This resource is part of a suite of materials and activities created to inspire entrants, and support teachers, and parents to enter *maths inside*: a photo competition open to everyone in Scotland. *maths inside*: see different, make connections, celebrate!

what is this?

This is an image bank activity containing images and questions to inspire interdisciplinary investigation and learning based on the *maths inside* photo competition and lead pupils towards the creation of an entry. It is suitable for **Early Years to Fourth Level (Pre-school–S3)** (credits).

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maths inside: see different, make connections, celebrate!

complementary resources

→ example journeys towards an entry to the competition, which also provide possible answers to the questions posed here
→ example interdisciplinary learning (IDL) activities based on the CfE experiences and outcomes (Es+Os)
→ Image Bank 1 for Early Years to Fourth Level (Pre-school–S3)

Storm in a Teacup

Have you ever noticed that shapes just like the clouds in the sky are formed when milk is poured into tea? What do you know about the *maths inside* a cup of tea or in the clouds?

What is the same with tea and air? What is different? Why does the tea mixing with the milk look like a storm cloud in the air? Where and when else do clouds form like this? Why don't all clouds in the sky look the same? Why do satellite pictures of Earth have the same circular patterns of clouds as the milk in the teacup? How do these patterns in our cup and on Earth form? Can you see these cloud patterns on other planets?

Which photo is more pleasing to look at? Is it clear what is being shown in each? Can you adjust our use of light and colour to make it any more appealing? How can the framing and composition of the photo change how it looks? What emotions do you feel during a storm? How can you capture them in your photo?

Can you find deep connections between everyday items and events that happen across the whole world? What and where is the *maths inside* our household items? Can you give it a title, take a photograph and add a sticker, and write a commentary that describes the maths you have discovered?

→ Storm in a Teacup example journey

Symmetry Inside

Can you see the symmetry in the plant above? What if we look at certain parts, its leaves, or its stems? For example, how many leaves come out at a time, and where do they come out from? What about the stalks themselves, do they follow any pattern along the main "trunk" of the plant?

How can you describe the pattern found on the leaf in the photo above? Why this pattern, and not another? What properties does it have? Where else does this kind of symmetry appear? How does the plant benefit from using these repeating shapes? Can you find a similar symmetry in classical or jazz music? In chemistry, poetry, or elsewhere in biology?

How visible are the patterns of symmetry from the pictures alone? What about the quality of the photo? How can I make it so that it is easier to focus on the subject and spot the patterns? What should be in the background of this picture? Where should I position the camera, and why?

What is your idea of symmetry? Do you experience it in your subject? In your daily life? Now it is your turn to give it a go! Where have you spotted maths inside your life? Can you give it a title, take a photograph and add a sticker, and write a commentary that describes the maths you have discovered?

