

BIG MANNY SCIENCE LESSON VIDEOS – TEACHER GUIDANCE



12–16 years

LIVING SWITCHED ON

From special journeys to everyday commutes, the rail network helps get us where we need to be. Even if we're not travelling, we need to be Switched On to the risks the rail environment can pose.

We can all enjoy life's adventures when we spot signs of danger, look out for our friends and always stay Switched On.

Young people often make responsible choices around the tracks but there can be times when independent decision-making can be compromised. Living Switched On has been designed to help young people aged 12–16 explore a range of themes such as peer pressure, the perils of group mindset and how at times accidents happen as a result of small bad decisions rather than one big mistake.

Living Switched On encourages young people to gain the knowledge that could keep them safer around the tracks, whilst also exploring the impact ripple that rolls out across communities and the rail industry workplaces when accidents happen.

Although safer behaviour and better decision making are the desired outcomes of this resource, at its heart is a clear examination of young people's vulnerabilities. In the safety of the classroom, we encourage educators to discuss what makes their students 'tick' – particularly when they're out and about as part of a friendship or peer group. Through this process, potential vulnerabilities for flawed decision-making can be identified, explored, and corrected in readiness for real world challenges.

CONTENTS

PAGE

Video Overview

2–3

Getting Started

3

Resource Guidance

3–6

CURRICULUM LINKS

KS3 & KS4

- **PSHE**
Health and wellbeing: Self concept, Managing risk and personal safety. Relationships: Relationship values, Social influences
- **Citizenship**
- **English**
Reading, Spoken English
- **Science**
Physics

S1–S5

- **PSE**
Health and Wellbeing: Self Concepts, Managing Personal Safety and Risks, Relationships. Social Influences
- **Citizenship**
- **English**
Reading and Talking
- **Science**
Physics

These resources can also be used within SMSC planning and delivery.

WHY IS THERE A NEED TO INCORPORATE RAIL SAFETY INTO YOUR TEACHING?

There are 20,000 miles of track, 30,000 bridges, tunnels and viaducts plus thousands of signals, level crossings and stations across our rail network. There are more than 19,000 trespass incidents on the tracks every year.

Learning to hazard spot and address potentially dangerous behaviour is crucial at any age. Schools have recognised the importance of teaching about a range of safety behaviours through PSHE and Citizenship lessons in school. The rail industry wants to support this vital work.

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12–16 years

HOW TO RUN THE ACTIVITIES AT SCHOOL

This resource has been designed to be flexible and easy to use with a range of options for delivery. This teacher guidance document contains tips for delivery and a loose script that can be adapted by educators to best suit the needs of their learners.

Teachers may decide to:

- Deliver the activities linked to each lesson individually within the normal timetable
- Run all of the activities across a week, as part of a topic focus week

HOW TO USE THE VIDEOS AND WORKSHEETS IN OTHER SETTINGS

We're aware that youth groups and families may also want to play this video with young people. The videos and the supporting worksheets could be used as home learning, with students responding to the questions rather than undertaking the discussions. Discussion may take place between the home educator and the student, or questions can be used for individual written reflections.

VIDEO OVERVIEW

NAME OF RESOURCE	FORMAT	LEARNING OUTCOMES
Speed of a moving train	Video [In PowerPoint presentation]	<ul style="list-style-type: none">• I can identify the risks associated with trespassing on the railway line• I can describe the causes of these dangers using scientific terminology and understanding (including sound waves and speed)• I can discuss possible impacts on people who choose to ignore laws and trespass on the railway• I can discuss the effect that social media influencers might have on knowledge and awareness of important safety warnings regarding the railway
Electric third rail	Video [In PowerPoint presentation]	<ul style="list-style-type: none">• I can identify the risks associated with trespassing on the railway line• I can describe the causes of these dangers using scientific terminology and understanding (including electricity, voltage, current, amps, conductor)• I can discuss possible impacts on people who choose to ignore laws and trespass on the railway• I can discuss the effect that social media influencers might have on knowledge and awareness of important safety warnings regarding the railway

