues.

Her very first experiment was when she was just 16 years old. She realized that soil moisture plays a crucial role in farming, especially in areas that are often dry and prone to droughts. To help, Kiara worked on a project that used AI to predict droughts and their impact on crops. She used an AI algorithm to predict soil moisture levels, which could help farmers prepare for droughts and make decisions about when to plant or irrigate crops.

Kiara's project was groundbreaking because it was one of the first times that AI was used to address real-world environmental problems like droughts. She entered her research into the Google Science Fair and won the Google Grand Prize.

Kiara has since continued to use AI to tackle environmental problems, and she's been recognised on many prestigious lists, including Forbes 30 Under 30. Her story shows how one curious and passionate teenager, armed with technology and a love for nature, can use their skills to make a difference in the world.





STEM Trailblazers – Let's Play!

Optional

30-45 mins

The suggested age group

20 points



PREPARATION

- Completed STEM Trailblazer Game Cards (10 per set: 5 Profile Cards + 5 Clue Cards, colour-coded).
- Timer (30 seconds).
- Flat surface for playing.
- Box or envelope labelled “STEM Trailblazers!”
- Designated **Timekeeper** for each round.



OUTCOME

This activity helps girls discover and celebrate the stories of inspiring women in STEM. It encourages teamwork, memory recall, active listening, and communication skills.

WHAT HAPPENS ?

1. Begin by sorting the cards into 5 colour-coded sets (10 cards per set: 5 profiles + 5 clues). Each group is assigned one colour set and keeps it throughout Round 1.
2. Split participants into **pairs or groups of 3**.

Within each team, assign:

- Trail Guide – reads the Clue Cards.
- Path Finder(s) – holds the Profile Cards and guesses the STEM Trailblazer.

3. Participants play the game in two rounds:

ROUND 1:

- The **Trail Guide** places the Clue Cards **face down** in a pile.
- The **Path Finder(s)** holds the 5 Profile Cards, facing themselves.
- The Timekeeper shouts “**GO!**” and starts the 30-second timer.
- The Trail Guide flips one clue card at a time and reads the clues aloud **without saying the name**.
- The Path Finder guesses the correct profile based on the clues.
- Remove any guessed matches from the deck.
- After time is up, switch roles and continue until all cards in the group’s set are guessed.
- **Round 1 ends immediately once one team successfully completes their set of cards.**

ROUND 2 – SWITCH AND CONTINUE

- Teams are reshuffled and participants are given a new card set (new colour) they haven't used before.
- Repeat the same process: Trail Guides and Path Finders take turns, roles rotate, timer runs for 30 seconds per turn.
- Once a team completes their new set, the round ends, and another reshuffle and deck switch occur.
- Continue playing rounds in this manner until all teams have gone through all 5 sets.
- The goal is for all participants to experience all STEM Trailblazer stories by the end of the activity.



TAKE IT FURTHER

Ask each participant to act as their favourite Trailblazer for a 1-minute speech: "I am [Name] and here's what I changed in the world..."



TIPS

For younger participants:

- Use fewer cards (eg 3 Trailblazers per round instead of 5).
- Let a facilitator help read clues if needed.



TAKE ACTION

- Participants invite someone at home or school to play a mini version of the game and introduce them to 2 or 3 STEM Trailblazers.
- Participants use one clue from the cards as a fun fact to start a STEM discussion at home or during lunch with peers.



MAKE IT YOURS: BUILD A CUSTOM STEM TRAILBLAZERS ACTIVITY



- After learning about real-life women in STEM through the STEM Trailblazers activities, why not take things a step further?
- Encourage participants to design their own version of a Trailblazers game—one that reflects what they've learned and gives them a chance to be creative, collaborative, and bold in their thinking.
- This can be a fun, reflective follow-up that deepens engagement and allows young people to tell the stories in their own voice.



What could this look like?

- Using the story cards as inspiration, participants can:
- Invent a new game format (card game, trivia, board game, matching game, etc.).
- Retell the stories through clues.
- Work in teams to develop rules and decorate their cards using recycled materials.



Add a personal touch: celebrate local changemakers

- Invite participants to look beyond the card set and think about women in their own communities who inspire them.



Encourage them to:

- Create a new card for someone they know.
- Share that person's story in their own words.
- Add a "Local Legends" deck to the Trailblazers game.



Designing their own game allows participants to:

- Reflect on the stories they explored.
- Practice storytelling, teamwork, and creativity.
- Celebrate women in STEM through their own lens.
- Build confidence in their ability to share knowledge in fun, engaging ways.



**COMMUNITY ACTION ACTIVITY-
GET THE COMMUNITY INVOLVED!**

50 points

Human Library Experience

Participants are invited to meet and listen to local women in STEM – each with their own inspiring journey to share. These women become “living books,” offering their stories, struggles, and successes in a space where girls can ask honest questions and learn through dialogue. This experience helps girls strengthen their identity and sense of belonging in STEM.

How to carry out this activity effectively**Steps**

1. Assign a small planning team (2–3 volunteers or mentors) to coordinate logistics.
2. Choose a venue suitable for small group conversations.
3. Identify and invite local women in STEM to be ‘living books’.
4. Brief girls on asking respectful questions and provide prompt sheets.
5. Organise rotations in small groups of 3–4, followed by reflections.
6. Appreciate guest speakers with notes, certificates, or small gifts.

**How to involve the community**

- Invite schools, parents, and local groups to attend.
- Partner with universities or STEM organisations to source speakers.
- Promote using flyers, WhatsApp groups, and church announcements.
- Involve local media or bloggers to cover the event.
- Document the event and share highlights online.



LEVEL 3: EXPLORE



Unleashing curiosity, connecting passions, and designing change

At this level, participants shift from simply learning about STEM to living it. With a growing sense of belonging, they are ready to explore – to connect STEM to their own interests and everyday life, and to imagine the impact they can make through it.

“Explore” is not just about gaining knowledge – it’s about awakening possibilities. From the world around them to the passions within them, participants begin to see that STEM is everywhere. But in most classrooms, STEM can feel distant, theoretical, or unrelated to their lives.

This experience changes that. Through immersive, hands-on rotations, participants get to experience STEM in action – and see themselves in it. STEM becomes real, relevant, and full of purpose.



Core experience: Day in the life rotations

At the centre of this level are the “Day in the Life” rotations – interactive stations where participants step into the shoes of real-world STEM professionals. These are not just simulations – they are experiences designed to build confidence, awaken interests, and connect learning to real impact.