→ Symmetry Inside example journey

Travel Constraints
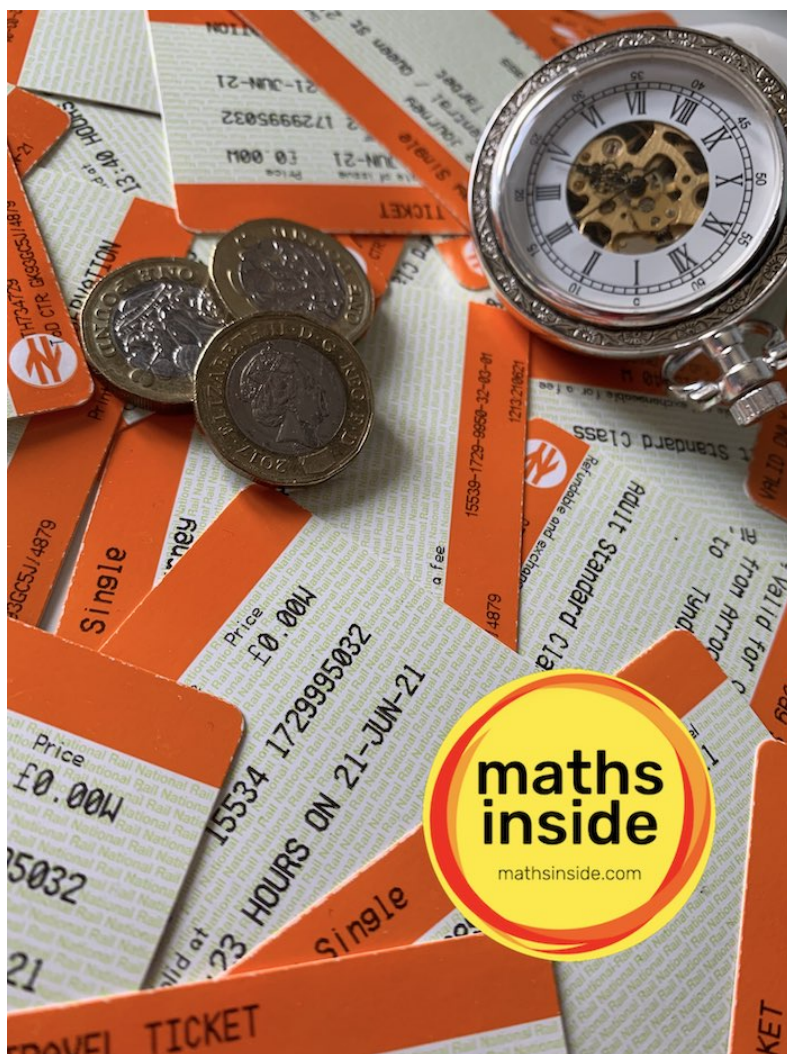
What is the quickest route to get to from one place to another? How much does it cost? What is the cheapest route? How fast is it? Are these the same route? When are they different? When traveling, what is better cheaper or faster? Or both? What changes with the method of transport? What remains the same? Can a compromise be found to get a route and method that is both quick enough and cheap enough?

Above is a photograph of some coins and a pocket watch resting upon numerous train tickets. Below is a photo of an arrivals and departures board with a quizzically posed and What represents travel choices, time and money constraints to you?

What do you think of these photos? Are they aesthetically pleasing or interesting? What can make them better photographs? What is the important information to convey to the viewer? How can you make the subject clear? Why is it interesting? What focus, lighting and contrast make the photograph more visually appealing? Can you think of any other settings we could adjust in taking the photo? What differences stand out between the two photos? Does one spotlight the *maths inside* more than the other? What emotions and feelings does travel and choosing a route bring up for you? How can theses be explored in a photograph?

For an entry to the *maths inside* photo competition, since the photo already has the *maths inside* sticker added, it needs two more things: a title, and commentary. What title can you give the photo to highlight what is important in the photo? What can you write in a commentary to summarise what you discovered in answering your questions? What part of this photo would you choose to highlight? Why did you choose this particular part? What is interesting about it? How could you describe what's happening, and why?

Now it is your turn to give it a go! What other situations have competing features or constraints? When else are choices constrained and compromises necessary? Where have you spotted *maths inside* your life? Can you give it a title, take a photograph and add a sticker, and write a commentary that describes the maths you have discovered?

→ Travel Constraints example journey

Open to all ages with prizes in each level. You only need a mobile, the internet & curiosity! Enter on your own or as a team, mind to add the maths inside sticker, and submit in one, or in as many categories as you like. The photo should be your own, without changes, and for a chance to win, cannot be shared anywhere else. View the T&C for more information, and please do get in touch if you have any questions.

credits

This suite of resources are the fruit of a collaborative project between undergraduate and postgraduate students from the University of Glasgow — School of Mathematics & Statistics, Education Scotland, and Dr Andrew Wilson (*maths inside* Founder and Director).

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The photos above are credited to Jordan Baillie, Christopher Johnson, Christian Lao, and Ross Sneddon.