
STEMAZING
AMEY-STEMAZING
PRIMARY STEM
OUTREACH
TRAINING
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WHY IS THIS NEEDED?

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£1.5 bn

Annual cost of STEM skills shortage to UK economy

Only 12%

Girls say being an engineer fits with who they are

By age 10

Children create career-limiting self beliefs which are fixed by age 14

X 3.4

More likely to consider a career in engineering after STEM session

Engineering UK
The Royal Society
EY & North East Ambition

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THE AIM

Equip, empower and enable people in Amey to inspire the next generation effectively and with ease!

Sarah Date

Social Value Lead,
CF Public Estates

Alex Knight

STEMAZING
Founder & CEO

Juma Malik

STEMAZING
Midlands Lead

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THE PLAN

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- Develop a new, fun, interactive 1-hour STEM workshop for Primary children linked to KS2 curriculum and Amey.
- Title: Exploring Engineering - Fun with Forces
- Learning objective: Connect learning to life – The topic of Forces & Balancing linked to Building Bridges in real life.
- Connect and engage Primary School children with hands-on STEM experiences led by Amey role models.
- Raise awareness and aspirations of STEM with children aged 7 – 9 years old.
- Support Amey staff to develop public engagement skills to enhance Amey outreach offer.

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THE BENEFITS FOR YOU

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- Grow confidence
- Grow skills – presentation / communication
- Build local community relationships
- Give back
- Make a difference
- Tackle STEM skills shortage
- Raise positive profile of our industries
- Fall in love with STEM again
- Sense of personal achievement / reward
- Chartership / Fellowship
- Benefit your company – MPDS, staff satisfaction and development, PR, recruitment, CSR

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1. Register online

Visit stem.org.uk/register and select 'STEM Ambassador'.

2. Online induction

Find out what to expect when you volunteer as a STEM Ambassador. A link will be sent from our central team.

3. Apply for a free DBS or PVG

Essential for working with young people, this will require an ID check by someone from an approved profession.

4. Connect with your STEM Ambassador support team

Once approved, your STEM Ambassador support team will be in touch, they are your main point of contact for any questions.

5. Begin volunteering!

We're so excited to have you on board! It's time to make a real difference.

You could start by:

- Signing up for an activity with a teacher or youth leader (check your dashboard for these opportunities!)
- Improving your skills with our free courses
- Offering an activity to teachers and youth leaders near you


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HOW CAN WE MAXIMISE OUR IMPACT AS STEM OUTREACH VOLUNTEERS?
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OUTREACH TOP TIPS

SIMPLE, SENSATIONAL, STEM – FOR ALL.

SIMPLE

- Simple intro to you, your work and your STEM message.
- Simple STEM activities.
- Make it easy to run so you can focus on audience.

SENSATIONAL

- Hook them early.
- Inform, influence & INSPIRE.
- Create interactive opportunities.
- They will remember how you made them feel.

STEM FOR ALL

- STEMAZING 3Cs
- Link STEM to real life.
- Showcase diverse role models.
- Include everyone in your audience (kids & teacher).


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LET'S DO THIS!

Run through of new STEM session designed for Amey role models

STEM Session for lower KS2 - Year 3 – 4 / P 4 - 5 (age 7 – 9 years old)

Resources needed for Exploring Engineering – Fun with Forces!

- For ice-breaker – per group of 4 children
  - A4 paper
  - 20 paperclips (small ish ~ 28mm is ideal)
- Main activity – per child
  - A4 printed template
  - pea-sized blob bluetack
  - 2 paperclips
- Schools provide
  - Ruler
  - books
  - glue stick
  - colouring pencils
  - scissors

LET'S DO THIS!

Exploring Engineering – Fun with Forces!

Guide Agenda (Total 60 mins)

- 5 mins – Intro - Brief Intro of role model & Amey
- 10 mins - Ice Breaker – Paper bridge activity – Groups of 4.
  Learning objective - What are the forces acting on a bridge? How can we engineer a bridge to be stable and strong? (Highlight balancing forces and shapes in design)
- 10 mins – Learning about Forces
- 20 mins - Main Activity – Can you balance the Beaver's Bridge! Individual.
  Learning objective – How to balance forces and engineer an object to be stable.
- 5 mins - Summary
- 10 mins - Q&A & Wrap Up – (give out certificates and mention they can take home their Balancing Beaver to show their families and tell them they have been Exploring Engineering).

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Exploring Engineering

FUN WITH FORCES

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Life's better connected

WE LOVE STEM!

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What is STEM?

People who work in STEM are **real life Superheroes**!

Through STEM we turn dreams into reality to make the world a better place.

Amey & STEMAZING have collaborated to bring you this STEMAZINGKids session linked to learning about Forces.

Let's go!