Participants will:

- ✔ Experience “a day in the life” of inspiring STEM professionals:
 - * An Environmental Scientist analysing water samples and learning about conservation
 - * An App Developer prototyping creative, problem-solving tech tools
 - * A Robotics Engineer designing and testing robotic systems
 - * A Data Scientist interpreting trends to tell powerful, data-driven stories
- ✔ Engage in hands-on, creative tasks that mirror real career pathways – from testing water quality and designing simple apps, to building robot prototypes and making sense of real-world data.
- ✔ Discover the connection between their everyday passions – whether it’s nature, tech, games, or numbers – and meaningful STEM futures.
- ✔ Ask questions and reflect with leaders, who help participants unpack each activity, draw personal insights, and build confidence in their unique abilities.

This is the moment when STEM becomes more than a subject – it becomes a story they can step into.



Why exploration matters

When participants are invited to explore STEM through real-life applications:

- They begin to see that their ideas, identities, and interests belong in these fields.
- They understand that STEM is not just for scientists – it’s for problem-solvers, builders, creators, and leaders like them.
- They discover that curiosity is a strength – and that asking bold questions leads to bold solutions.

At this level, we spark confidence, courage, and imagination. Participants begin to envision themselves as STEM professionals—ready to shape the world through the power of STEM.



A Day in the Life

Level 3



Compulsory



Full Day Activity



11+ years

60 points
15 points for each station

PREPARATION

- Print activity signs for each station.
- Print worksheets, templates, and station instructions.
- Prepare supplies and layout for each activity.
- Assign a facilitator or guide for each station if available.
- Create 4 distinct station spaces (indoors or outdoors).



OUTCOME

Participants experience what it's like to work in 4 different STEM professions – Science, Technology, Engineering, and Mathematics – by rotating through interactive, hands-on activity stations. The goal is to help participants better understand real-world STEM careers and explore how they relate to daily life and global challenges.

WHAT HAPPENS ?



Participants rotate through 4 STEM-themed stations in small groups. Each station immerses them in a day in the life of a real-world STEM career by simulating hands-on experiments and creative challenges. Participants are split into smaller groups and explore the stations together. Facilitators should introduce each station, explain the challenge, and help the group reflect on what they learned.

Encourage groups to complete all 4 stations. If time is limited, stations can be spread over multiple sessions or camps.



Station 1: SCIENCE – Environmental Scientist supplies:

- Red cabbage leaves.
- Pot and stove or kettle to boil cabbage.
- Clear cups or jars.
- Vinegar.
- Baking Soda.
- Samples of water (tap, river, rain, pond, etc.).
- Spoons.
- Plastic bottles or clear containers.
- Printed Secchi disk pattern (black-and-white target in the appendix).



INTRODUCTION:

1. Read this to the participants:

Environmental scientists study the environment to understand how to protect our air, water, and land. In **Station 1**, you will step into the role of an **Environmental Scientist by testing water quality using pH and turbidity tests**.

- The pH test helps us check whether the water is acidic, neutral, or alkaline. This matters because water that's too acidic or too basic can be unsafe to drink or harmful to the environment.
- The turbidity test measures how clear or cloudy the water is. Cloudy water might carry dirt, germs, or pollution, and may not be safe for everyday use.

By doing these tests, we will see how science helps protect communities and solve real problems—like ensuring people have access to clean, safe water. This is especially important in camps, schools, and areas where people rely on shared water sources.

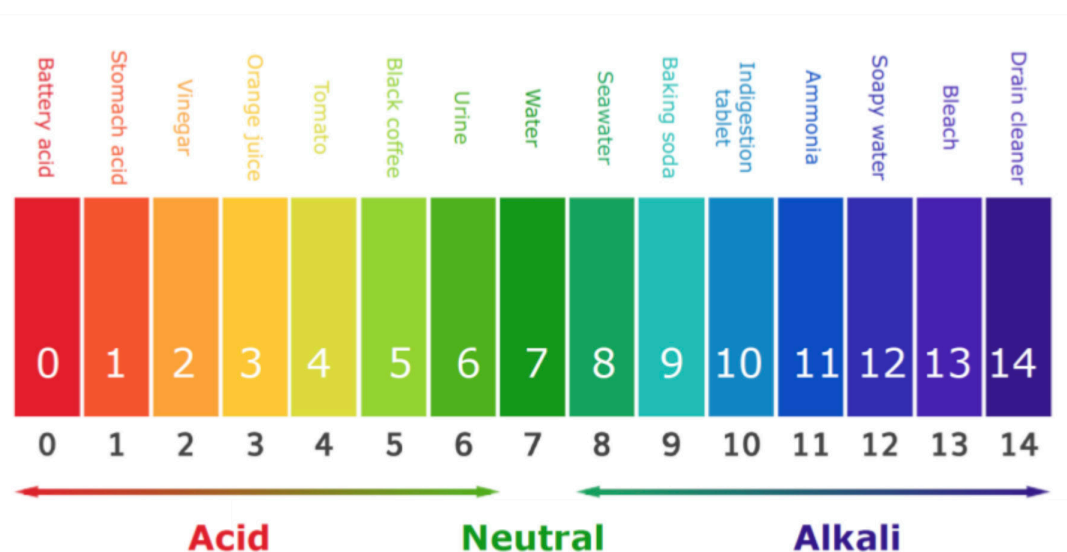
Instructions:

A pH test tells us how acidic or basic (alkaline) something is. Red cabbage juice works as a natural indicator.

- Red or pink = very acidic (like vinegar or lemon juice).
- Purple = neutral (like clean water).
- Green/yellow = basic (like soap or baking soda).

pH Test using cabbage water:

1. Before the session, boil cabbage leaves in water until it turns deep purple. Let it cool.
2. Pour equal amounts of cabbage water into clear cups.
3. Add a few drops of vinegar to one cup, baking soda water to another, and tap water to others.
4. Observe the colour changes and compare the results with the pH colour scale:





Red cabbage is one of the best natural pH indicators because it contains a pigment which changes colour clearly across the pH scale. You can also try alternatives like turmeric, hibiscus tea, or blueberry juice, but red cabbage usually gives the most vivid and reliable results.

What is a Turbidity Test?

A turbidity test checks how clear or cloudy water is. Cloudy water may be unsafe or polluted.

Turbidity Test (Water Clarity):

1. Tape a printed Secchi disk pattern to the bottom of a clear container.
2. Pour each water sample in slowly.
3. Look down into the container. The less clearly you see the pattern, the more polluted the water may be.