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VIDEO OVERVIEW

NAME OF RESOURCE	FORMAT	LEARNING OUTCOMES
Overhead line equipment	Video [In PowerPoint presentation]	<ul style="list-style-type: none">I can identify the risks associated with trespassing on the railway lineI can describe the causes of these dangers using scientific terminology and understanding (including electricity, current, amps, conductor, arcing)I can discuss possible impacts on people who choose to ignore laws and trespass on the railwayI can discuss the effect that social media influencers might have on knowledge and awareness of important safety warnings regarding the railway

GETTING STARTED

- Resources can be accessed via the [Switched On website](#). Living Switched On also incorporates films and activities from You vs Train, an existing Network Rail resource warning about the risks of trespassing on the railway
- Living Switched On hosts a range of resources from films to quizzes and group discussions we recommend that educators familiarise themselves with the content and plan an appropriate approach for their students
- Some resources explore dangerous behaviour and we recommend sharing trigger warnings i.e. let students know the nature of the content and give them the opportunity to opt out if they feel it might trigger difficult emotions

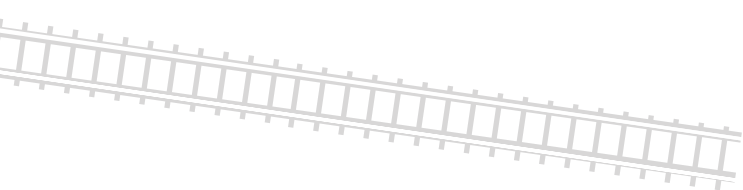
BIG MANNY SCIENCE LESSON VIDEOS

Overview

Big Manny is a social media influencer and an expert on all things science. He has used his knowledge and expertise to develop three social media videos, to demonstrate the science behind the main dangers present on the railway, as well as the impact of making unsafe decisions. Important scientific concepts are investigated and explained, with content focusing upon:

- The speed of trains (and how this affects your ability to hear the train travelling on the line)
- The voltage of the overhead line equipment (and how this can cause electrocution through arcing)
- The voltage of the electric third rail (and how this might affect the body if contact is made)

Accompanying resources support students to extract important scientific and safety information to be aware of, asking them to consider how this might affect their behaviour in relation to the railway lines.



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Supporting resources and equipment required

- Interactive whiteboard / screen with sound or digital devices (iPad, tablet or laptop) that groups can watch their allocated video on
- Worksheet – Big Manny and the speed of a moving train
- Worksheet – Big Manny and the overhead line equipment
- Worksheet – Big Manny and the electric third rail
- Transcription document (of all three videos)
- Teacher PowerPoint slide deck

Set up

- Resources can be accessed via the [Switched On website](#).
- Print off the Worksheets and transcription document and share with class. You may want to print off less transcription documents and have one per table.
 - Worksheet – Big Manny and the speed of a moving train
 - Worksheet – Big Manny and the overhead line equipment
 - Worksheet – Big Manny and the electric third rail
 - Transcription document
- Set up the PowerPoint on your whiteboard/ screen ready to show your students.

Timing

45–60 minutes (across 1 lesson or 2 shorter sessions. If used as two shorter lessons, the tasks should be split between Task 1 – 6 and Task 7 – 8).

Suggested order

- Use the 'Video – Trains' alongside the pupil worksheet **Big Manny – The speed of a moving train** to allow pupils to record individual responses in preparation for the class discussions.
- Break into 2 halves of the class / group, half focusing on video 'overhead line equipment' and half focusing on 'electric third rail'.

- Watch videos and use the **Big Manny and the overhead line equipment worksheet** and **Big Manny and the electric third rail worksheet** to inform reflections
- Create presentations to share back to class
- Plenary / Group discussions

ACTIVITY

- Ask pupils to reflect upon the question 'What might be the relationship between science and the railway?' and hear any initial ideas that pupils might have about the relationship between science and the railway.
- Introduce Big Manny (Tik Tok Science Education Creator of the Year 2024) and Manny Kang (Network Rail Community Safety Manager and Fundraiser of the Year at the Pride of Britain Awards 2024) as the presenters in the three films. The science experiments and demonstrations featured in the videos are used to understand key aspects of the railway network and their relationship to the dangers of trespassing on the railway lines. More information on the collaboration between Network Rail and Big Manny can be found [here](#)
- All students watch the 'Video – Trains', utilising the pupil worksheet **Big Manny – The speed of a moving train** to allow pupils to record individual responses whilst watching the video, in preparation for the class discussion.
- If appropriate, watch video twice to support understanding and accessibility to language and scientific content. A transcript of the video is also available in supporting materials.
- Facilitate a class discussion, using the **Check for Understanding questions (on slide 5)** to pull out key information that is important. These questions mirror those on the **Worksheet**, so pupils should have recorded responses to these prior to the class discussion.