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Hi, I’m Alex

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My job is – an Engineer

I design things that help people

Fun fact about me – I have worked in Thailand for my job!

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Fun with Forces!

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- Engineers use an understanding of Forces to help them design and build many things we rely on in our lives – for example, **BRIDGES**!
- Let's experiment! We are going to work in groups to make and test a simple paper bridge. You will need:
  - ✓2 piles of books to make a valley - the cliff (book) edges should be 15cm (a short ruler) apart.
  - ✓1 piece of A4 paper & 20 paperclips
- **We can make something stronger by changing its shape! Maths in action!**
- Engineers use STEM skills to design bridges to make them stable, strong and sustainable!

What can you tell me about Forces?

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Gravity

Gravity is the force that pulls objects down towards Earth (this gives objects weight). This is a **non-contact force** because it acts without touching (magnetism is also a non-contact force)

Contact Forces

Contact Forces need objects to touch. For example - air resistance and friction. They can only apply a force onto an object if they touch it directly.

Balancing Forces

For an object to stay still – the forces acting on it need to be balanced. An object will move if its forces are **unbalanced.**

Can you Balance your Beaver's Bridge?

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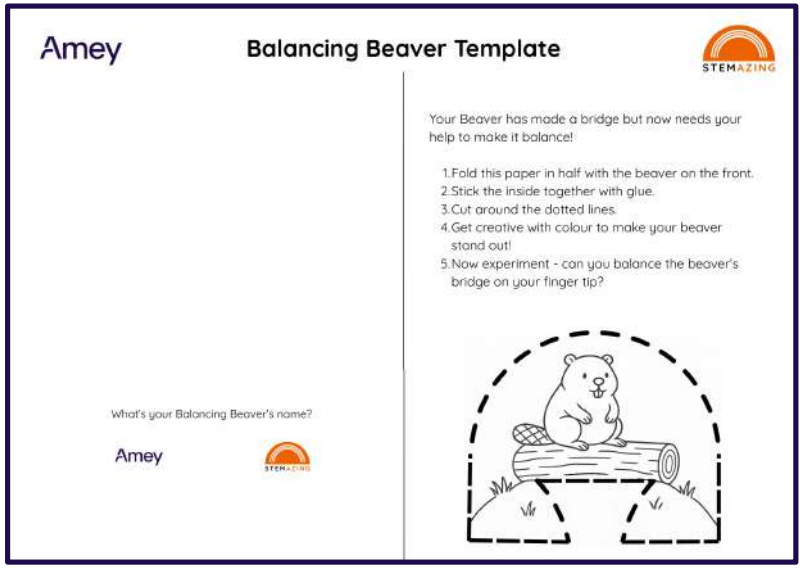
Now it's your turn to do another brilliant bridge challenge!

This little Beaver has built a bridge but needs your help to make it balance!

Let's all be STEM Superheroes and save the day!

You will need:

- ✓Beaver template
- ✓Glue stick
- ✓Scissors
- ✓Colouring pencils
- ✓Pea-sized blob of blue tack
- ✓2 paperclips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Balancing Beaver Template

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Your Beaver has made a bridge but now needs your help to make it balance!

1. Fold this paper in half with the beaver on the front.
2. Stick the inside together with glue.
3. Cut around the dotted lines.
4. Get creative with colour to make your beaver stand out!
5. Now experiment - can you balance the beaver's bridge on your finger tip?

What's your Balancing Beaver's name?

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Questions for you!

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- What does STEM stand for?
  - ✓ Science Technology Engineering & Maths.
- What Force gives something weight?
  - ✓ Gravity.
- How do you make something stable?
  - ✓ Balance the forces (and lower the centre of mass).
- How do engineers improve the world?
  - ✓ They use STEM skills to design and build solutions that solve problems.

Hands up if the answer is **YES** to these questions:

1. Did you enjoy the workshop today?
2. Do you know more about how STEM makes a difference in the world?
3. Are you interested to learn more about STEM jobs in future?