TAKE IT FURTHER

- Research ideal pH levels for drinking water.
- Try filtering water through charcoal or sand and retesting.
- Connect this to clean water access in your area.



SAFETY GUIDELINES

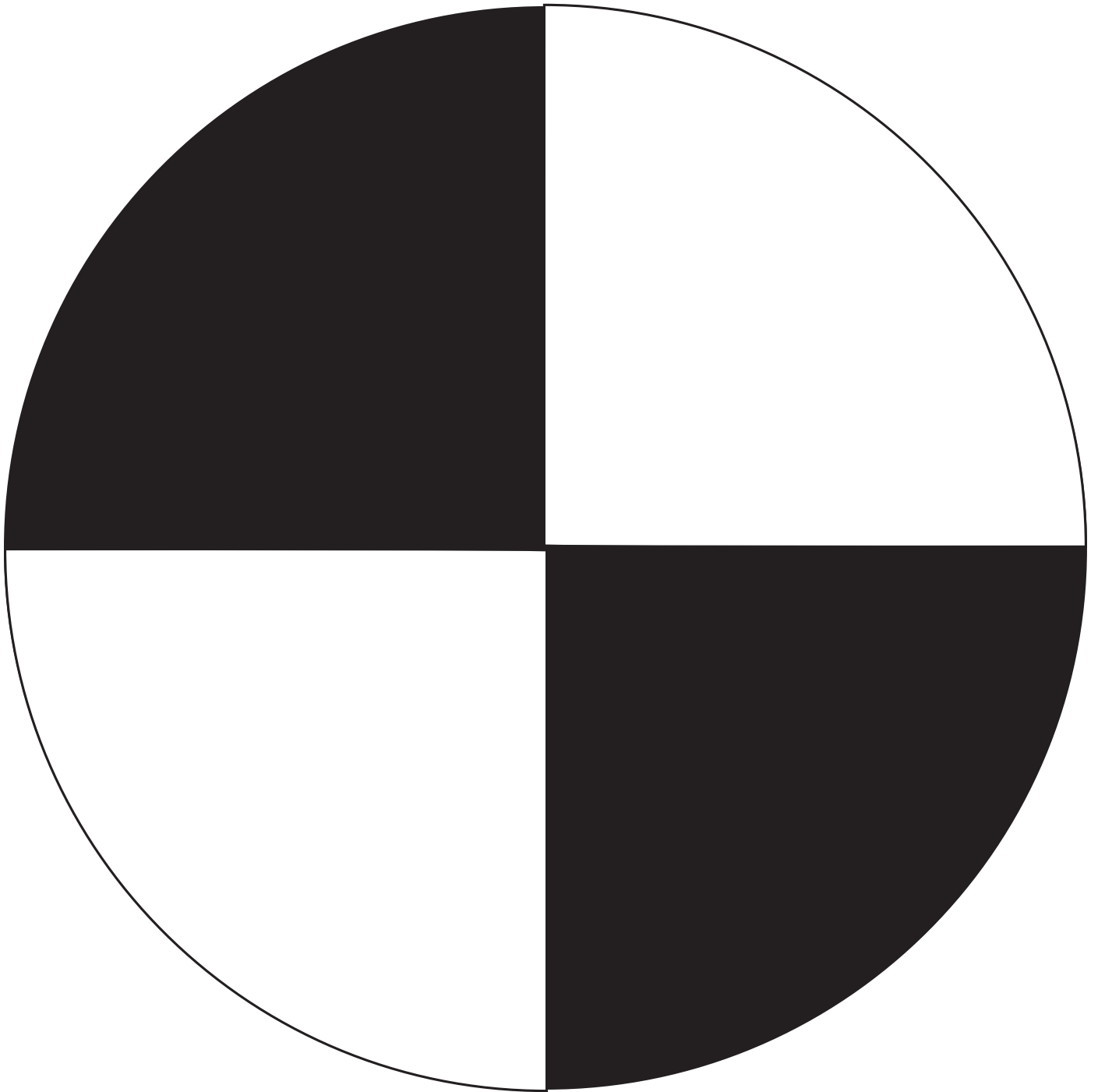
1. Go over safety rules clearly at the beginning of the session.
2. Instruct them to observe only- do not allow participants to smell or taste any liquids.
3. Label all containers clearly especially when using substances like vinegar or baking soda solutions.
4. Keep all materials out of reach of younger children.
5. Supervise all mixing and pouring. Ensure participants handle liquids carefully to avoid spills or splashes.
6. Wash hands after the activity.

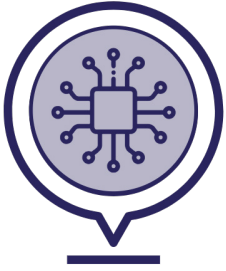




A Day in The Life

Station 1: Secchi disk pattern





Station 2: TECHNOLOGY – App Developer

Supplies:

- Pens, pencils, rulers.
- Colouring pencils or markers.
- Printed smartphone screen templates (3 per group in the appendix).

Introduction:

Read this to participants:

App developers create mobile apps, like the ones you use on your phone every day. But before they start building, they draw out their ideas on paper to see how people would use the app. This process is called **User Experience (UX) Design**.

Drawing the app first helps them figure out what works and what doesn't without wasting time or money. It's faster and cheaper to change a sketch than to fix a finished app. This station lets you explore how app ideas are planned and tested before they're actually built.

Instructions:

1. Give each group of participants 3 phone screen templates.
2. Ask them to design a helpful school app, eg for homework, clubs, or mental health.
3. Label each screen:
 - Page 1: Home screen-The first page you see when you open an app. It has the main buttons and options.
 - Page 2: Menu/info page - A screen that helps users find what they need, like help, schedules, or settings.
 - Page 3: Profile/tools page-Your personal area in the app. It shows your info or gives you tools, like changing your password.
4. Participants should think about how they want the app to look like:
 - What buttons and labels would they like to be included?
 - What colour scheme will you use and think about your choice of imagery.
 - Where will the app name be? What kind of logo would it have?



