

Network Rail's

S.T.E.M.

Activities

Pack

Issue 1

Introduction

At Network Rail the safety of our passengers is paramount, and we continuously aim to 'put them first'. Acknowledging this we have created a STEM Activities Pack encouraging you stay at home and keep your children educated and occupied during these unprecedented times.

We have created this pack of activities and resources, because we understand how challenging juggling work, parenting and home schooling must be. We will update the pack weekly with:

STEM Activities

The pack contains STEM resources for different age groups, with information on what you can expect the children to learn and also how you can link that to the railway, so they can understand how it connects to your job too. We will be adding to these resources regularly to try to keep them entertained

Additional Learning Resources

At the back of the pack you'll find a summary of other available learning resources with links. The aim of this section is to make it as easy as possible for you to know what resources are available, rather than having to trawl to find them. We will continue to add to this section and welcome you to share anything you find with the team, so it can be included. We will review the usefulness of these resources to expand and provide more detail, as the pack grows each week.

Please get in touch with the team if we can help, if you have any ideas or suggestions or things you feel would help you and other parents. The team can be contacted on earlyengagement@networkrail.co.uk. We will begin to gather the questions we hear most often into one place and will add a Frequently asked questions page into the document soon.

Time Capsule Activity Sheets

Challenge the creative minds of your children with this COVID-19 activity pack. Whether it's colouring or interviewing their parents, children can create memories to remember 2020 in a positive light!



5-8



9 - 11



12 - 14



15+

WHAT YOU'LL NEED

- Pencils
- Colouring Pens
- Paint (optional)
- ... and the creative minds of your children!!!

DURATION:

- 10 – 15 minutes per activity sheet

LEARNING OUTCOME(s) / RAIL LINK

Consider the following:

- Things do not always go to plan on the railway and resilience and adaptability are too vital qualities often required from our employees. Teaching your children from young how to view to the positives in negative situations can develop these behaviours.
- The rail industry requires more than just technical minds, creativity is key for any job on the railway. Help your children to explore their creative side whilst completing this workbook.

PARENT INVOLVEMENT (Star Rating)

A scale the level of involvement from the parent required to complete the task



Kids D.I.Y.

SUPPORT
NEEDED...

ALL HANDS
ON DECK!

Click [HERE](#) to Access the
'Activity Sheets'

How to be Safe Around Electricity

BBC Bitesize has created a short lesson teaching the importance of safety when handling electric appliances in the home.



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WHAT YOU'LL NEED

- Laptop/Desktop or Mobiles Device (i.e. iPad)

DURATION:

- 10 minutes

Click [HERE](#) to Access the Lesson

LEARNING OUTCOME(s) / RAIL LINK

Consider the following:

- Network Rail is a safety critical company, meaning the safety of our employees and passengers is at the forefront of what we do. 'Everyone Home Safe Every Day' is our promise to the nation, underpinning all our work and activities.
- Children should watch the animated clip, outlining safety considerations to be taken around the home and complete the activity underneath to show their understanding.
- Challenge children to 'Close Call' any behaviours at home that could be deemed as 'unsafe'.

PARENT INVOLVEMENT (Star Rating)

A scale the level of involvement from the parent required to complete the task



Kids D.I.Y.

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Balloon Cup Racers

Have your children manoeuvre their 'cup transport' models around the course using the wind force from a balloon.



5-8



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12 - 14



15+

WHAT YOU'LL NEED

- Plastic cups (preferably of different sizes)
- Clear Table/Board
- Masking Tape (to create your course)
- Balloons
- Stationery (for cup model design)



DURATION:

- 15-20 minutes: Model Design
- 5-10 minutes: Course Design
- 15-20 minutes: Practical Task

LEARNING OUTCOME(s)

- Consider how different cup sizes impact the amount of force needed to move the cup.
 - Children should also consider how their designs impact the weight of the cup and in turn the force required for movement
- **Safety Consideration:** More force may increase the speed, but it will also decrease the control of the cup resulting in the cup falling off the course
 - Children should consider the effect of speed and control on safety.

RAIL LINK

When designing a train many factors have be accounted such as materials, speed, infrastructure and most importantly safety.

Consider the following:

- Imaginative designs/add on features can increase the passenger experience on the train, but can too much decrease efficiency?
- Higher Speeds can get passengers from A to B quicker however how does this impact the safety of the passengers?
- Lower Speeds can increase safety but how will the mood of the passengers be affected with an increased journey time?
- The rail infrastructure is varied around the UK. Will different course designs impact the amount of speed and control required to complete the course?

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Balloon Cup Racers

Have your children manoeuvre their 'cup transport' models around the course using the wind force from a balloon.

INSTRUCTIONS

1. Gather the materials that you need to create your cup and course.
2. Decorate your cup models making sure they are different weights and sizes.
3. Using masking tape, parents will need to create the course. This can include straight lines or curves.
4. Place your cup models at the beginning of the course.
5. Blow up your balloon but do not tie it.
6. Release the air inside the balloon near the first cup to allow it to move.
7. Note how the design of the cup has impacted how much force is required for movement.
8. Repeat step 6 to move your cup around the course.
9. Once your first cup has reached the end of the course, blow up your balloon again to guide the remaining cups around the course.
10. Reflect on how the force needed may have differed to the first cup.

