

OVERHEAD LINE EQUIPMENT – 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.

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

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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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 RESOURCE AND WORKSHEET IN OTHER SETTINGS

We're aware that youth groups and families may also want to use this resource with young people. The gameshow and supporting worksheet could be used as home learning, with students responding to the questions rather than undertaking the group discussions – this may mean disregarding some of the boxes in the student worksheet. Discussion may take place between the home educator and the student, or questions can be used for individual written reflections.

RESOURCE OVERVIEW

NAME OF RESOURCE	FORMAT	LEARNING OUTCOMES
Overhead Line Equipment – Know the score	PowerPoint deck	<ul style="list-style-type: none">• I can identify rail-related risks and dangers including:<ul style="list-style-type: none">– I understand that 25,000 volts (25kV) run through the overhead line equipment, 100 times the electricity supplied to a home.– I understand that electrocution or electric shock (where the electrical current hits a person or object) can occur even when you do not touch the overhead line equipment– I understand that heat generated by an electric shock from high voltage in the overhead line equipment is in excess of 3,000 degrees Celsius– I understand that the overhead line equipment supplying electricity to the trains are always switched on• I know that taking risks around rail tracks can end in serious injury or death, which can have an impact on others and the wider community, as well as myself• I can demonstrate ways to keep my friends safe, and resist pressure from friends to take risks or behave unsafely around the rail environment• I can handle emotional feelings and navigate complicated situations with my peers, to keep those around me safe, including when to seek help• I know when to report situations of danger to the emergency services

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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

OVERHEAD LINE EQUIPMENT - KNOW THE SCORE

Overview

The electrified railway system in the UK is expanding. It is creating faster ways of travelling, whilst using a more sustainable source of energy. But the electrified railway also carries a number of dangers and safety issues, when treated without due care and attention.

The 'Overhead Line Equipment – Know the Score' resource is a quiz-based game show that aims to educate and then test pupils about one key area of the electrified railway system – overhead line equipment. The resource aims to encourage learners to think about the importance of paying attention and behaving safely around the railway, especially when encountering electrified overhead line equipment.

The first half of the quiz presents key knowledge in the style of a gameshow that students should be aware of when it comes to overhead line equipment. The second half presents a specific situation – reflecting a real-life circumstance that students might find themselves in – to help older learners think about the complexity of situations, including peer pressure and personal responsibility, that may involve interactions with the railway lines, trespassing and overhead line equipment.

Supporting resources and equipment required

- Slide deck for Overhead Line Equipment – Know the score game show
- Student worksheet (1 per student)
- Pens / pencils
- Optional: Mini whiteboards for voting

Timing

40–55 minutes

Set up

- Resources can be accessed via the [Switched On website](#).
- Print off the accompanying student worksheet and ensure each student has their own to fill in as you go through the gameshow.
- Set up the **Overhead line equipment – Know the score** gameshow on your whiteboard/screen ready to show your students.
- You may wish to play the quiz with students during:
 - A normal timetabled lesson, for example, PSHE or Citizenship
 - A topic focus week, for example, Rail Safety Week

HOW TO PLAY THE GAME

- There are two rounds to this quiz-style game – one individual round for students to compete against each other, and one group round, where they will have to make decisions at each stage of a complex scenario.
- In round one, students' answers to each question can be compared to the answers of a group of young people from across the UK. This is to help students reflect on their own knowledge about the overhead line equipment, how misconceptions about the electrified railway might exist and the impact that can have on decision making when young people interact with the railway environment.
- In round two, students are presented with a scenario which develops as the questions go on. It is much more important that learners focus on sharing and discussing what they think might be the right thing to do. Students should use

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their answer sheets to jot down initial responses to each question, before they enter into group discussions and come to a collective decision on what they would do/ or how they would answer a question.