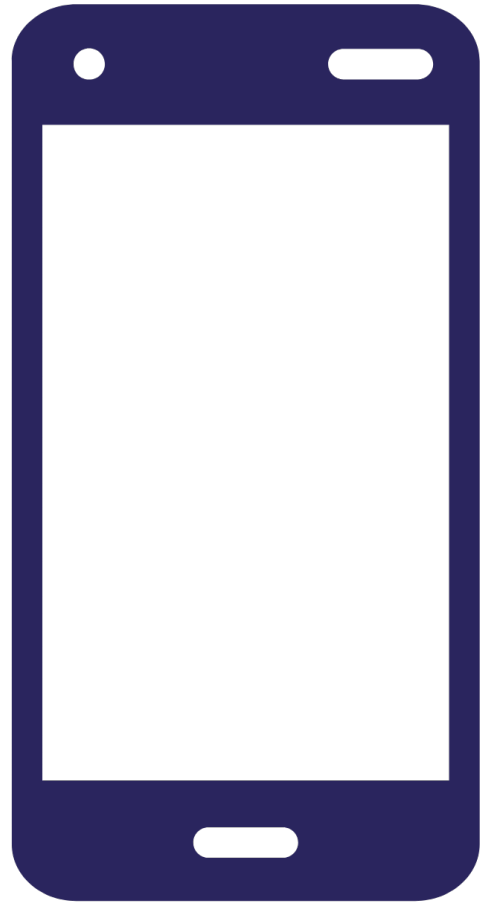
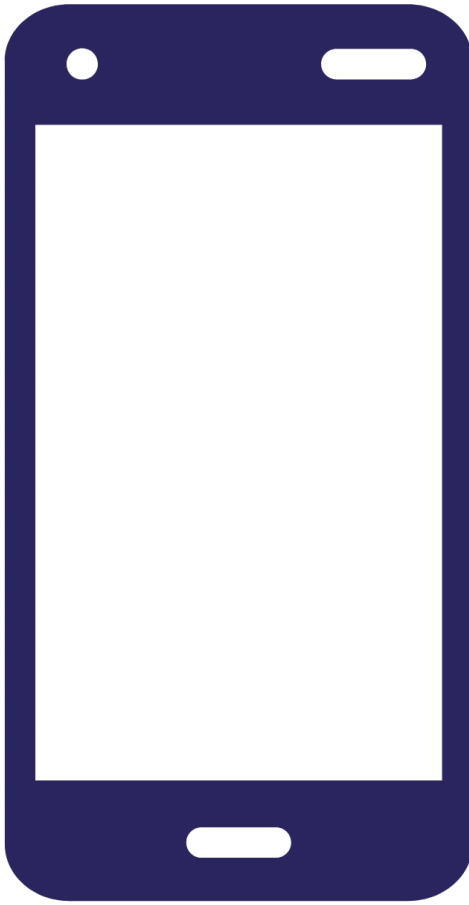
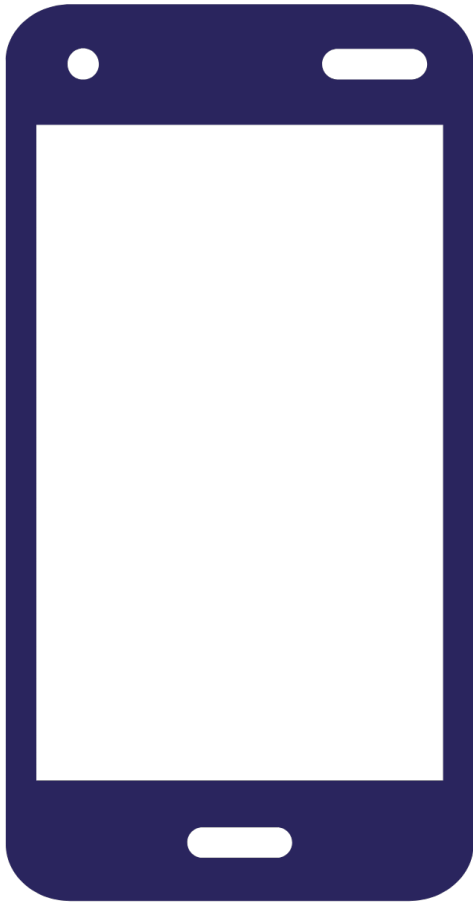
TAKE IT FURTHER

- Turn your sketches into digital designs using Canva.
- Learn more about app security.
- Compare with an app you use every day.





Station 2 : Smartphone Screen Templates



NOTES:

NOTES:

NOTES:





Station 3: ENGINEERING – Robotics Engineer

Materials needed (per group):

- Cardboard or thick cardstock.
- Pencil.
- Scissors.
- Tape (masking or clear).
- Drinking straws (3–4 per group).
- String or yarn (about 2 meters total).
- Ruler (optional).
- Lightweight item to grip (eg paper cup, sponge, ping-pong ball).

Introduction:

Read this to participants:

Robotic engineers build machines that help people—from robots that assist in surgeries to ones that explore space or help with everyday tasks. One of the most important parts of robotics is understanding how movement works, especially how our own bodies move.

In this activity, you'll explore how joints and motion work by building a simple **robotic hand**. By mimicking how fingers bend and flex, you'll learn how engineers design robots to move like humans. This hands-on project gives you a glimpse into the world of robotics and how science meets creativity to solve real-world problems.

Instructions for participants:

1. Form groups

- Ask participants to get into groups of 2 or 3.

2. Trace the hand

- One group member places their hand flat on a piece of cardboard.
- Another group member traces around it using a pencil.
- Cut out the hand shape, slightly larger than the tracing, to leave room for materials.

3. Mark and fold the finger joints

- Ask participants to observe where their fingers naturally bend—these are the joints.
- On the cardboard hand, draw 2–3 lines across each finger where those joints would be.
- Carefully fold the cardboard along each line. These folds simulate how real fingers bend.

4. Cut and tape straw pieces

- Cut drinking straws into small pieces (about 2–3 cm long).
- Tape **one straw piece between each joint line** on every finger.
- Be sure to **leave small gaps** between straw pieces so the fingers can still bend freely.
- Tape one **longer straw across the wrist area**—this will guide all the strings out of the hand.
- Check that all straw pieces are flat and securely taped to the cardboard.



5. Cut and thread the strings

- Cut **5 long pieces of string or yarn**, one for each finger (about 40–50 cm each).
- Tape **one end of the string to the tip of each finger**.
- Then, thread the other end of the string through the straw pieces on that finger, down toward the wrist.
- After each string goes through its finger, **thread it through the wrist straw** to guide it out the back of the hand.

By now, pulling the string should bend the finger.

6. Test and adjust for grip

- Have participants gently pull multiple strings at once and watch the fingers curl inward.
- Ask them to place a lightweight object—like a sponge or paper cup—under the fingers.
- As they pull the strings, the robotic hand should grip the object.