What will your future look like?
There are endless possibilities in a STEM career.
We need more young people like you to become our future real-life STEM superheroes.
Thank you and well done -
YOU ARE STEMAZING!
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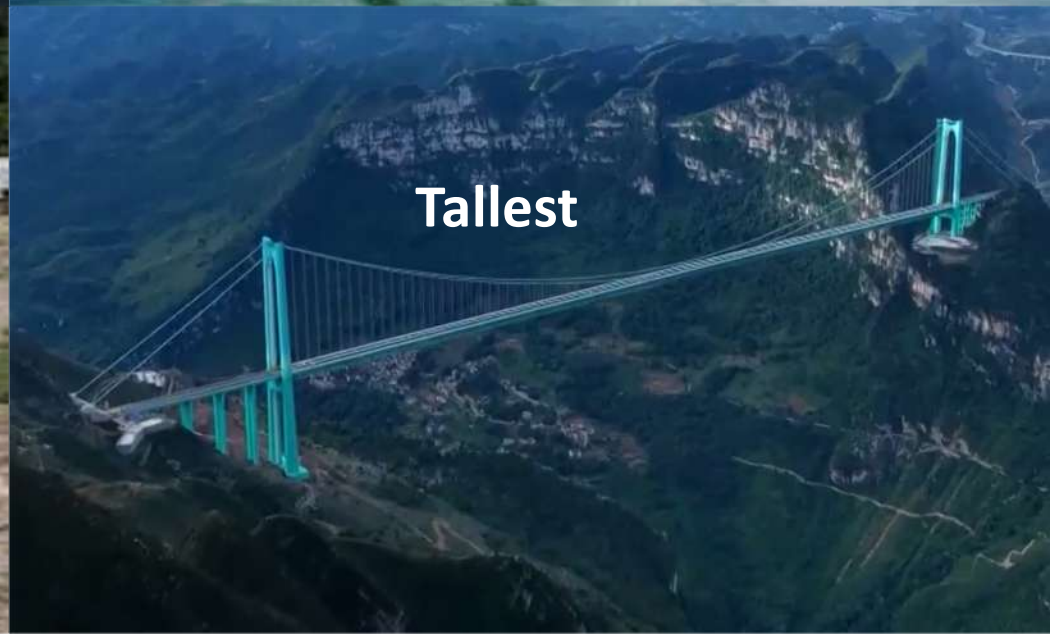
Longest


Most
Expensive


Oldest
still in use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SUPPORT RESOURCES
FOR AMEY PRIMARY ROLE MODELS

1. Link to the recording of this training session to view again
2. Video tutorial of the STEM session alone as if delivering to Primary audience
3. Pdf for reaching out to schools to download
4. Pptx of session slide deck to download and add your own intro slide about you
5. Pdf of notes of slide deck to download
6. Role Model Assistance 1 pager sheet with key steps and key STEM messages to download
7. Completion certificate for children to download
8. Link to evaluation survey for Role Models to complete

https://www.stemazing.co.uk/amey-primary-stem

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EXPLORING ENGINEERING (PRIMARY: AGE 7-9 YRS) ROLE MODEL SUPPORT SHEET

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(ALSO SEE VIDEO TUTORIAL AND SLIDE DECK TO ACCOMPANY THE SESSION. CAN RUN ACTIVITIES AND EXPERIMENTS WITHOUT SLIDES IF PREFERRED)

Welcome to this fun STEM workshop, called Exploring Engineering!

We are going to practice being curious, creative and courageous as you all become mini-engineers and do 2 different experiments to explore how we apply the amazing science you learn in school to real STEM jobs and real problem-solving in our world. Plus you'll learn a cool engineering magic trick you can take home to show your family and friends!

Ice-breaker resources per group:
- 20 x (28mm) paperclips (Amey)
- 1 x A4 paper (Amey)
- 6 - 10 books (Teacher)
- 15 cm ruler (Teacher)

Main activity resources per child:
- Colouring pencils (Teacher)
- Scissors (Teacher)
- Glue stick (Teacher)
- A4 printed template (Amey)
- Pea-sized blob Blu Tack (Amey)
- 2 x (28mm) paperclips (Amey)

Risks to manage
- Safeguarding - Have DBS/PVG (notify teacher in advance if not), don't take photos (ask teacher to take)
- Resources / tools - Care using scissors (injury) and working with paper (paper cuts)

Key Steps & Guide Agenda - also see presentation notes **(Total 60 mins)**
1. (5 mins) Hook & Introduction - What is STEM? Intro to STEM, Amey and role model (slides 1 – 3)
2. (10 mins) Ice-breaker activity - Groups of 4: two bridge designs. How can we engineer a bridge to be strong and stable? Highlight balancing forces and shapes in design. (slide 4)
3. (10 mins) 3 key Forces learning points, then Amey bridge video (notice Girder bridge like they made from paper) - Discuss different interesting bridges - what do they notice about them, what do they think makes them strong & stable? (slides 5 – 7)
4. (20 mins) Main activity - Let children create their Beaver's Bridge and try to balance it, then show them how to lower CoG and balance. Have fun with where you can balance it! (slide 8)
5. (5 mins) Sumary qus and final message: we need more young people like all of you to be our future engineers - our STEM superheroes of the future! (slide 9 - 10)
6. (10 mins) Q&A & Wrap Up – (optional slide 11) & give out certificates and remind to take home their Balancing Beaver to show their families to explain how they've been Engineering Explorers!