- The slide deck is designed to walk your students through the quiz-style game show, providing key questions to consider and important information for them to be aware of. Your role is to read the slides to the class and prompt discussion.
 - To increase interactivity you may want to read the slides as a class or call on volunteers to read aloud.
- The student answer sheets allow them to record their individual answers and have them ready to use in discussion as a whole group and then with their small group in Round two.

YOUR ROLE AS THE TEACHER IS TO ENSURE

1. All students identify their individual responses to each question before any discussion. This is important to see where their thinking / understanding is and to compare their answers to others in the room and the sample group.
2. To call on or ask for volunteers to share their responses, highlighting some of the differences that may exist in student perceptions about safety with the railway and the overhead line equipment.
3. To ensure that correct answers are confirmed clearly and that students record these answers on their individual worksheets.

ROUND ONE: ACTIVITY GUIDANCE

- Ensure that all students have a worksheet.
- **Slide 2:** Begin by introducing what overhead line equipment is:
 - Explain that the electrified railway system in the UK is expanding helping to create faster ways of travelling, whilst using a more sustainable source of energy.
 - However the electrified railway also carries a number of dangers and safety issues, when treated without due care and attention.

- Explain that this gameshow quiz is designed to help educate students about those dangers and see whether they can make effective decisions to keep themselves and those around them safe.

- **Slide 3:** Guide students to think carefully about the quiz questions – the answers may not be as they think!
- **Slide 4:** Explain to students that they should write down their individual answers on their student worksheet.

QUESTION ONE

- **Slide 5:** Ask students question one about electricity in the overhead line equipment. To increase interactivity you may want to read the question collectively as a class or call on volunteers to read aloud.
 - When reading the question, draw your students attention to the overhead line equipment.
 - Point out that it is through the wires, rather than the pylons where the electric voltage is carried.
- **Slide 6:** Read the answers on the slide. Pause here to let students circle their individual answers on their worksheets.
- **Slide 7:** Conduct a hand raising activity to see how many students picked option A, B or C.
- **Slide 8:** Explain that a group of young people of a similar age were asked the same question. Pause here to reflect on how this marries up to what the class selected. Was it similar? Go on to the next slide to reveal the answer.
- **Slide 9:** Explain that **25,000 volts** (25kV) runs through the overhead line equipment, a voltage over **100 times stronger** than the electricity supplied to your average home (230 volts).
 - Pause here to students can write down the correct answer on their worksheet.
- **Slide 10:** Assess how many of the class were correct/wrong. Point out that nearly half of young people in the sample group guessed **incorrectly**.

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- Ask students to consider what problems could it cause that nearly half of young people don't realise how strong the electricity in the overhead line equipment is? Get students to write down their answers on their worksheet.
- **Slide 11:** As they're recording their answers move on to the next slide which shows more facts that they should consider, including:
 - You can get a severe electric shock from the 230 volts within the electric supply within a house
 - There are approximately 19,000 recorded incidents of trespass on the rail network each year
- Once answers have been recorded call on individuals to share their thoughts. **Correct answers could include:**
 - If you can get an electric shock from household wires that is severe, the shock from the overhead line equipment could be lethal or at least cause life-changing injuries.
 - The high numbers of trespassing incidents may be exposing themselves to the possibility of electric shock from the overhead line equipment.
- Ask the students whether they were surprised by the answer as scientific knowledge of electrical circuits may have taught them that a circuit needs to be complete and closed for the electricity to travel.
- **Slide 17:** Emphasise that a person does not have to be touching the overhead line equipment to get an electric shock or be electrocuted.
 - This is because the human body can act as a conductor to the electricity.
 - Electricity is attracted to earth and wants to ground itself.
 - Therefore electricity at the strength of 25,000 volts will be attracted to a conductor to be able to travel to earth as quickly as possible.
 - This process of electrical current jumping is called 'arcing'.
 - Pause here to get students to record what 'arcing' is.
 - » **Correct answer:** when the electric voltage of 25,000 volts can jump from the overhead line equipment to your body, due to the strength of the voltage.

