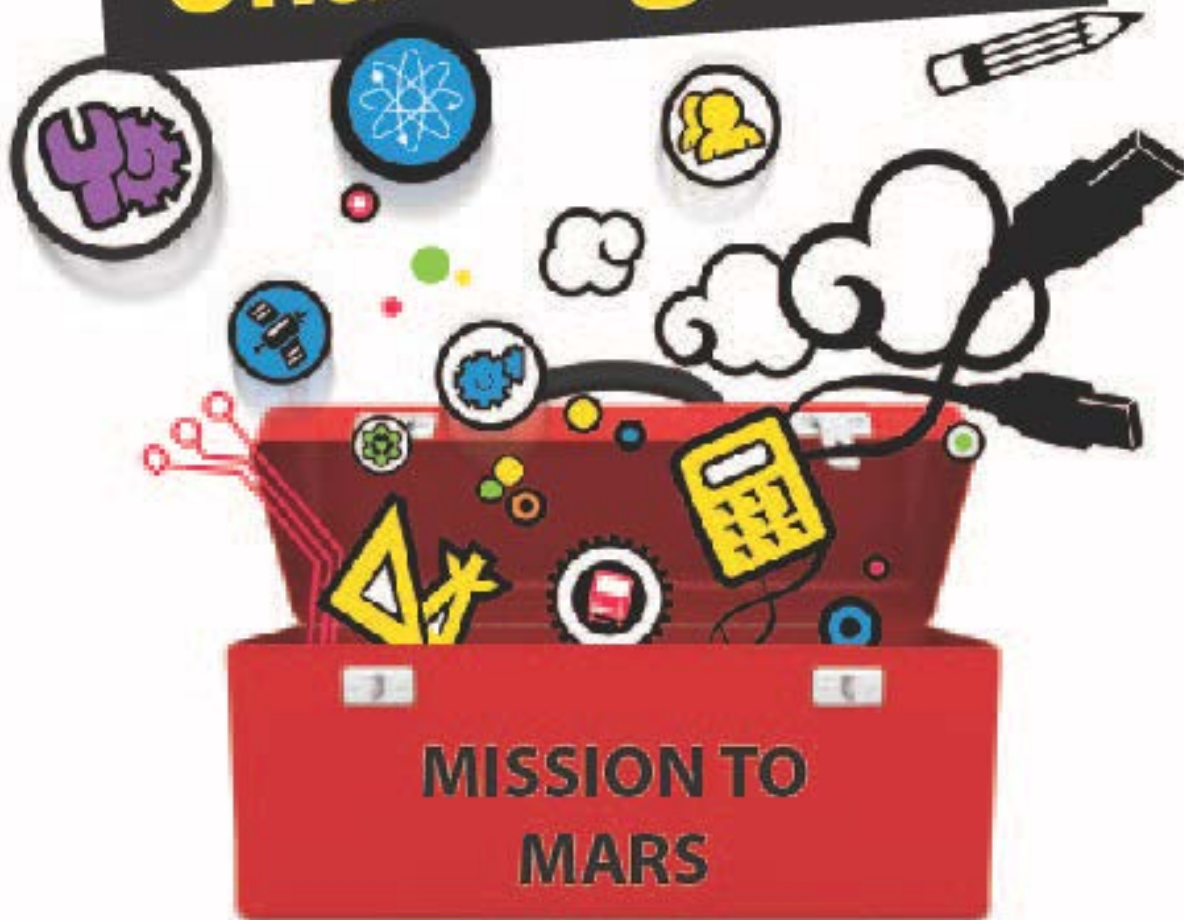
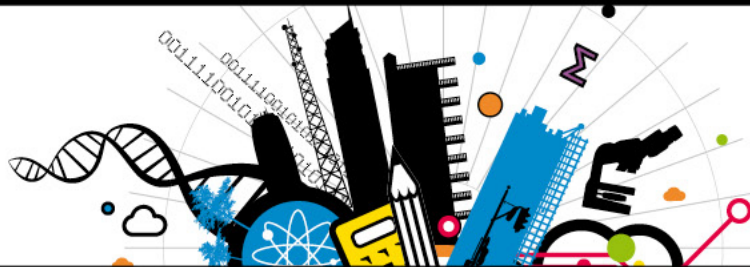




DIY Faraday Challenge Day



Introductory Presentation Slides and Notes



Mission to Mars Introductory Presentation

This booklet is a PDF copy of the introductory PowerPoint presentation for the Mission to Mars Faraday Challenge. You can use this presentation as a guide for both you and your students during the day. The PowerPoint presentation includes the use of some related film clips which can be found at the bottom of the resource page.

