> This resource is part of a suite of materials created to inspire entrants, and support parents, teachers and those out-of-school to make deeper connections with their surroundings. The *maths inside* is waiting to be discovered!

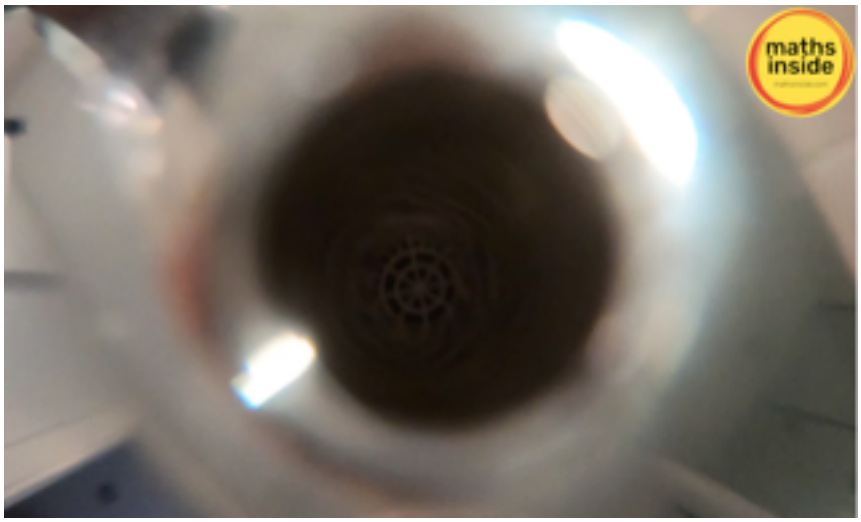
Below, you can find an example documenting the submission journey for an **Senior Phase** entry to the *maths inside* photo competition (credits).

We welcome entries, both individually and in groups, from all ages of children and young people, as well as parents, guardians, carers and teachers and anyone qualifying for the out-of-school category! See mathsinside.com for full details.

Flow

Have you ever thought about how many different types of things flow? Almost anything that flows is a fluid. Fluids are all around us and they move in some pretty interesting ways. Have you ever pondered this connection between water, air, and even gerbils in sufficiently large quantities! Have you ever examined the water coming out of your bathroom tap? What different states can it be in? What happens if you turned the tap on full blast? How is the water flow when the tap is only opened just enough to get it beyond a stream of drips? Try it now.

This is a photograph from inside the steam of water coming from my bathroom tap when it is only just enough to get a smooth flow. We can see from the bottom of the stream to the faucet.



Since this is a submission to the *maths inside* photo competition and I've already added the sticker, it needs two more things: a title, and a commentary. What title could you give the photo? What could you

write in your commentary? What part of the photo could you choose to highlight? Why did you choose this part? What makes it interesting? How could you describe what's happening? Why is it happening?

I titled my photo

> Straight from the source

and gave it the commentary

> The particles in the water coming from my bathroom tap are flowing past each other in smooth layers, so the light within the stream isn't refracted and we can see all the way to the source

What is that at the top of the picture? How often do you look at your own bathroom tap from that angle? What do you think of this photo? Could it be considered an aesthetically pleasing photograph? Or a technically interesting photo? To take it, I put my phone in a sandwich bag and hoped it was pointed in the correct direction (be careful if you try this!). The maths inside photo competition is a photo competition, so to make a better entry, we should both take a better photograph and develop our commentary.

What could make a better photograph? What does the viewer need to be told in the photo above? What is the subject? What is happening? Why is it interesting? An important part of taking a photograph that makes sense without being told about the context is framing. What could we change just about the framing of the photograph to help tell a more compelling story? One thing is to pull back, to make it clearer that the subject is a tap. Could you play with the framing, lighting, focus, and contrast to make a visually interesting photograph? I took the photograph below which I think is better for this competition

What can we add to the commentary? What questions do you have about it looking at it for the first

time? How could you answer them? What do you see in the first photo that you don't in the second? Why does this change happen? I chose to keep the same title

> Straight from the source

and change my commentary to

> This is a photograph of water flowing from my bathroom tap. The water particles are flowing past each other in smooth layers without mixing, so the light passing through the water is only refracted by the outer surface of the water. Because of this, we can see through the water and to a warped image of what lies behind the stream. This behaviour is called laminar flow. Laminar flow is influenced by the speed of the flow, the consistency of the fluid that is flowing, and the shape of the channel the water is coming out of. This is an important concept in applied mathematics, physics, and engineering.

This commentary covers the same ground as the first one, but then it takes a deeper-dive, telling us about why the behaviour (glassy flow) arises not just a consequence (it's see-through). I also tell you what flows like this are called, which is an interesting detail.

Now it's your turn! Where is the *maths inside* your life? Can you photograph it, add a *maths inside* sticker and title, and write a commentary that explains what you have found?

Remember that submissions need to be original to be eligible for the maths inside photo competition. Judges can only accept original photos, commentaries and titles that are not featured, shared or displayed elsewhere (this includes social media and other competitions). See the T&C for more information, and please do get in touch if you have any additional 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, and Dr Andrew Wilson (*maths inside* Founder and Director).

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The photos above are credited to *Jay Mackenzie*.