QUESTION TWO

- **Slide 12:** Ask students question two.
- **Slide 13:** Pause here to allow students time to record their answers on their worksheet. Conduct a hand raising activity to see how many students said true and how many said false.
- **Slide 14:** Explain that a group of young people of a similar age were asked the same question. Pause here to reflect on how this compares to what the class selected. Was it similar? Go on to the next slide to reveal the answer.
- **Slide 15:** Explain that an electric shock from the overhead wires can occur without a person physically touching the overhead line equipment.
 - Pause here to students can write down the correct answer on their worksheet.
- **Slide 16:** Assess how many of the class were correct/wrong. Point out that 21% of young people in the sample group guessed incorrectly.

QUESTION THREE

- **Slide 18:** Ask students question three. Remind students to consider when picking their answer that 100 degrees is the boiling point of water.
- **Slide 19:** Pause here to allow students time to record their answers on their worksheet. Conduct a hand raising activity to see how many students picked option A, B or C.
- **Slide 20:** Explain that a group of young people of a similar age were asked the same question. Pause here to reflect on how this compares to what the class selected. Was it similar? Go on to the next slide to reveal the answer.
- **Slide 21:** Explain that the heat generated by an electric shock from high voltage wires is more than **3,000 degrees Celsius** – hot enough to ignite (set fire to) a victim's clothing.
- **Slide 22:** Emphasise that an electric shock of 25,000 volts may be lethal and at the very least it will cause life changing injuries.
 - Further emphasise that the heat of the shock may cause burning of clothes and skin, resulting in significant injuries.

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- Ask students to reflect on what they've learned so far and explain why trespassing could be dangerous. You may want to pick volunteers to share their answers.
- Ask students if they think young people are being injured or killed as a result of incidents involving overhead line equipment? Invite them to respond by raising their hands for 'yes' or 'no'. Gauge class consensus before moving on to the next slide.
- **Slide 23:** Guide the class to read through the BBC News article, which explains a weekend of events in Scotland where two young people in 24 hours were electrocuted in unrelated incidents. Ask students to consider the following questions. You may want to call on volunteers to share their answers:
 - How long ago were these events?
 - Is it surprising that two teenagers were both seriously injured/killed on the same weekend?
- Pause here so students can write down on their worksheets how the heat of the electrical shock from overhead line equipment might affect someone.
 - **Correct answers include:**
 - » an electric shock of 25,000 volts may be lethal and at the very least it will cause life changing injuries.
 - » the heat of the shock may cause burning of clothes and skin, resulting in significant injuries.
- Pause here to ask students why might we assume that the electricity is off when the trains are not running between 11pm and 4am? You may want to call on volunteers to share their answers.
 - Answers may include:
 - » It saves electricity
 - » It is better for the environment
 - » The trains are not running at this time
 - » It helps sustainability
- **Slide 28:** Re-emphasise that the electricity in the overhead line equipment is always on and that we need to use Switched On thinking and not trespass on the tracks, whatever the time of day.
 - Highlight to students that not all trains are in the public timetable, for instance freight trains or maintenance trains.
- **Slide 29:** Guide the class to read another part of the BBC News article. Ask students to consider what time the incidents happened.
 - Ask students to consider why more accidents might happen at night time. Pause here so students can record their answers on their worksheets.
 - **Correct answers could include:**
 - » If we are out with friends in the evening, it could be easy to make less rational decisions when interacting with the railway
 - » If trains aren't running it's easier for people to think that there is no electricity present

QUESTION FOUR

- **Slide 24:** Ask students question four.
- **Slide 25:** Pause here to allow students time to record their answers on their worksheet. Conduct a hand raising activity to see how many students picked true and how many picked false.
- **Slide 26:** Explain that a group of young people of a similar age were asked the same question. Pause here to reflect on how this marries up to what the class selected. Was it similar? Go on to the next slide to reveal the answer
- **Slide 27:** Explain that the electricity supply in the overhead line equipment is **always on**, even when trains are **not running, including at night**.