This booklet presents all of the presentation slides and accompanying notes, which included the use of the following files:

1. Mission to Mars Introductory Presentation (PPT)

Includes references to the video clips listed below (items 3-4) – you will need a video player installed on your computer which plays MP4 formats in order to view these video clips (digital media players are readily available to download for free online).

2. Mission to Mars Introductory Presentation Slides and Notes (PDF)

3. Video clip: Briefing video (MP4)

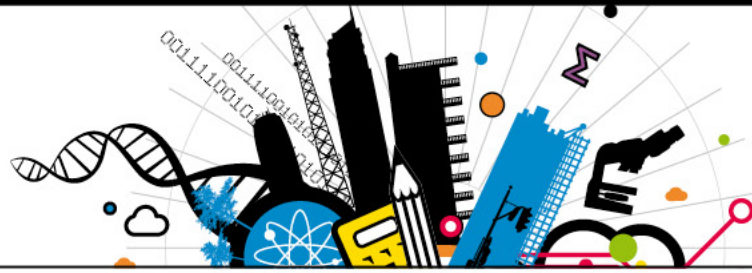
The first introduction to the challenge day explaining the challenge brief and tasks involved in the challenge.

4. Video clip: Outro video (MP4)

Video to show at the end of the challenge day before the winning team is announced.

5. Sound effect: Drum roll (MP3)

Sound effect to play just before the winning team is announced.



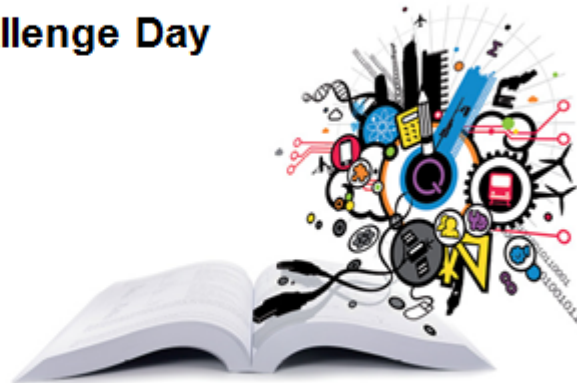
Slide 1

The IET

DIY Faraday Challenge Day

2013-2014

Mission to Mars



Notes

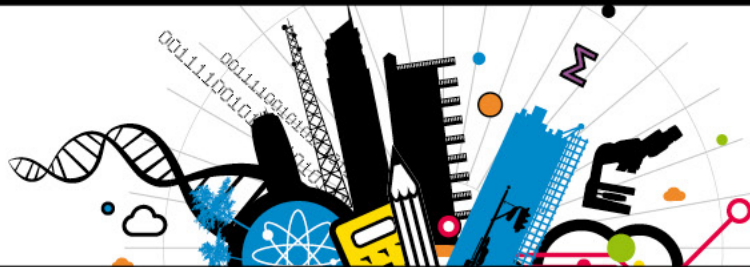
9.15 am

Notes:

As students arrive, get them to fill out Team Registration form and check they have 130 Faradays

9.30am (5 minutes)

- Welcome to the Institution of Engineering and Technology's DIY Faraday Challenge Day.
- Today is a STEM challenge – does anyone know what STEM stands for? Elicit responses from students or tell them: Science, Technology, Engineering, and Maths – today you will be using all of your knowledge and skills in these subjects.
- Today you are no longer students you are teams of engineers and there is a very important problem which you are required to solve!
- Before we get started..... Health and Safety/Housekeeping.



Slides 2 & 3

What is engineering?

IET Education
The Institution of
Engineering and Technology

Faraday

www.ietfaraday.org

Notes

'What is engineering?' – elicit responses briefly.

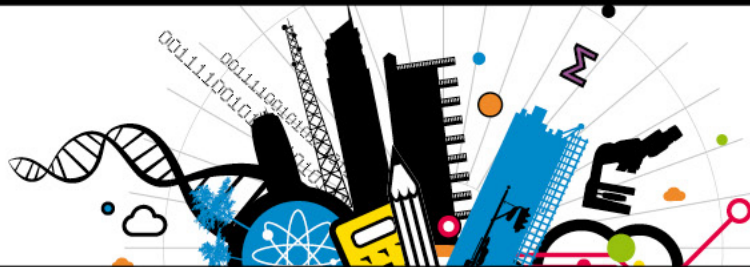
What do you think that engineers have helped to create in this room? Emphasise the point that engineers will be involved in everything – clothes, curtains, building, heating, cooling, lighting, tables, chairs, bags, electrics etc.