Wrap-Up & Reflection:

- Ask: “What helped the hand grip better?”
- Discuss how robotic hands in real life use motors instead of strings but the principles of joints and tension are the same.
- Encourage groups to test different objects or adjust finger spacing and string tension.

Video reference: <https://youtu.be/c9FuPdI3xCE?si=BtzqB3X4DkqQYglh>





Station 4: MATHEMATICS – Data Scientist

Materials needed (per group):

- Plain or graph paper.
- Coloured pens or markers.

Introduction

Data scientists work with information to help solve problems in fields like health, sports, engineering, and even social media. They collect and analyse data to discover patterns and make smart decisions. Today, you're going to be a data scientist! You'll collect information from each other, organise it, and look for trends. Let's get started.

Instructions for participants:

1. Each participant will gather the following three pieces of data from everyone in their group.
 - **Age** - How old are they?
 - **Favourite Subject** - Pick one from this list: Science, Maths, Tech, Art, Engineering.
 - **Favourite Colour** - Any colour they like the most.
2. Instruct participants to create a simple **data table** on their paper. Their table should look something like this:

Name	Age	Favourite Subject	Favourite Colour
Jane	13	Tech	Purple

Ensure all group members' data is included.

3. Once the data is recorded, participants will **choose two data points to compare**. Some ideas:
 - **Age vs. Favourite Subject**- Do older people like the same subjects?
 - **Favourite Subject vs. Favourite Colour**-Do people who like the same subject choose the same colour?
 - **Age vs. Favourite Colour**- Do people of the same age like the same colour?

Prompt: "Choose the two things you're most curious about. What patterns or surprises can you find?"





4. Encourage groups to talk about what they observed:

- “Did everyone who liked the same subject choose a similar colour?”
- “Did everyone of the same age have the same favourite colour?”
- “Was there any pattern in favourite subjects?”
- “What did you learn about your group by collecting this data?”

5. Wrap-Up & real-life connections

- Explain that **data scientists** use numbers just like this to solve real-world problems, from studying weather patterns to improving sports performance and public health.

6. Take it further (optional extension):

- **Careers in Data Science** – Talk briefly about where data science is used: healthcare, sports, climate science, social media, banking, etc.
- **Explore real datasets online:** Encourage students to explore data platforms like [Our World in Data](#) or [NASA Kids' Club](#)

Reflection questions for the whole activity:

- Which STEM career did you enjoy the most?
- What was the most surprising thing you learned?
- How do these skills help solve real problems?
- What STEM career would you like to try in the future?





TAKE IT FURTHER

- Invite real life professionals to give a glimpse of a day in their life.



TIPS

- Do not ask about body features like height or weight. Some people may feel shy or sad about this.
- It's better to ask about fun things like favourite colours, foods, or subjects.
- Use simple, fun topics to help everyone feel included.
- You can also change the questions to match what your group likes.



TAKE ACTION

- After visiting all the stations, participants write down the career they enjoyed most and why. Then, share it with a friend or family member in one sentence:
- "I tried being a [career] today, and I liked it because...."
- Participants choose one skill or fact learned at any station and explain it to a family member or friend.



LEVEL 4: STEM INNOVATION CHALLENGE

LET'S BEGIN

1. What are the SDGs?

In 2015, world leaders agreed on a plan to build a better future for everyone by 2030. This plan is called the **United Nations Sustainable Development Goals (SDGs)** – a set of **17 global goals** that tackle the biggest challenges facing the planet today.

These challenges include:

- Ending poverty and hunger.
- Making sure everyone has access to clean water, good education, and health care.
- Taking action on climate change.
- Promoting gender equality.
- Building peaceful, fair, and inclusive societies.

SUSTAINABLE DEVELOPMENT GOALS



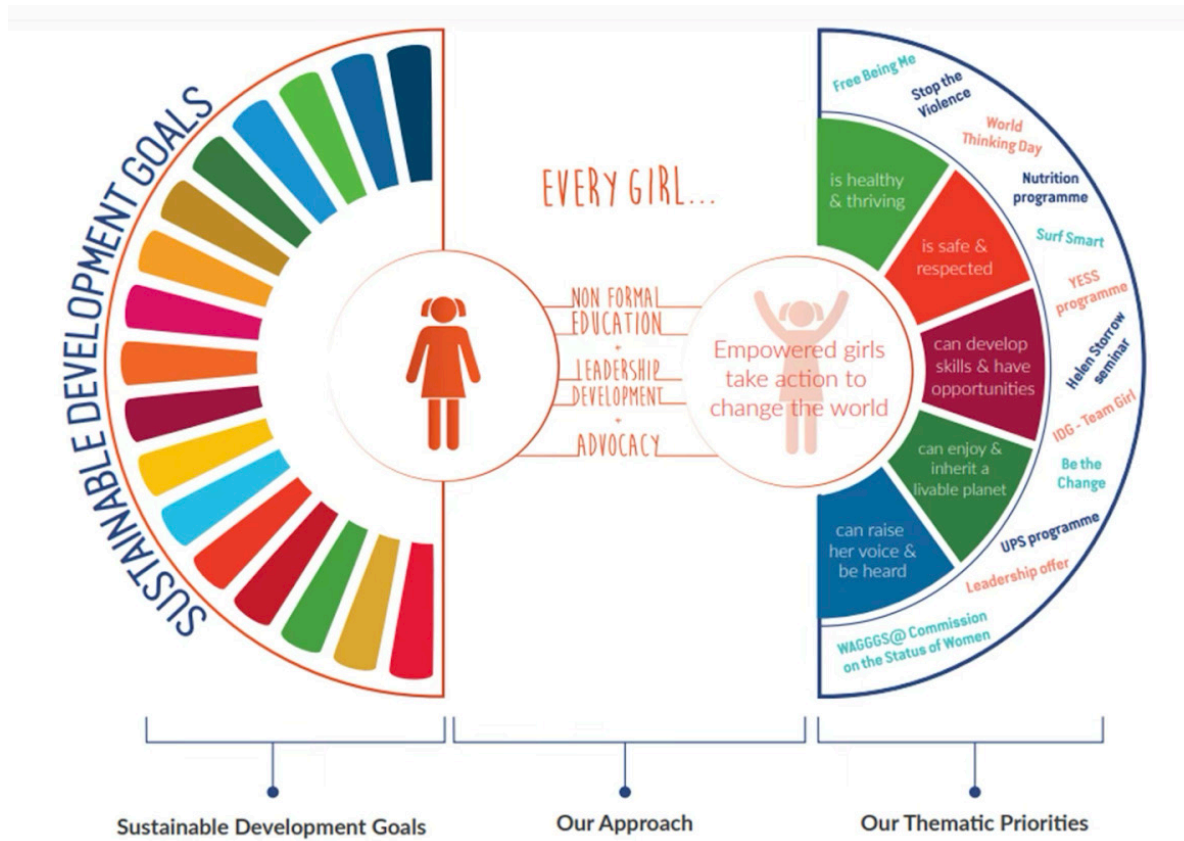
The SDGs belong to everyone – and **young people, especially Girl Guides and Girl Scouts, have a key role to play** in helping the world achieve them. Whether it's through local action or global innovation, **you can be part of the change.**

2. WAGGGS and the SDGs

The World Association of Girl Guides and Girl Scouts (WAGGGS) has aligned its mission with the SDGs – working closely with young people across the world to understand how Girl Guiding and Girl Scouting can lead the way.

