Metro Invention Challenge

Teacher Workshop Guide

The aim of Little Inventors workshops is to allow students to think creatively and explore what is possible with their imagination. We want to inspire students to think up and draw original, ingenious, funny or perfectly practical invention ideas without limits!

The Metro Invention Challenge offers a creative approach to learning using STEAM and invention. It is a programme designed for the Nexus Metro in partnership with Little Inventors.

At the end of the workshop, students will be able to draw and submit their own inventions to appear on **metrotakeover.littleinventors.org**, where they will be reviewed by the Little Inventors team. There is also a bulk upload tool available for teachers, please email **hello@littleinventors.org** for more information and access to this. Their idea might be chosen as a Little Inventors team favourite, brought to life and displayed in a Metro station!

Metro Invention Challenge is supported by a resource pack:

The resources have been designed to support scaffolded learning for students aged 6 to 12 years old to stretch their imagination and creativity. The resource includes a PowerPoint presentation, 3 activity sheets and a set of mini-challenge cards, and this resource guide, for you to select or combine to suit the time you have available and the abilities of your students. Use the notes in the presentation to deliver your workshop. You can choose the slides and activity sheets that you think are most appropriate to support your lesson, whether for primary or secondary students. We encourage a process where students can come up with lots of initial ideas and then they can develop one or more ideas, with added detail, where time allows.

This resource covers curriculum outcomes that support the National Curriculum in the following ways:

Key Stage 1 and 2:

Significant historical events, people and places in their own locality/History/Science/ Literacy/Maths/Design and Technology/ Expressive Arts and Design

Key Stage 3:

Science/History/Art and Design/Literacy/Design Technology

Community Takeover 1980-2020

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A step-by-step guide to using the resources:

1. Start by downloading the Challenge pack
2. Familiarise yourself with the available resources
3. Ensure that you have all the printed materials and tools needed to begin:

   Printed materials per student:

   1x Invention sheet (worth printing a few spare ones!)

   1x Metro Journey Story Planner

   1x Invention Game Worksheet

   1x Mini-challenge cards (can be shared in a group)

   AND/OR tools or materials needed during the workshop: Make sure you have plenty of black pens and colouring pens/pencils available for the workshop!
4. When you are ready to deliver the workshop, use the Metro Invention Challenge presentation on a whiteboard or computer to guide you through the activities.
5. Use the presentation guide notes to prepare you for each slide

Running the workshop

This guide suggests how you might want to use the Little Inventors resources to run a structured workshop over a single or a double lesson. Customisable and extended activities are also provided to enable all students to make the most of the workshop.

The workshop is composed of 6 activities:

1. Activity 1 (PowerPoint Presentation): What is the Metro Invention Challenge?

This is an opening activity which introduces the challenge and invites the children to think about the great North East inventors of the past before exploring Metro as it is today.

2. Activity 2 (worksheet): Metro Journey Story Planner

Create a story about your journey on Metro. Use this sheet to get your students to think about all the aspects of a Metro journey to identify starting points for inventing.

3. **Activity 3 (worksheet): Invention Game**

This game gets ideas flowing by putting together or adapting useful travel objects to make something new.

4. **Activity 4 (Game): Mini-challenge Cards**

More idea generation to support children to think of lots of ideas. Use these as a random draw or assign cards to students. Great as an individual or group activity.

5. **Activity 5: Invention Drawing**

6. **Activity 6: Sharing Invention Ideas**

The total time required to complete the following activities varies and we recommend running it over one to three sessions. Some of the activities could also be set as homework or be used as part of literacy or maths lessons. You may want to deliver this as part of an existing scheme on design and technology, or as a stand-alone project. It's up to you!

Activity 1: What is the Metro Invention Challenge? (PowerPoint Presentation 20min + activity timings)

Explain that in this workshop, students will get to learn about invention, some of the history of Metro and some of the great transport inventors of the North East. Explain that they will also get a behind the scenes look at the Metro Railway and the people who work on Metro before coming up with an invention idea that will create new and fun ways to use Metro.

Open the **Metro Invention Challenge presentation** and go through the slides with your class; feel free to pause the presentation to complete the additional activity resources:

- **Slides 1-2** Explains the Metro Invention Challenge
- **Slides 3-4** Introduces Little Inventors and explains how we make children's inventions real and some examples of children's inventions that professional makers have brought to life.
- **Slide 5** Invites children to become Transport Inventors! Could the children become the next great transport inventor in the North East? Invite them to put on their inventor's hat! (Talk Partners: Can the students tell the person next to them what their inventor's hat looks like?! For example it could be a bright yellow bowler hat with useful tools tucked under a secret compartment)
- **Slide 6** Gives two examples of great North East Transport inventors: William Armstrong who built Newcastle's Swing Bridge and invented the hydraulic mechanism of London Tower Bridge. Also, George Stephenson, with his son Robert, invented the steam engine 'Rocket' which transformed railway travel.

- **Slides 7-9** Some history and facts about Metro including 'Metro in Numbers'! Why don't you use the 'Metro in Numbers' slide in your maths lesson using the following challenges?

Metro in Numbers: Number challenges (for KS2+)

- There are about 500,000 homes in Tyne and Wear, can the students work out roughly how many houses live near a Metro station?
- Can the students order the numbers/distances from greatest to smallest?

- **Slide 10** Journey on Metro: this explains the different stages of a Metro journey. Invite the students to imagine their own Metro journey. What might they need? What happens, first, next last? Can they turn their ideas into a story full of fantastical inventions?