Key STEM Messages & Extra Info for Role Model (also see completion certificate)
- Engineers are like creative problem-solvers who use science, maths, imagination and teamwork to build things that help people. They turn cool ideas into real life inventions.
- Gravity is the invisible force that pulls objects down towards Earth (this gives objects weight).
- Gravity is a non-contact force because it acts without touching (also like magnetism)
- Contact Forces need objects to touch before they can act. For example - air resistance and friction.
- For an object to stay still – the forces acting on it need to be balanced.
- An object will move if its forces are unbalanced.
- Bridges don't just hold heavy cars; they have to fight the wind! Engineers design bridges to be strong and stable in high winds and even resist forces from things like earthquakes.
- We made different designs of bridges from the same piece of paper. Flat paper is weak, but if you fold the edges up you make a girder which is a stronger shape because it is stiffer & resists bending.
- In engineering, we test things to failure to learn! We design things on the computer to test it safely and also make models and prototypes (like you did) to test designs before we build the real thing!
- Every object has a "magic spot" called the Centre of Gravity (C of G) or Centre of Mass where all its forces are balanced!
- Low C of G makes things more steady. Just like our Balancing Beaver Bridge - we made it balance by having the same weight on each side, and adding weight to the bottom to lower the C of G - so we could balance it more easily - even on our noses!

Extra interesting info
- The triangle is a strong shape in engineering. Connected triangles are even stronger - this is called a Truss and is often used in bridges.
- Engineers use forces to understand how strong to make a bridge - they calculate two weights: the "Dead Load" (the bridge itself) and the "Live Load" (the extra forces acting on it like cars and people moving on it).

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ENGAGE YOUR LOCAL PRIMARY SCHOOL

Deliver STEM workshops in March - May

- We are recruiting schools in Birmingham, Manchester, Sheffield, Glasgow.
- If you live outside of these areas you can reach out to your local primary school independently, or through your local social value lead.
- Complete form at the end of this workshop to help us match you to a Primary school.

TEACHER'S TOP TIPS

The Essentials (Before You Arrive)

- **Paperwork**: DBS/PVG certificate and Photo ID
- **Tech Protocol**: Email slides to the teacher early & bring a backup on USB / your laptop if possible
- **Consult Teacher:** Attention & Rewards strategy?
- **Dress Code**: Wear "Professional-Comfort" - be ready to move, lean, or sit.
- **Wellbeing**: Pack nut-free snacks and stay hydrated.
- **Resources**: Be prepared with resources and certificates you need to bring.
- **Arrival**: Aim for 30 minutes early to navigate parking and sign-in.

TEACHER'S TOP TIPS

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In the Classroom (The Golden Rules)

- **Safeguarding**: No personal phone photos.
- **Behaviour Pro-Tip**: Catch them being good!
- **Countdown**: To give warning of when they need to finish.
- **Match the Room**: Observe the teacher's required noise level for instructions.
- **The Listening Rule**: Only start talking once 90% of the class is focused. This prevents repetitive questions later.
- **Pause & Pivot**: If two students ask the same question, stop the class to clarify for everyone.
- **Check-ins**: Use "Thumbs Up/Down" to gauge understanding as you go.

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TEACHER'S TOP TIPS

Managing the Vibe

- **Stay Flexible**: Don't panic if you don't finish every slide - prioritise the fun!
- **Watch the Clock**: Keep an eye on the time to ensure a calm pack-away.
- **Time the Task**: Announce clear time limits and give a 1-minute warning during activities to smooth transitions.
- **Utilise the Teacher**: They know the students best. Don't hesitate to ask them for support with class management.
- **Enjoy It**: You are not expected to be a teaching expert! Just be yourself and enjoy it! Your enthusiasm is the most important resource in the room for inspiring the children with STEM!

NEXT STEPS & TIMINGS

1. **NOW** – Complete form (QR code)
2. **Feb** - Access your support resources & make time to practice (www.stemazing.co.uk/amey-primary-stem)
3. **By end Feb** – If in 4 target areas we will make school intro. You then arrange timing for delivery.
4. **By end Feb** - If outside target areas - Reach out to your Business Unit Social Value Lead so they can help you find a suitable school or approach your local Primary school if you have links directly.
5. **Early March** – Get STEM session dates and timings agreed with teacher and practice session at home.
6. **March - May** – Deliver STEM session/s.

4 Target Areas:

- Birmingham
- Manchester
- Sheffield
- Glasgow

Your Social Value Lead:

- Consulting - Sara Bowler
- TI Highways - Adam Webster
- TI Rail - Joanne Billing
- CF Public Estates - Sarah Date
- CF Defence - Guy Grant
- CF Defence - Khusela Mbassa


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THANK YOU FOR INSPIRING THE NEXT GEN!
For further support contact:
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