On click (slide 2) - Engineering is the application of science to the needs of humanity! Emphasise point that engineers create things that we can use, they help people!

There are many types of engineer – highlight the range using the pictures on the slide.

Use picture of wind turbine to emphasise that engineers are crucial in the role of sustainability. Define sustainability if required.

Ask pupils who are interested in a career in engineering- pupils to raise their hands if they are interested.



Slide 4

Context



Briefing video

Notes

Play briefing video.

Approximately 4 mins.



Slide 5

Re-cap of the Challenge



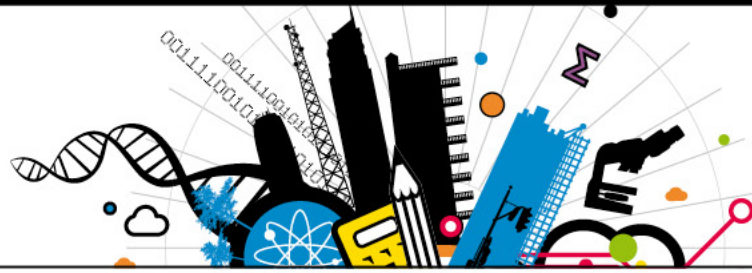
What does your team need to do?

1. Design and build a prototype rocket.
2. Design and build a prototype transport system to move your rocket 3 metres from the rocket facility to the launch site.



Notes

- 'Make It 2 Mars' is a fantastic opportunity to further mankind so what does your team need to do?"
- 'Make It 2 Mars' have the resources and launch system for the prototype rocket however they need a good quality prototype constructing by your team.
- Remember there are two parts to this challenge – the transportation system and the rocket. You need to complete both in order to be successful.
- For the test of your prototype you will need to be able to transport your rocket over a distance of 3 metres safely and effectively.
- Your transportation should include an electric circuit – you will lose points if it does not.



Slide 6

The final test



Today's goal is to present and test your prototype transport system and rocket.

3 minutes

- Present to the Judges the key points from your reflections

5 minutes

- Set up your transport system
- Transport your rocket to the launch site
- Set up your rocket on the launch pad and launch your rocket

Notes

- This is a competition. Each person will have a certificate to show they took part in the day (give to teachers to write names out).



Slides 7 & 8

Tools to help you



STEM knowledge and skills

- Be brave!

The Shop

- Limited resources

Budget

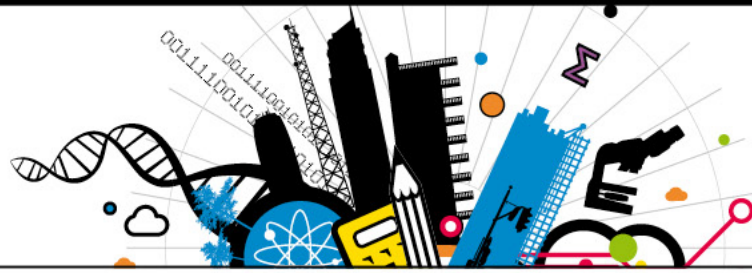
- 130 Faradays
- Spend wisely!

STEM consultant

- Expensive but there if you need expert advice

Notes

- **STEM knowledge and skills** - Engineers are problem-solvers. They rely on science, maths, technology and design to be successful. Engineers take risks so that they can create something new. Think about what you already know and how this knowledge can be applied creatively today! Be brave in your ideas – we will reward those who challenge themselves.
- **Shop** - Purchase materials you will need to build your prototype. Supplies are limited. You can negotiate on price but you can only sell back to the shop for half price. No selling between teams. You may want to consider using recyclable materials if you are going to think about sustainability.
- **Budget** - Keep accurate records of your purchases. You need to know that the only time the amount you spend comes into play is when there are two teams on the same points. The one who has spent the least will win. You should not compromise the effectiveness of your designs in order to save money.