You could pause the presentation here and go to **Activity 2: The Metro Journey Story Planner.**

- **Slides 11-13** Who works on Metro? These slides introduce you to some of the people who work on the metro and what their job looks like.
- **Slide 14** Meet the passengers: Find out about the interesting people/animals who travel on Metro every day.
- **Slide 15** Safety on Metro during the pandemic and a link to some additional resources if you have time.
- **Slides 16-19** Introducing invention: find out about inventing and how ideas can turn into something new that has never existed before! Your ideas could solve a problem or become a new and fun way to travel Metro!

You could pause the presentation here and go to **Activity 3: Invention Game** or, if you don't have time, the activity can be adapted to be done in pairs as a talking partners activity.

- **Slides 20-22** Let's Get Inventing: These slides encourage your students to think of inventions for Tyne and Wear Metro. You could place blank sheets of paper or post-it notes on the tables so that students can note down different ideas as they think of them. They could think of lots of inventions and then decide which would be the best to focus on for their invention drawing activity.
- **Slides 23-24** Draw your invention!

You could pause the presentation here and go to **Activity 4: Invention Drawing Activity**.

- **Slide 25-26** Gives information about how to submit your students' invention drawing ideas to Little Inventors and where to get more information about the challenge.

Use the PowerPoint as interactively as you like! You could pause the PowerPoint to use the additional resource sheets or use the questions in the slides as talking points for your class.

Invite your class to have fun by acting out invention ideas and characters in the presentation, also invite your class to think a little deeper by talking about the different aspects of Metro (for example using their senses to think about what the station looks like, feels like and sounds like).

Activity 2: Metro Journey Story Planner

Slide 10

15-20 min activity or a full hour lesson if included as a planning activity for a literacy lesson (KS2)

This is a story-making activity which could be included as part of this workshop or as a separate literacy lesson (or lesson series) about a journey on Metro.

- Look at slides 10 and invite the students to write words or draw pictures about what they see and hear. Ask them to imagine what it might feel like to be waiting on the platform or getting on the train and write any adjectives/description words they can think of.
- The students could work in pairs or table groups on a large sheet of paper or could use post-it notes to share vocabulary with the rest of the class.
- You could ask the students about their experiences travelling on the train or Metro to encourage ideas.
- Ask your students to think about the process of travelling on Metro. Which station is the nearest? What could they need for the journey? What would happen first, next and last? To encourage creative story ideas, ask them who they might meet (use slides 12-16 for ideas of different passengers and staff on Metro) or what bonkers thing might happen on the journey?
- Invite children to write/draw their ideas on the Metro Journey Story Planner

Differentiation:

Extended Activity: Invite the students to turn their journey into a story or play!

Supported Activity: Draw a comic strip about their journey with what they might need and who they might meet on the journey.

Activity 3: Invention Game

Slide 20

10 min activity (KS2)

This is an idea generating activity which encourages students to combine different objects or adapt them to make something new.

- Ask children to think about what they might need to travel. Perhaps the students could add objects to their Invention Game Sheet, or write extra objects on the whiteboard.
- Do they know what each object is used for? Ensure children know about the travel items; what they are and what they are used for.
- To generate ideas, ask the children to combine the objects to create something new. For example, could you have a rain-poncho train ticket or a travel-pillow umbrella? What might these new inventions look like and how would they work?
- Can the students describe and draw their ideas?

Extension: Create a sales pitch for their new object. Can they persuade the class that they really need their object to travel on Metro?

Support: Could they add an extra feature for one of the travel accessories rather than creating something new?

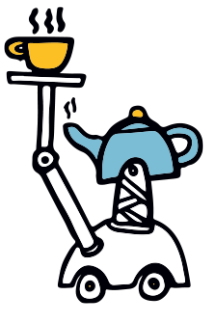
Activity 4: Challenge Cards

15 min (KS2)

These challenge cards help to break down the topic into some specific starting points and prompts.

- Students can work individually or in a small team
- Give each student or group a set of mini-challenge cards and ask them to respond to the prompt on the card.
- You could make it a speed challenge, ask them to name as many responses to the mini-challenge card as they can in two minutes, then move on to the next one. They can then select one idea to take forward and develop fully.

Extension: Without giving any clues away about their invention, ask students to take part in a quick-fire round of questions (asked by other students) ie. other students can ask only questions that the inventor can answer yes/no to. i.e is it helpful? Could it helpful in other places, such as in the home? Does it make a noise?



Activity 5: What's your invention? (20-40 mins)

Once students have had a chance to develop their ideas a little through one or more of the activity sheets, give them an invention sheet to draw and explain their own invention.

Students can draw more than one invention if they want.

Differentiation: Students make a video or audio recording to explain how they got their idea in their own words. Students could make a 3D model to express their invention ideas.

Extension activities: Students could give a presentation of their idea to the class, make a prototype model of their invention, create a poster for their invention or make a video about it.

Activity 6: Sharing Invention Ideas

Gather all the student invention drawings in a gallery around the classroom / workspace. Get students to discuss their favourite ideas – what do they like and why? Encourage positive feedback throughout.

- What do they think of their invention?
- What are its strengths and weaknesses?
- How do they think their invention would work in real life?
- Can they imagine their invention being used by other people? What would they say?
- What other ideas or challenges can they think of?
- Why are inventions useful?
- How will they approach problems in the future?

Give students extra invention sheets to come up with more invention ideas at home.

After the workshop:

Make sure you collect all invention sheets during the workshop. Invention drawings should be scanned (rather than photographed) to be uploaded to **metrotakeover.littleinventors.org** for a chance to get picked as Little Inventors Team favourites, and some ideas will be selected to be brought to life and displayed in a Metro station.