WAGGGS focuses on **five core** areas that connect directly with the SDGs:

- Every girl is healthy and thriving.
- Every girl is safe and respected.
- Every girl can develop skills and have opportunities.
- Every girl can enjoy and inherit a liveable planet.
- Every girl can raise her voice and be heard.



Through these five areas, WAGGGS empowers girls to take action on issues that matter to them, in their communities and beyond.

3. STEM and the SDGs: Why they go hand-in-hand

Science, Technology, Engineering, and Mathematics (STEM) is not just about classrooms, labs, and experiments – STEM is the key to solving real-world problems.

Imagine:

- Using solar panels to power a classroom.
- Designing an app to help young people access mental health resources.
- Creating ways to test clean water in your community.
- Using data and design to reduce waste or fight climate change.

From clean energy to digital education, from climate science to accessible health solutions, STEM drives the innovation needed to achieve every single SDG. Encouraging girls to get involved in STEM today means investing in a future that is fairer, smarter, and more sustainable for everyone.



Design Thinking + STEM: solving big problems creatively

In this challenge, participants will use a method called Design Thinking — a creative, human-centered process used by inventors, engineers, and changemakers all around the world.

Design Thinking helps you:

1. **Understand** a real problem.
2. **Explore** the needs of the people affected.
3. **Imagine** possible solutions.
4. **Prototype** your ideas (turning thoughts into models).
5. **Test and improve** what you create.

This challenge combines Design Thinking and STEM to help girls think boldly, problem-solve as teams, and turn their ideas into action that supports the SDGs.

Why it matters: Be a STEM Changemaker

We are living in the Fourth Industrial Revolution — a time when technology is changing how we live, learn, and work. But while technology grows, so do the challenges: from climate change and water scarcity to poverty, hunger, and inequality.

That's why this challenge matters.

The Innovation Challenge gives participants a chance to:

- Step into the shoes of an inventor, scientist, engineer, or designer
- Learn how STEM connects with solving global problems
- Explore their passions and creative ideas
- Design a solution that helps your **community and the world**

You don't need to have all the answers. What you need is curiosity, courage, and creativity. This is a moment to imagine, design, and build a better future — **one idea at a time.**

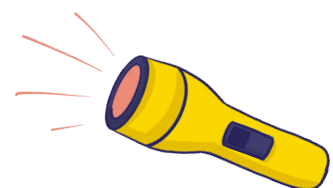




Let the challenge begin

In this hands-on, one-day challenge, participants step into the role of **young innovators and changemakers**, using their **STEM super skills and creative thinking** to tackle real-world issues that affect their communities.

Working in small teams, participants **select one Sustainable Development Goal (SDG)** from a list of **six pre-selected Sustainable Development Goals**





Each team receives a **10-Step Action Task Card** that will guide them through the innovation process. These ten steps are rooted in the globally recognised **Design Thinking model**, a structured way to solve problems by understanding people’s needs and developing thoughtful, user-centered solutions. They will move through the **five stages of design thinking**:

- **Empathise** – Learn about the chosen problem by exploring how it affects people in the community.
- **Define** – Clearly describe the core issue the team wants to solve.
- **Ideate** – Brainstorm and sketch out as many creative ideas as possible—no idea is too big or too small!
- **Prototype** – Pick their best idea and create a detailed design or plan for it on paper.
- **Test & reflect** – Share their ideas with others, receive feedback, and think about how to make it even better.

All solutions will be designed and drawn **on paper**. No physical models or materials are needed unless leaders have time to explore. This keeps the focus on **critical thinking, collaboration, and creative problem-solving** using the participants' existing knowledge, experiences, and imagination. By the end of the activity, each group will present their innovation—a design that could help **solve a real problem** in a sustainable way using STEM. They’ll also reflect on what they learned, how they worked as a team, and how they might take their idea further in real life.

This challenge empowers participants to:

- ✓ Connect STEM with community impact.
- ✓ Practice teamwork and leadership.
- ✓ Strengthen their understanding of the SDGs.
- ✓ See themselves as future engineers, scientists, tech leaders, and problem-solvers.





Level 4

ACTIVITY 1



STEM Innovation Challenge



Compulsory



Full Day Activity



11+ years



60 points



PREPARATION

- Print **SDG Action Task Cards and Pitch Templates** (one per group, customised for each SDG).
- Provide materials: A3/A2 sheets, markers, pencils, rulers, erasers, sticky notes.
- Organise space for team collaboration and presentations.



OUTCOME

- Apply the **design thinking process** to real-world issues.
- Use STEM knowledge to design a **community-based solution**.
- Gain experience in **teamwork, creativity, empathy, and communication**.
- Show how innovation can be **local, realistic, and impactful**.
- Develop a detailed **paper blueprint** of a solution that addresses an SDG.

WHAT HAPPENS ?



1. Forming innovation teams

- Divide participants into small groups of 3 to 5 members. Make sure every team has a mix of voices and talents (eg a strong drawer, a confident speaker, a good listener, etc.).
- Explain that each team will become “STEM innovators” solving a problem in their school, neighbourhood, or community.

2. Choosing an SDG

Help teams choose one SDG (Sustainable Development Goal) that they feel most connected to or passionate about. Let them discuss what issues they care about and encourage personal connections to the topic.

You can allow teams to draw SDGs from a hat, choose freely, or match topics based on local relevance.