CLOSING ROUND 1

- **Slide 30:** Ask students to consider the following questions and write them on their individual worksheets:
 - How many questions did they get correct?
 - Which of the questions and their answers surprised them the most?
 - What have they learnt about the electrified railway and overhead line equipment that they didn't know before?
- Once recorded ask students to share how many answers they got right.
- Engage in a classroom discussion asking students to share their responses to the other two questions.

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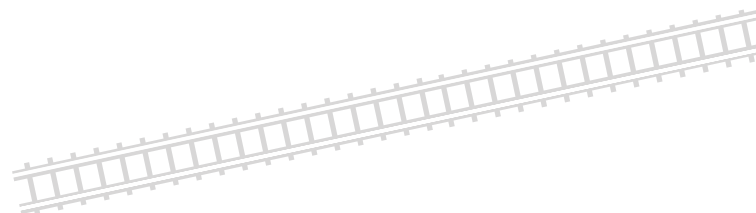
ROUND TWO

- **Slide 31:** Split the class into groups of 3–5.
- **Slide 32:** Explain that in this round, answers are likely to be more complicated as they focus on emotional scenarios that can affect our decision making.
 - Unlike round one, there are not always obvious right answers at each stage.
 - It is much more important that learners focus on sharing and discussing what they think might be the right thing to do.
 - Explain that students should use their answer sheets to jot down initial responses to each question, before they enter into group discussions and come to a collective decision on what they would do/ or how they would answer a question.

QUESTION FIVE

- **Slide 33:** Guide students to read the scenario. You may want to call on a volunteer to read aloud to the class.
- **Slide 34:** Ask students to consider themselves as the best friend of the trainer owner. Ask them to record on their worksheets what they would be feeling in this situation.
- **Slide 35:** Once students have written their answers ask them to consider what they think the right thing to do in this situation is. Pause here so students can record their individual answers on their worksheet.
- **Slide 36:** Once all individual answers have been recorded get students to discuss in their groups. Ask them to consider what ideas were the same and which were different. Allow time for discussion.
- **Slide 37:** Ask students to reflect on what they learned in round one and get them, in their groups, to decide what their answer to part A is and what the right thing to do in part B is.

- **Slide 38:** Read through the slide. Ask the students to consider the different ways that the best friend of the trainer owner could be feeling in this situation. Engage in a class discussion, considering how each feeling might impact how the individual responds to the situation. Discuss whether any of the groups had similar answers.
 - Ask groups to explain their answers and why they would be feeling that way.
 - Points worth noting include:
 - » How often the feelings were related to safety regarding the overhead line equipment
 - » How often the feelings were related to the trainers
 - Explain that the safety of those involved is much more important to consider than the trainers.
- **Slide 39:** Read through the slide. Ask the students to consider the different ways of approaching the situation and engage in a class discussion about the pros and cons of each approach.
 - Ask groups to explain their answers and the reasons behind them.
 - **Discussion could include:**
 - » The risks of getting the trainers (re-highlight the dangers of the electric overhead line equipment)
 - » The risk of getting the trainers compared to the benefits of getting them back (the trainers are not worth putting your friend's life at risk)
 - » Why informing the emergency services (who would then inform the British Transport Police) may be vital if someone's life is in danger
- **Slide 40:** Read through the slide and remind students of the importance of making smart Switched On decisions that are driven less by emotions and rather rationale thinking.