- **STEM consultant** - You can purchase consultancy time but consultants do not make your prototype or come up with initial ideas.
- **Engineering team brief** - Contains all the key information which you will require to be successful. Keep referring to it.
- **Inspiration Station** - Help get the creative ideas flowing by visiting the inspiration station.



Slide 9

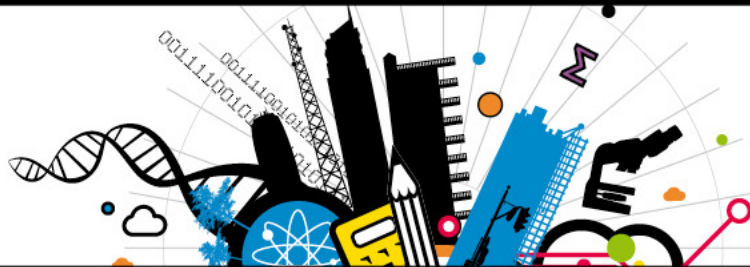
How to score points



- Planning and research
- Development of prototypes
- Accounting
- Presentation
- Quality and performance of the transport system and rocket prototype
- Teamwork

Notes

- *Don't forget this is a competition. You will be judged on these categories. Look at the marking criteria on page 10 of the Mission to Mars team brief to see how you can gain maximum marks.*
- *The first two sections will be judged on your planning sheets (**refer them to A3 planning and reflection sheets**) and from discussion with your team and watching your progress.*
- *Your accounts sheet can be found on page 9 of the Mission to Mars team brief. Look at the marking criteria – marks are given for accuracy, cost effectiveness and neatness so you may want to keep your accounts in rough initially and then copy them out.*
- *Your presentation and prototype marks will come from the final test. We will give you further information on what should be in the presentation later in the day.*
- *We will be watching how you work as a team throughout the day. Marks will be deducted for any unsafe working or where you do not work together as a team.*



Slide 10

Tips for working safely



1. Do not use mains electricity sources!
2. Keep your work station tidy (including the floor around it).
3. Use all materials and kit safely and sensibly, particularly when using the cutting and gluing stations. Tie long hair back when using these stations.
4. Report any spillages, accidents or potential hazards to the teacher immediately.
5. If your appliance (motor) does not work straight away take the wires off the battery immediately and check your circuit. You may have a short circuit which can make the wires get very hot.

Notes

- Go through the tips for safe working! Emphasise all cutting and gluing to take place at the station – use safely and properly.



Slide 11

Electric circuit refresher



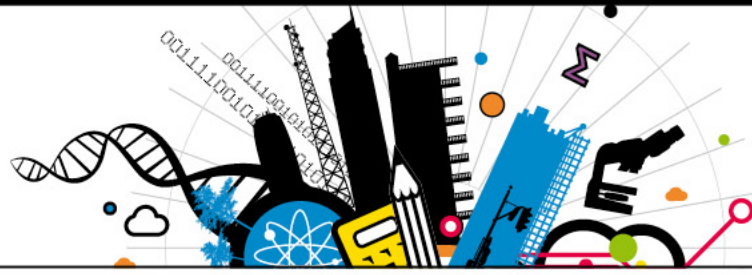
You have 5 minutes to make a circuit using:

- 1 x motor
- 2 x 1.5 volt battery
- 1 x battery snap
- 1 x battery holder
- 1 x red wire
- 1 x black wire

- Does the way you attach the black and red wires to your motor make a difference to the direction it rotates?

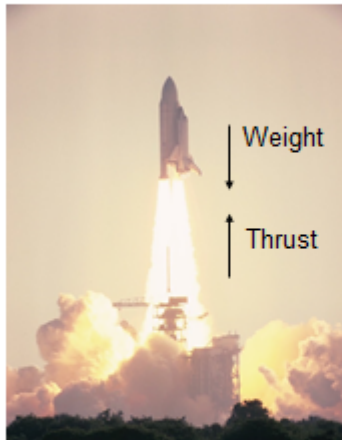
Notes

- Electricity is a part of most modern engineering projects. You need to be careful when working with electricity.
- On the tables there is the equipment you will need to make a circuit including a motor.
- Help the students where necessary.
- Set the time limit (10 mins) and give the team a 5 minutes warning.
- Once time is up stop the students and check their progress by asking: What is important about the way you attached the wires to the battery? What did you have to do to attached the wires to the motor?
- Ask the question on the slide (students may shout the answer or may do a hands-up vote if they are a shy group). Important to note that direction of motor is determined by way motor is connected to power source.



