

Lesson Plan

NEUROHEADWAY

Neuroscience Into Education

Lesson objective	Introduction	Main activity	Reflection	Success criteria
Where is mathematics used and why is it special that mathematics is so versatile? LO: to be aware of the usefulness of mathematics, and introduce the question as to how this is possible	We want children to learn mathematics in school, but at the same time it is often not so clear why that's important. Bring up the question what the use is of mathematics and how it's helpful	Talk about different places where mathematics is being used, and so different things for which you might need maths to understand how they work. Some examples are suggested on the slides	Reflect on the fact that, while mathematics is clearly used a lot, it is very abstract and has little to do with the world around us. How are sums telling us anything about the things we do on a day-to-day basis?	I have an idea of the pervasiveness of mathematics in the modern world. I have thought about the fact that mathematics is about very abstract things in relation to its applications.
Why did we start with mathematics in the first place? LO: to give a concrete starting point for talking about the use of mathematics and offer historical motivations for the material we now expect them to learn	Watch the animation about the emergence of arithmetic in Mesopotamia to introduce the historical context in which we first started using mathematics	Discuss some of the early applications of arithmetic, such as facilitating accounting and trade. Try to do these things without using numbers, to illustrate that it is possible, but difficult, to do these things without numbers	Do you think we could do everything we do now without using numbers (or more advanced maths)? Is it practically feasible to go about your life without ever using numbers?	I know why we started doing mathematics and so what some of the motivations are behind the development of arithmetic. I can reflect on the ease that comes with using numbers
How do numbers manage to make our life easier? LO: to understand some of the	The previous activities were focussed on understanding some	With the help of the second animation, talk about the idea	Is mathematics special in this way? Or are there other	I have an idea of how mathematics is applied to the world around us.

basics behind the application of mathematics, which make it useful for us	of the uses of mathematics. From this we can now go back to the initial point, that numbers are actually very abstract and so it's not really obvious why they are so useful	that numbers form a kind of structure which we can fit on the world. Try going back to the cases that children tried to translate and see how the fitting works. You can also try to come up with more cases where it doesn't work	disciplines that can be applied to the world in this way? Why do you think that being able to do this fitting makes our life easier in the way discussed earlier?	I can reflect on why mathematics is useful as a result.
What is mathematics useful for, for you? LO: to get children to think about why mathematics is relevant for them	After all this talk of how mathematics is useful we haven't really gotten to the issue a lot of students struggle with: why should <i>they</i> know this mathematics?	The discussion has already centred on how mathematics helps us. So, children may start with considering things they want to understand. Then the question is whether there is mathematics that would help them with that. The use of the numbers is easy to illustrate, but there are lots of other areas that may be relevant (some suggestions are in the accompanying text)	What things could I understand better with mathematics? Where might I need mathematics later on? In other words, what is the reason that I am learning mathematics now?	I have an idea of some of the areas where mathematics is helpful. I can think about the reason why mathematics is being taught, and why it is useful to learn it

Power point Example

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Where do we use mathematics?

- Lots of different maths is used by us:
 - Google uses mathematics to figure out what websites they should show you
 - Stores use mathematics to figure out how expensive their products should be
 - Social media use mathematics to find people you might be friends with in real life
 - And, of course, scientists use mathematics all the time to figure out how the world around us works

But, but, it's so abstract

- Think about the numbers for a second. Are these things you can touch? Do experiments on, like you can do experiments on atoms?
- Well, no. Numbers don't really have anything to do with the world around us. They're not around in the way that tables are.

Keeping track of stuff

- As we just saw, one of the uses of mathematics is to make it easier to know how much of something you have
- Still, you don't absolutely *have* to use mathematics: it is just as good to say that you have a bucket of water and another bucket of water as to say that you have 2 buckets of water

Making trade easier

- Similarly, using numbers makes it easier to trade: you can then say how much money something is worth
- Again, you can also just trade by saying that a fish is worth a handful of grain, a bucket of water, a piece of cloth, etc...



Numbers: they make life easier

- From these two examples you can see that the reason we use numbers, and other kinds of maths, is to make it easier for us to do things
- We *can* do them without maths. We can trade, and keep accounts, and do all those other things without using numbers. But it is much, much harder.