Available SDGs:

SDG	Focus Area
SDG 3 – Good health & well-being.	Promoting healthy lives and wellness for everyone.
SDG 4 – Quality education.	Making education fun, fair, and available for all.
SDG 5 – Gender equality.	Ensuring equal chances for girls and boys.
SDG 6 – Clean water & sanitation.	Solving problems related to water access, hygiene, and cleanliness.
SDG 7 – Clean & affordable energy.	Using clean energy like solar or wind for daily needs.
SDG 13 – Climate action.	Protecting the planet from pollution and climate change.

3. Working through the Action Task Card

- Each SDG comes with a 10-step Action Task Card designed to guide participants through a simplified version of the Design Thinking Process (Empathise, Define, Ideate, Prototype, Test & Reflect).
- Go over each step with the group first so they understand how the activity will flow.
- Encourage discussion and teamwork at every step. Everyone should contribute!

Participants must **tick** each action box before moving to the next step on their card. This helps ensure the team doesn't skip important thinking or planning stages.

4. Designing the Innovation

Each team will now sketch out their solution on paper.

What their design should include:

- A large, clear drawing or visual (A3 or A2 paper works best).
- Labels and arrows showing how it works, who it helps, and what it uses (bonus if it uses recycled or local materials).
- Creative ideas that are realistic and community-focused – no need to build anything physically yet!

Provide pencils, colored markers, rulers, scissors, and other simple materials to make the paper models look vibrant and clear.



5. Writing a brief summary

After the drawing is done, guide teams to write a short summary or create a mini poster. Their summary/poster should include:

- The SDG they chose.
- The community problem they are solving.
- Why it matters to them personally.
- How they used STEM to solve the problem.
- A short explanation of how their solution works.

6. Group presentations - pitch time!

End the session with a presentation round where each team shares their solution in 2–3 minutes.

They should:

- Introduce their SDG and problem.
- Show their design and explain how it works.
- Talk about why they believe it will help people in their community.
- Be creative! Presentations can be verbal, poetic, dramatic, or even a mini skit.

Create a safe and fun space for participants. Encourage applause after every presentation. You can invite other groups or community members to watch if available.

Final submission checklist

Each team must submit:

- A paper-based design with labels and visuals.
- A short-written summary or mini poster.
- A team presentation (formal or informal).

You may also collect their completed 10-Step Task Cards to reflect their journey. Once all groups have presented, bring everyone into a circle and reflect:

- What did you enjoy the most?
- What was difficult or surprising?
- How could your idea really help others?
- Would you like to try this in real life?



TAKE IT FURTHER

Encourage teams to build simple prototypes using recycled materials, paper, or basic craft supplies. It doesn't need to be perfect — just a hands-on version of their idea.





TIPS

For younger participants :

- Use illustrated SDG cards or posters for easier understanding.
- Keep the design brief simple: Who does it help? What does it do? How does it work?



TAKE ACTION

- Each team member chooses one small thing they can do this week connected to their SDG – eg use less water or switch off lights at home.
- Participants share their solution idea with a friend or family member.

COMMUNITY ACTION ACTIVITY- GET THE COMMUNITY INVOLVED!



50 points

STEM Innovation Fair

Participants build on their STEM challenge ideas or create new ones, identifying real-world problems that matter to them. They design prototypes, models, or creative demonstrations tied to the UN Sustainable Development Goals. This fair is a celebration of their innovation and leadership.



How to involve the community

Community engagement ideas

- Invite families to support and attend.
- Bring in school leaders or local experts as judges.
- Partner with businesses or NGOs for sponsorships or resources.
- Promote through local bulletins and newsletters.
- Invite media to cover the event and share the outcomes.



How to carry out this activity

Steps

- Launch the challenge 4–6 weeks before the fair and invite team registrations.
- Guide teams to select a problem and provide them planning tools.
- Assign mentors for regular check-ins and mid-way showcases.
- On event day, facilitate presentations
- Celebrate all participants and conduct post-event reflection.



STEM INNOVATION CHALLENGE

STEM Action Cards

SDG 13: Climate Action – Take Care of the Earth



Goal: Help fight climate change by solving a local environmental problem.

What's the problem? Some ideas to get you thinking: Rising temperatures, plastic pollution, deforestation, flooding or droughts, poor air quality.

1

Look around: Carefully observe your school, home, or community. What signs of climate issues do you notice? Are there littered areas, frequent flooding, or really hot days?

2

Talk to people: Interview local residents, friends, or family members. Ask them how environmental changes like pollution or weather patterns affect their daily life.

3

Write it down: As a team, pick the most important issue you discovered. Write a sentence explaining the problem you want to help fix.

4

List ideas: Use your creativity! Brainstorm possible solutions using science, tech, or engineering. Think about your community's needs and what resources you have nearby.

13 CLIMATE ACTION



5

Pick one idea: Choose your best solution. Ask yourself: Is this idea realistic? Can it be built or used here?

6

Draw it out: Create a clear drawing of your idea. Where will it be used? Who will use it? What will it look like?

7

Paper model: Make a labeled paper model or diagram showing how your idea works. Use symbols or arrows to explain key features.

8

Try it out: Share your idea with someone—another group, a facilitator, or a family member. Ask what they think. Is it useful? Easy to understand?

9

Fix it up: Use the feedback to improve your drawing or explanation. Add more detail or fix confusing parts.

10

Show and tell: Present your design to your group. Explain the problem and how your solution helps fight climate change.



SDG 3: Good Health & Well-being – Let's Make Health Cool



Goal: Help people live healthier and happier lives.

What's the problem? Some ideas to get you thinking: Poor nutrition or hygiene, mental health stigma, lack of access to healthcare, bullying or school stress.

1

Notice health issues: Look around at school, home, or in your community. What health issues do people deal with every day?

2

Ask around: Interview a nurse, a teacher, or a parent. What health concerns are common or growing?

3

Choose a focus: As a group, agree on one health issue to work on—something that feels important and real to you.

4

Think of solutions: Brainstorm ideas using STEM—could a new tool, a creative system, or a smart plan help?

3 GOOD HEALTH AND WELL-BEING



5

Pick one: Decide on the idea that will help the most people and is something you could realistically create or promote.

6

Plan it: Sketch the design on paper. Show what it looks like, how it works, and who will use it.

7

Mini model: Make a paper-based mock-up. Use arrows, notes, or colours to show the parts of your solution.

8

Test it: Ask a peer or adult to look at your model. What do they understand? What do they question?

9

Fix it up: Make your design better! Add parts or simplify it based on what you learned from feedback.

10

Tell your story: Present your improved idea. Share what problem it solves and how it helps people stay healthy.