Don't Tip the Ship!

Create your paper boat and investigate how the size and shape of the model affects the weight it can carry before it sinks!



5-8



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15+

WHAT YOU'LL NEED

- 1cm² paper
- Ice cream tub, or any tub/tank
- Coins (to act as weights)
- Sellotape
- Scissors
- Cloth/Mop (for any spills)
- Optional Extra Materials for the boat (foam, foil, plasticine)



DURATION:

- 1 hour

LEARNING OUTCOME(S)

- Consider how different the size, shapes and materials (if you opt to include this option) will affect the amount of coins (weight) the model boat can carry.

RAIL LINK

Similarly, to this boat exercise, when designing the railway (infrastructure and modes of transport) many factors must be considered including:

- Size/Shape of infrastructure/vehicles
- Cost of Materials
- Meeting the Customers' Needs

Consider the following:

- Less weight in the vehicle may decrease the likelihood of damage/sinking (increasing safety) but how could this impact customer satisfaction?
- Increasing what the vehicle can carry might meet the customers' needs but what impact could too much weight have on the efficiency and safety of the vehicle?
- Changing the material from cheaper resources (paper) to more sturdier materials may increase efficiency and quality but what impact does it have on cost?

PARENT INVOLVEMENT (Star Rating)

A scale the level of involvement from the parent required to complete the task



Kids D.I.Y.

SUPPORT
NEEDED...

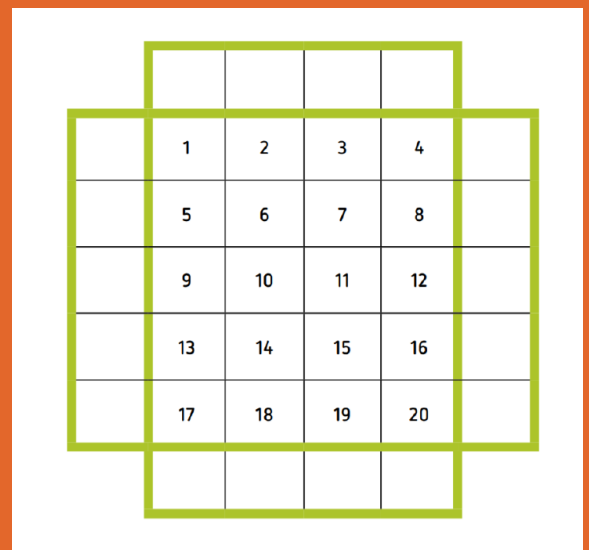
ALL HANDS
ON DECK!

Don't Tip the Ship!

Create your paper boat and investigate how the size and shape of the model affects the weight it can carry before it sinks!

INSTRUCTIONS

1. Fill a tub or tank with water. Place it on a mat or tray so your surfaces don't get slippery with spilled water.
2. Take a piece of squared paper. Create a rectangle of 6 x 7 squares. Cut this out as shown.
3. Fold up the four sides (shown in green). Tape the corners together to make it watertight.
4. Count the number of squares in the base of the boat.
5. Gently place the boat in the tub of water – it will float!
6. Add weights one after the other until the boat sinks. For best results, place the weights equally and in a balanced way around the boat. On a real ship, the weight is carefully spread across it to prevent it from tipping.
7. Now try different designs. Does the size or shape of the boat affect how many weights it can hold? The only limit is the size of the tub!



My Skills My Life Quiz

Acknowledging the skills gap and lack of diversity impacting the railway industry, Network Rail has partnered with WISE (Women in Science and Engineering) to develop the 'My Skills My Life' (MSML) Quiz!



5-8



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15+

WHAT YOU'LL NEED

- Laptop/Desktop or Mobiles Device (i.e. iPad)

DURATION:

- 10 minutes

Click [HERE](#) to Create a Profile
and Access the Quiz!

LEARNING OUTCOME(s) / RAIL LINK

At Network Rail, we firmly believe that you are less likely 'to be what you couldn't see'.

- Complete the personality quiz and read the profiles of female role models whose jobs match your 'career personality type'. Profiles include a description of the role models' job, their pathway to get there and even their salary!
- **FOR THE MUMS:** The Quiz is only as good as the profiles you get to read at the end, and we aim to have as many of female workforce's profiles on there as possible! If you are in STEM-related role and believe you could inspire the future generation of female workers – please create a profile by following the instructions on the link below:

<https://www.wisecampaign.org.uk/what-we-do/expertise/welcome-to-my-skills-my-life/how-you-can-get-involved/create-your-role-model-profile/>

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Primary Engineer Leaders Award

'If you were an engineer, what would you do?' is an annual STEM (science, technology, engineering and maths) competition that asks students to identify a problem and design a solution, inspiring them to find the engineer they could be and helping design the future of engineering.



5-8



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12 - 14



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Click [HERE](#) to access more information and the competition!

