

STEM Plan

#TEWeek19



Tomorrow's Engineers Week 2019 provides a unique opportunity for engineers, employers, universities and schools to showcase how engineers are on a mission to make the world a better place.

At the heart of the Week will be a "Big Assembly" where around 50,000 young people are expected to take part in the same school assembly at the same time. The Big Assembly will feature inspirational engineers on a mission to improve people's health and the nation's wellbeing by protecting the environment.

This lesson plan helps you to integrate the Big Assembly into the school day in STEM subject lesson. Other lesson plans are available for PSHE lessons or a larger Assembly.

Date:

Year:

Years 8-9

Lesson:

STEM

Topic

Tomorrow's Engineers Week Big Assembly

Use with 'STEM lesson plan starter'

Learning objective and outcome

By the end of today's lesson you will understand what engineering is and have had the opportunity to work alongside a partner to do some engineering of your own.

Starter activity (5 min)

As students are entering the classroom, display the slide showing four images with the question: What do all of these structures have in common?

Invite responses from the students. The correct answer is that they're all made out of paper.

Briefly give details of these four incredible structures...

1. Steve Messam's Paper Bridge in the Lake District. For further detail and if time allows see the following link: www.youtube.com/watch?v=dKto0hsaMRs
2. A paper flower bouquet. Ideal for brides who suffer from hay fever or a gift to a loved-one in hospitals (many hospitals now have a no-flower policy)
www.christinepaperdesign.com/paper-flowers-for-a-fairytale-wedding

(cont. overleaf)

3. ahaDRONE – a cardboard drone.
www.skykrafts.com/product/ahadrone
4. Christchurch cathedral, built to replace the one destroyed by the devastating 2011 Earthquake.
https://en.wikipedia.org/wiki/Cardboard_Cathedral

Explain that all of these structures are examples of engineering and the Big Assembly is going to help them gain a greater understanding of what a career in Engineering could involve.

Main Activity (30 mins)

When students are settled, explain that they are going to view the Tomorrow's Engineers Week Big Assembly, which will help them to understand what engineering is and introduce them to the possibility of pursuing an engineering career – something they may not have considered before today.

Encourage students to listen carefully and note down any questions they have in the back of their exercise books. Ask them to listen out to any examples they hear where the engineers are on a mission to help make the world a better place.

When the Tomorrow's Engineers Week Big Assembly is finished, allow time to discuss any questions students have. You could get the discussion going by posing questions such as:

- Did you learn anything new from the Big Assembly?
- What was the most impressive example of engineering you saw?
- Do you have any great engineering ideas of your own to solve real-life problems facing us in the twenty-first century?
- Are there any problems here in school which engineering could help us to solve?

A Q&A sheet for students to complete will be available from bigassembly.org closer to the time of the broadcast.

Student Activity (20 mins)

Invite a real life engineer to come and talk to the students and conduct a Q&A.

Alternatively, conduct a simple practical experiment that brings engineering to life.

Reinforce the key message from the Big Assembly that engineers are on a mission to make the world a better place. For example, tackling cancer and dementia, saving peoples lives at sea and protecting us from floods and water pollution. These engineers all have a type, such as civil engineer, mechanical engineer, water engineer.

Another real-life example of this is an engineering project in Scotland that created a new system to stop otters from being killed on roads.

You could show this short film which explains their project: www.youtube.com/watch?v=wUhhX2TlIk8

Ask the students to imagine that they are those engineers and they have to create brand new otter bridges.

Students work in pairs/groups of three to put forward engineering solutions to this challenge: using nothing but this newspaper and no more than one metre of sticky tape, construct a bridge that spans 30cm (the length on a standard long school ruler), is at least 15 cm tall and is capable of holding the weight of an otter (if toy otters can be provided this might be a nice touch, otherwise it may be possible to fashion an otter out of blu-tack or plasticine).

Stretch and Challenge

Increase the weight of the object that the bridge must hold. For example an exercise book, a pencil case, a bottle of water, etc.

Students may come up with a variety of solutions to this challenge. Allow them to come up with their own solutions.

Award merits/house points for the most ingenious engineering solutions. There is no 'correct' answer and the definition of what constitutes a bridge could be fairly broad.

At the end of the time available, students could participate in a 'walking gallery' whereby they walk around the room, inspect the bridges produced by their peers and vote for the one they think is most successful and/or leave a post-it note with WWW/EBI comments (What Went Well/Even Better If)

Plenary (5 min)

What are the positive and negative aspects of using paper in engineering? Also, discuss the pros and cons of paper vs plastic (such as for shopping bags). Think – pair – share.

Come up with a list using two columns on the board. Award merits/housepoints for good/original ideas.

For example you could have:

Positives

Lightweight, sustainable, relatively cheap, recyclable.

Cons

Weak, lacks weather resistance, could be considered littering.

If you like, you could get students to write their ideas on a piece of paper or post-it notes to be added to the board.

Assessment Afl

Students can be assessed on their contributions to the class discussions and the quality of their solutions to the challenge and their answers to the plenary.

Key Words

Engineering

Differentiation

Differentiation will be by outcome. For those who struggle to get going, feed in some suggestions such as different methods of folding or rolling the paper to make it a more robust structure. Challenge more able students to use fewer sheets of newspaper or restrict the amount of sticky tape.

Resources

- A projector and screen to show the slide for the entry activity and the 'Big Assembly' presentation
- Register for the Tomorrow's Engineers Week Big Assembly online: www.bigassembly.org/register-tew
- A newspaper
- Stickytape
- Scissors
- Blu-tac/plasticine to fashion an otter for the bridge challenge or, if funds allow, a toy otter, such as www.amazon.co.uk/Schleich-14694-Otter-Rarity/dp/B009MJUCNA/

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