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1. How fast can passenger trains travel?
 2. How do sound waves normally travel from their source?
 3. What happens to the sound waves when a train is travelling 125 miles per hour?
 4. What is the reason that you may not hear a train travelling towards you?
 5. Why is it dangerous that you may not be able to hear a train travelling towards you if you're crossing or stood on the railway line?
- Undertake a small group discussion, followed by a whole class discussion (as per teacher slides), focusing on the following questions (slide 6):
 - What are key messages that Big Manny is trying to get across in the video that they have studied?
 - Why is it important that young people are aware of this content?

*These first activities act as a model for the smaller group tasks that now follow. Here, split the class in half (for the 2 remaining videos), and then into groups of 4/5 pupils per group. Half of the groups should focus on **Video – overhead line equipment**. The other half of the groups should focus on **Video – electric third rail***

- Individuals within their group use the worksheet attached to their video (**Big Manny and the overhead line equipment** or **Big Manny and the electric third rail**) to note down and extract key information from watching their video. They can use the prompt questions to help develop their thinking and extract key safety and scientific information. Educators can also use these questions to check for understanding. The information will help them to create their presentation, but these questions do not need to form part of the presentation.

Questions for Big Manny – Overhead line equipment:

1. What tool does Big Manny use to show how electricity can travel from one object to another?
2. What is 'arcing'?
3. How many amps would you have to be electrocuted by for your heart to stop beating?
4. How far can electricity in the overhead line equipment arc?
5. On average, how many people trespass on train tracks per day?
6. Why is it dangerous to trespass on the train tracks?

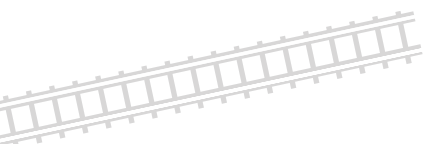
Questions for Big Manny – Electric third rail:

1. What is the ham in this video designed to represent?
2. What is the car battery representing in this video?
3. Why is the meat cooking / burning?
4. What is the difference between the voltage / amps from the car battery compared to the voltage in the electric third rail?
5. If your body touches the electric third rail, why might you be unable to release it from the electric third rail track?

Each group should create a 3–5 minute presentation, in **response to the following questions**:

- What are key messages that Big Manny is trying to get across in the video that they have studied?
- Why is it important that young people are aware of this content?

Each group gives their presentation to the rest of the class, sharing particularly with the half of the class who haven't studied the same video. Ensure that the two videos are shown to all before the presentation from the content is shared by pupils.



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PLENARY

Undertake a whole class discussion reflecting on the effect of these three videos, using the questions on Slide 16.

Optional: Pupils can first individually (or in small groups) consider their responses to the questions, before the teacher facilitates the discussion.

- What impact has watching these videos had on you?
- Has there been one of them that has been particularly impactful? Why?
- What new knowledge have you gained/learned?
- What effect do social media posts like this have on young people regarding important decisions such as staying off the electric third rail?
- Have the videos informed your understanding of the electric third rail?
- Who would you send this video to? Would you want anyone in your friends or family to watch it?

Differentiation

The video Big Manny – Electric third rail is the most challenging video scientific content wise. This could be used for adaptable teaching by giving this to more able groups.

Identified groups could instead focus their presentation on either the first video shown (Big Manny – Trains) following after the whole class discussion, therefore consolidating and reinforcing learning already explored.

Rather than splitting groups in half, all groups could focus their independent presentation work on video Big Manny – overhead line equipment.

The transcription of the videos can be used as a scaffolding resource for reading. Important vocabulary has been written in bold, to draw attention to the most important material.

Additional Activities

[Explore the Living Switched On resources](#) on the Switched On website, for more rail safety activities to complete with pupils in the classroom.