This year's Leader Award is accompanied with 7 lesson plans, which will support your delivery of the programme and its key outcomes. Should you choose to use them, they will provide you with a structure that helps you develop specific skills and curriculum knowledge in your pupils, whilst they complete set tasks which are required for the competition. Each of these lessons has been mapped across the relevant English National Curriculum and Scottish Curriculum for Excellence areas, such as KS1-4 English, KS1-3 Design & Technology, Art & Design and P1-S3 Literacy and English, Technologies and Expressive Arts. It provides an exciting opportunity for the cross curricular application of key skills, knowledge and understanding learnt in these subjects, through an innovative, successful and entirely personal project. These resources support the delivery of the programme, which offers young people a platform to speak and write fluently and openly about their ideas, solutions and emotions. The development of multiple means of communication, whether it be spoken, written or drawn, allows young people to express themselves with no restriction.

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Engineer Steve

Internal

<https://networkrail.sharepoint.com/sites/myconnect/news/Pages/National/News/Engineer-Steve.aspx>

External

https://www.youtube.com/playlist?list=PLcieUuOBJRercdh-Rt_h2pc3g61DE5Bpz

Khan Academy

<https://www.khanacademy.org>

Especially good for maths and computing for all ages but other subjects at Secondary level. Note this uses the U.S. grade system but it's mostly common material.

BBC Learning

<http://www.bbc.co.uk/learning/coursesearch/>

This site is old and no longer updated and yet there's so much still available, from language learning to BBC Bitesize for revision. No TV licence required except for content on BBC iPlayer.

FutureLearn

<https://www.futurelearn.com>

Free to access 100s of courses, only pay to upgrade if you need a certificate in your name (own account from age 14+ but younger learners can use a parent account).

Seneca

<https://www.senecalearning.com>

For those revising at GCSE or A level. Tons of free revision content. Paid access to higher level material.

OpenLearn

<https://www.open.edu/openlearn/>

Free taster courses aimed at those considering Open University, but everyone can access it. Adult level, but some e.g. nature and environment courses could well be of interest to young people.

Blockly

<https://blockly.games>

Learn computer programming skills - fun and free.

Scratch

<https://scratch.mit.edu/explore/projects/games/>

Creative computer programming

Ted Ed

<https://ed.ted.com>

All sorts of engaging educational videos

National Geographic Kids

<https://www.natgeokids.com/uk/>

Activities and quizzes for younger kids.

Duolingo

<https://www.duolingo.com>

Learn languages for free. Web or app.

The Kids Should See This

<https://thekidshouldseethis.com>

Wide range of cool educational videos

Crash Course

<https://thecrashcourse.com>

You Tube videos on many subjects

Crash Course Kids

<https://m.youtube.com/user/crashcoursekids>

As above for a younger audience

Crest Awards

<https://www.crestawards.org>

Science awards you can complete from home.

iDEA Awards

<https://idea.org.uk>

Digital enterprise award scheme you can complete online.

Paw Print Badges

<https://www.pawprintbadges.co.uk>

Free challenge packs and other downloads. Many activities can be completed indoors. Badges cost but are optional.

Tinkercad

<https://www.tinkercad.com>

All kinds of making.

Prodigy Maths

<https://www.prodigygame.com>

Is in U.S. grades, but good for UK Primary age.

CBeebies Radio

<https://www.bbc.co.uk/cbeebies/radio>

Listening activities for the younger ones.

Nature Detectives

<https://naturedetectives.woodlandtrust.org.uk/naturedetectives/>

A lot of these can be done in a garden, or if you can get to a remote forest location!

British Council

<https://www.britishcouncil.org/school-resources/find>

Resources for English language learning

Oxford Owl for Home

<https://www.oxfordowl.co.uk/for-home/>

Lots of free resources for Primary age

Big History Project

<https://www.bighistoryproject.com/home>

Aimed at Secondary age. Multi-disciplinary activities.

Geography Games

<https://world-geography-games.com/world.html>

Geography gaming!

Blue Peter Badges

<https://www.bbc.co.uk/cbbc/joinin/about-blue-peter-badges>

If you have a stamp and a nearby post box.

The Artful Parent

<https://www.facebook.com/artfulparent/>

Good, free art activities

Red Ted Art

<https://www.redtedart.com>

Easy arts and crafts for little ones

The Imagination Tree

<https://theimaginationtree.com>

Creative art and craft activities for the very youngest.

Toy Theater

<https://toytheater.com/>

Educational online games

DK Find Out

<https://www.dkfindout.com/uk/?fbclid=IwAR2wJdpSJSITf4do6aPhff8A3tAktmnpaxqZbkgudD49l71ep8-sjXmrac>

Activities and quizzes

Twinkl

<https://www.twinkl.co.uk>

This is more for printouts, and usually at a fee, but they are offering a month of free access to parents in the event of school closures.

Ruth's Little Kitchen

<https://www.instagram.com/ruthslittlekitchen/>

Instagram username: ruthslittlekitchen

A cook-along profile for all ages