Slide 12

Rockets

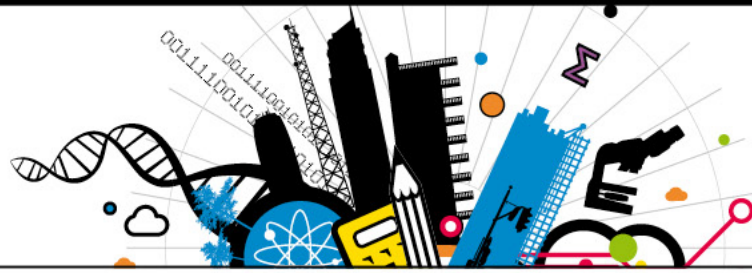


The thrust for your prototype will be created by compressed air.

The heavier your rocket the greater the thrust needed to launch.

Notes

- A rocket will launch when the forces acting on it are right. In this case it is thrust and weight.
- We will be using this rocket launching station. It works on compressed air for the thrust – this will be the same pressure for all groups.
- You need to think about the weight of your rocket. If it is too heavy it will not launch. The heavier an item the harder it is to get it moving – it is easier to push a box of tissues than a car.
- We can see this if we blow the paper cover off a straw.
- Blow the paper cover off a straw. Use this to illustrate the idea of ensuring the end of the rocket is closed and that the rocket fits closely on the pipe. Introduce the rocket body former on their tables. Get them to consider the idea of weight and the effect on thrust.



Slide 13

Role allocation



You have 10 minutes to:

- Allocate each team member a specific role using the job specifications sheets in the 'Mission to Mars' team briefing
- Read your own job specification once allocated

Notes

- *In real life, engineers work in teams and their ability to work well as a team is key to their success. Today, you are going to take on real-life engineering roles to experience what it is like to be part of a problem solving team.*
- *There is no time to lose so you have 10 minutes to allocate roles, fill out name tags. Think about the skills you all have and how they are best used for the good of your team.*
- *Give 5 minute warning.*
- *When they have allocated roles, ask each team member to stand up role by role 'Project managers please stand up. What is your role?' Clarify key points for each role, thank them and say it is nice to meet them. 'Accountants, please stand up. what is your role?' etc.*



Slide 14-26

Stages



Stage 1 – Planning and research

Stage 2 – Development and modifications

Stage 3 – Final build and initial testing

Stage 4 – Final test

Notes

STAGE 1: Planning and research

- Brainstorming of ideas
- Planning and research

STAGE 2: Development and modifications

- Shop opens
- Development and build of prototype solutions
- Modification of prototypes
- Testing

STAGE 3: Final build and testing of prototype

- Final modifications
- Preparation of presentation
- Shop closes at 1.30 p.m.
- Look in the Mission to Mars team brief for the schedule of the day. Don't worry – you do get a morning working break at 11.10 for 10 minutes and lunchtime is from 12.30 until 1.00!



Slide 27

Your presentation



You will have **3 minutes** to tell us about your project.

You might want to use your presentation to answer these questions:

- Why and how your team came up with the solutions including what makes them innovative and cost effective
- The STEM used in your solutions and the importance of engineering
- How your transportation system could be built in real life
- How could you power your transportation system in an environmentally friendly way?

Notes

- Call PMs to the front of the room - brief Project Managers on content of the presentation which they will relate to the rest of their team.
- Remind them to look at the marking criteria to ensure they include everything required.
- Although all the team has to stand at the front for the presentation they do not all have to speak.



Slide 28

Tools down!



Shop, cutting and gluing station now closed!

- . Accountants – submit your accounts to the Shop Manager with any remaining Faradays
- . Return any equipment to the shop
- . Finalise reflections for presentation
- . Prepare for final demonstration

Notes

- *The shop is now shut.*
- *Accountants please submit your completed accounts sheet and any remaining Faradays to the shop manager.*

You have 15 minutes to:

- *Finalise your presentation and ensure everyone knows their role.*
- *Get finance sheet from Shop Manager to check against accounting sheets.*
- *Mark accounts sheet.*
- *Check final amount against remaining Faradays and shop accounts for accuracy.*