SDG 4: Quality Education – Make Learning Fun for Everyone



Goal: Help more students learn in safe, inclusive, and exciting ways.

What's the problem? Some ideas to get you thinking: Lack of books or tech, boring subjects, learning difficulties, gender gaps in participation.

1

Look around: What challenges do you or others face when learning? Are there distractions, missing materials, or hard subjects?

2

Ask teachers or friends: What do people wish was different in their learning environment? What helps them learn better?

3

Pick one issue: Choose one learning-related issue that your group feels ready to improve.

4

Think creatively: Brainstorm solutions—a new tool, an app, a learning game? Use your imagination and local knowledge.

4 QUALITY EDUCATION



5

Pick one idea: Choose the most exciting and useful solution. Make sure it could be used at school or in a club.

6

Draw it: Sketch out your idea clearly. Label important parts and how it works.

7

Paper model: Turn your sketch into a paper-based model. Use symbols, arrows, and colour to explain how it improves learning.

8

Get feedback: Share your idea and ask others: "Would this make learning easier or more fun?"

9

Make it better: Use their ideas to fix or improve your plan. Keep what works, change what doesn't.

10

Present it: Share your final model and describe how it helps students and teachers learn better together.



SDG 5: Gender Equality – Everyone Deserves a Fair Chance

- Goal:** Help girls and boys have equal opportunities in your community.
What's the problem? Some ideas to get you thinking: Unequal access to leadership, gender roles at home or school, lack of girls in STEM, limited safe spaces.

1

Notice the gaps: Look around you. Where do you see people treated unfairly because of their gender?

2

Talk to others: Ask your classmates or family: Have they seen unfairness? What would they like to change?

3

Pick one issue: Choose a real issue you want to solve—something that limits equality.

4

Brainstorm ideas: Clubs, apps, posters, buddy systems—what could help people feel more respected and included?

5 GENDER
EQUALITY



5

Pick one idea: Choose the idea with the biggest impact that could really work in your setting.

6

Draw it: Create a neat sketch showing your idea in action. Label parts and people involved.

7

Paper model: Use your drawing to show how it works. Use labels and colour to make it clear.

8

Ask for opinions: Show your idea to someone and ask: “Would this make things fairer?”



9

Improve it: Add new parts or simplify based on what you hear. Make it stronger and more useful.

10

Share it: Present your model and explain how it helps girls and boys have equal chances in your school or community

SDG 6: Clean Water and Sanitation – Water for All

- Goal:** Help improve access to clean water and safe hygiene in your community.
What's the problem? Some ideas to get you thinking: Dirty or unsafe drinking water, lack of toilets, poor hygiene awareness, leaking pipes.

1

Look around: Where do you see water problems—leaks, waste, or dirty water?

2

Ask around: Speak to community members or health workers. What water-related challenges do they notice?

3

Choose a focus: Choose one issue related to clean water or sanitation that affects your community.

4

Brainstorm ideas: What could solve the issue? A new tool, a better system, or a campaign to spread awareness?

6 CLEAN WATER AND SANITATION



5

Pick one idea: Choose the solution that would make the biggest difference and is possible to carry out.

6

Draw it: Make a drawing of your idea, showing what it does and how it would work.

7

Paper model: Use your sketch to build a simple paper model or labelled diagram.

8

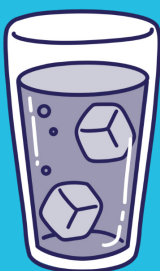
Get feedback: Show your model to a friend or adult. What do they like? What's missing?

9

Improve it: Adjust your design based on their ideas. Make it easier to understand and use.

10

Share it: Present your final model and explain how it helps people get clean water or better hygiene.





SDG 7: Affordable and Clean Energy – Power Up the Future

Goal: Help your community use energy that is safe, clean, and affordable.
What's the problem? Some ideas to get you thinking: No electricity in some homes, high energy costs, too much use of polluting fuels, wasting energy.

1
Look around: Do people in your area have problems with electricity or fuel? Is energy being wasted?

2
Talk to people: Ask friends, shopkeepers, or local leaders: What energy issues do they face?

3
Pick one problem: Choose one energy challenge your group wants to solve.

4
List ideas: What STEM-based solutions could help? Could you create a tool, system, or awareness idea?



5
Choose one idea: Select the one that's most doable and most helpful.

6
Draw it out: Make a neat sketch of how your solution would work.

7
Paper model: Use labels, arrows, or diagrams to explain your idea more clearly.

8
Ask for feedback: Share your design. Ask, "Would this help save or create cleaner energy?"



9
Improve it: Use feedback to update your idea. Make it easier, smarter, or more helpful.

10
Show and tell: Present your solution and explain how it helps create a better energy future.



Pitch Template

STEM Innovation Challenge Pitch Template

Use this to prepare your team's 2–3 minute pitch! The examples are just a guide. Please create your own and explain further where needed.



1. Our Chosen SDG

Which Sustainable Development Goal (SDG) did your group choose? Write the full name and number of the SDG.

Example: SDG 4 – Quality Education



2. The Problem in Our Community

What real problem are you trying to solve? Where or how does this happen in your school, community, or neighborhood?

Example: Some students don't have access to learning materials or a quiet space to study.



3. Why It Matters to Us

Why did your group choose this problem? Why is it important to you? Share any personal experiences or stories that connect you to the issue.

Example: One of our teammates struggled to study at home due to noise, so we wanted to help others in the same situation.



4. Our Solution

What idea did you come up with to solve this problem using STEM? How does it work? Use simple language to describe your solution. You can also draw arrows or features on your paper design to help explain.

Example: We designed a foldable learning station that can be made from recycled cardboard and fits into small spaces. It blocks noise and includes a solar lamp.



5. How It Helps

How does your idea help solve the problem and support your chosen SDG? Explain the impact it could make – who benefits and what might change?

Example: This helps students focus on learning at home and makes education more equal.



Present a Sketch of Your Design



“The STEM Changemakers programme aims to equip Girl Guides and Girl Scouts with critical skills, creativity, and confidence—empowering them to break gender stereotypes and step into leadership in STEM fields. When girls are empowered in STEM, they become drivers of change, shaping a more equal world where every girl can thrive.

I am inspired by the passion and dedication our members continue to show as they lead this important work.”

– **Candela Gonzalez, Chair, World Board, WAGGGS**



www.waggs.org

www.campfire.waggs.org



World Association of Girl Guides & Girl Scouts

World Bureau, Olave Centre 12c Lyndhurst Road, London, NW3 5PQ, United Kingdom