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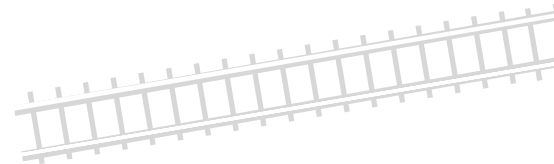
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QUESTION SIX

- **Slide 41:** Guide students to read the scenario. You may want to call on a volunteer to read aloud to the class.
- **Slide 42:** Ask students to again consider that they are the best friend of the trainer owner. Ask them to record on their worksheets what they would do in this situation.
- **Slide 43:** Once all individual answers have been recorded get students to discuss in their groups. Ask them to consider what the right thing to do in this situation is. Allow time for discussion.
- Ask groups to explain their answers and the reasons behind picking it.
- **Slide 44:** Read through the slide. Ask the students to consider the different ways of approaching the situation and engage in a class discussion about the pros and cons of each approach.
 - **Discussion could include:**
 - The influence of the brother on the situation
 - Confronting the brother could be scary or intimidating
 - Convincing the friend to walk away could be hard if they are being influenced by their brother
 - The risks of leaving the friend to get the trainers (he may be unaware of the dangers of the electric overhead line equipment)
 - Distracting the friend so as to diffuse the situation in a non-confrontational manner
 - Calling an adult for help may be vital if someone's life is in danger but you could feel intimidated not to
- **Slide 45:** Read through the slide and remind students of the importance of making smart Switched On decisions that are driven less by emotions and rather rationale thinking.
 - Emphasise the influence of other people in the decision-making process e.g. people who they are affected by, influenced by or fearful of.

QUESTION SEVEN

- **Slide 46:** Guide students to read the scenario. You may want to call on a volunteer to read aloud to the class.
- **Slide 47:** Ask students to again consider that they are the best friend of the trainer owner. Ask them to record on their worksheets what they would be feeling in this situation.
- **Slide 48:** Once all individual answers have been recorded get students to discuss in their groups. Ask them to discuss how they would be feeling as the best friend in this situation. Allow time for discussion.
- Ask groups to explain their answers and the reasons behind it.
- Engage in a class discussion about the most common feelings that the groups felt the best friend would be feeling.
 - **Discussion could include:**
 - Feeling scared for the friend's safety
 - Feeling annoyed, stressed or angry about the situation
 - Feeling intimidated by the brother and unable to speak up
 - Feeling pressured by the brother or wider friend group to get the trainers back
- Remind students that emotions the pupils may be feeling in this situation, can very often influence our behaviours and decisions.
- Reiterate the importance of making smart Switched On decisions that are driven less by emotions and more by rationale thinking.



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QUESTION EIGHT

- **Slide 49:** Guide students to read the scenario. You may want to call on a volunteer to read aloud to the class
- **Slide 50:** Ask students to again consider that they are the best friend of the train owner. Ask them to record on their worksheets what they would do in this situation.
- **Slide 51:** Once all individual answers have been recorded get students to discuss in their groups. Ask them to consider what the right thing to do in this situation is. Allow time for discussion.
- Ask groups to explain their answers and the reasons behind picking it.
- **Slide 52:** Read through the slide. Ask the students to consider the different ways of approaching the situation and engage in a class discussion about the pros and cons of each approach.
 - **Discussion points could include:**
 - You should call the emergency services on 999 to report their actions as this is now an emergency and someone's life is at risk. The emergency services will inform the British Transport Police.
 - The risk of getting involved even if it is well intentioned
 - How likely is the option of shouting at them to stop and come away from the railway and overhead line equipment be to work?
 - Distracting your friend may not be enough in this situation
- **Slide 53:** Reinforce the importance of calling 999 in this instance.
 - This is the only appropriate course of action in the emergency situation.
 - Reiterate the importance of making smart Switched On decisions that are driven less by emotions and rather rationale thinking.

PLENARY

- **Slide 54:** Ask students to consider the following questions and write them on their individual worksheets:
- Did any of your responses change from your individual answer to your group answer?
- Which were the harder questions to answer? Why?
- Could you always agree in your group on what the right thing to do was? Is there always an obvious right answer?

Once students have noted down their answers, engage in a classroom discussion asking students to share their responses to the other two questions.

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.

Differentiation

- **For learners with lower cognitive or literacy skills who would benefit from additional support or a slower pace of learning** you may wish to draw on resources from the 'Switched On for every journey' programme, which are designed for students aged 7–11. These revisit key rail safety messages in a more supported and accessible way.