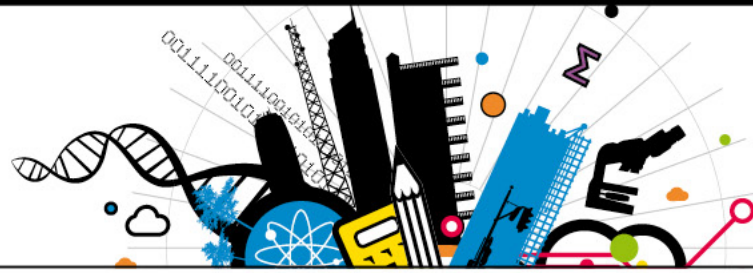
Slide 29



STAGE 4: Final test

Notes

- *Testing is fun. There may be problems or issues with prototypes but it is important to be relaxed! Remember I am marking on a number of different things and the competition is not won or lost on the performance of the prototypes.*
- *Ask students to bring their chairs to the front to make a semi-circle behind the judging table.*
- *Ask a teacher/technician to operate the launch station.*
- *Get a student to time the presentation, etc.*



Slide 30

Stage 4 - Presentation and Final testing



3 minutes - Teams present reflections from Stages 1, 2 and 3.

5 minutes - Demonstration of transport system and rocket launch.

We will cut you off if you go over time!

Notes

13.45-14.45 pm

60 mins

(Includes time to assemble students at the front, give instructions for how the presentations and testing will be carried out and then 8 minutes per team for presentation and testing).

Notes:

- *Remind teams of the format of the presentations and tell them how you will indicate that they are coming near to time.*
- *Teams to come up and present their findings.*
- *1 minute given to set up their prototypes.*
- *Teams are randomly chosen to present their reflections.*
- *Team's come up to the front of their room to setup device and present.*



Slide 31

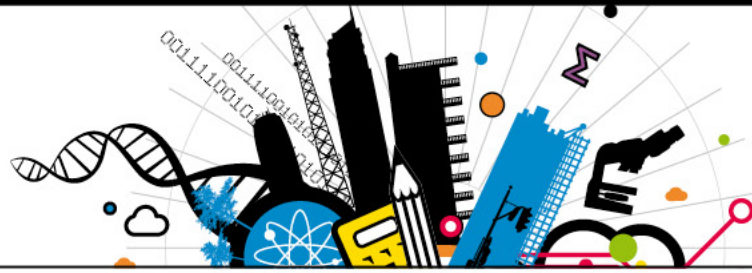
Tidying Up



- Put in a pile on your table the role cards and team number cards
- Tidy up your workspace and put any rubbish in the bin

Notes

Judging is a difficult business so whilst we consult and check our figures please could you help us by tidying up quickly and without asking us questions.



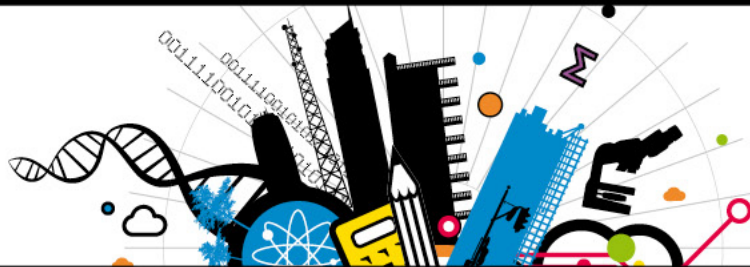
Slide 32



And the winner is.....

Notes

- *Each team has been fantastic and you have all be successful in completing the DIY Faraday Challenge Day set for you today.*
- *Give each team feedback about your strengths in the challenge today. Winner to be announced.*
- *I will not be telling each team what score they got (apart from the winning team) or where they came in the rank order because we want you all to go home today celebrating your success rather than thinking 'We came sixth/fifth/fourth/etc'.*
- *Relay careers messaging – what should they do next if they enjoyed the day.*
- *Play wrap up video (approximately 2 mins).*
- *Go through each teams' strengths and then announce that there can only be one winner.*
- *Ask students to do drum role and announce winner with the number of points they got.*
- *Ask students to put their hands up if they are interested in a career in engineering.*



The IET DIY Faraday Challenge Day 'Mission to Mars' is based on the Faraday Challenge Day of the same name, a STEM activity day written and delivered by the Attainment Partnership on behalf of the Institution of Engineering and Technology (IET).

The IET Faraday website hosts a wide range of teaching resources for science, design and technology and maths. These include classroom activities with film clips, online games, posters, careers resources and STEM activity days.

www.ietfaraday.org

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