FREE

My Science Club

EARLY, MIDDLE & UPPER PRIMARY CHEMISTRY

IS PAPER A SUSTAINABLE MATERIAL?

My Science Club

in collaboration with

Great Science Share for SCHOOLS

This session has been adapted for use as part of the **Great Science Share for Schools 2024** from a full My Science Club 6 session pack from our Early Primary Chemistry pack called '*Making Materials*'.

If you want to become a full member of My Science Club, **just click here** and add a 12 month membership to your basket. Then you can sit back and enjoy a full year of fully planned and prepped science clubs for any age and any subject area - we've done the all the hard work for you!

As a huge thank you for joining our club through our collaboration with Great Science Share for Schools 2024, simply enter the code **MSCGSSfS** at checkout and a 10% discount will be applied automatically. This code is valid until end of December 2024.

Welcome to our club!

Bryony and Paul, founders and co-creators of
My Science Club Ltd

EDUCATOR'S GUIDE

SESSION 1: HOW CAN WE RECYCLE PAPER?

In this My Science Club session children will collaborate to make recycled paper by using pre-prepared pulp.

EQUIPMENT TO PREPARE IN ADVANCE

QUANTITY	ITEM	NOTES
As much as you can	Newspaper sheets	Ask families of your clubbers to send in newspaper in advance.
1 for the group	Bucket of pre-soaked newspaper 1/2 filled with warm water	PREPARE FOR THE NEXT SESSION - Shred and soak newspaper several days in advance

EQUIPMENT FOR THE SESSION

QUANTITY	ITEM	NOTES
A few different pieces for each child	Selection of different types of paper	These can just be scraps and might include newspaper, parchment, writing paper , wrapping paper, wallpaper, greaseproof paper.
At least 1 per group	Newspaper sheets	Ask families of your clubbers to send in newspaper in advance.
2 or 3 for the group	Small empty bucket	A seaside bucket or a mixing bowl work well
6 per child	Paper Towels, or cloths/tea towels	The children may require more depending how much water is in the mixture.
1 or 2 for the group	Large spoon	
1 or 2 for the group	Sieve	
1 per pair of children	Rolling pin	You can also use a full water bottle as a rolling pin!

Note: additional resources will be required for subsequent sessions depending on what the science clubbers decide to investigate

PREPARATION IN ADVANCE OF THIS SESSION:

To stimulate wonder, curiosity and ultimately a line of scientific enquiry that can be investigated, this science club starts with a session making recycled paper!

We strongly recommend that you make up a bucket (or 2!) of shredded paper at least a week in advance to have the best chance of making fabulous paper!

If time allows, get your science clubbers to help you shred the paper at the end of your previous science club and fill the buckets with water.

Give it a stir every couple of days to ensure nothing is drying out. Top up with extra water if needed. Keep the bucket in a warm place as it speeds up the pulping process.

SESSION GUIDANCE

Get thinking (10 minutes)

Do you have Early Primary (age 4-7) aged children in your club?

What do we use paper for? Collate as many uses as possible from their experiences.

Do you have Middle Primary (age 7-9) aged children in your club?

Use the thinking activities above plus:
Where does paper come from? Find out what they already know and watch the short video here.

Do you have Upper Primary (age 9-11+) aged children in your club?

Use any or all of the thinking activities above plus:
What are the sustainability concerns around paper production and consumption? Find out what they already know.

TOP TIP

Ask families and colleagues to collect free newspapers or any they read at home in advance as newspapers are not as readily availalbe in as many homes as they once were!

Main Activity (45 minutes)

Activity 1: Exploring Paper

What different types of paper are there?

Show the science clubbers examples of different paper - newspaper, parchment, writing paper , wrapping paper, wallpaper, greaseproof paper.

Why do we use different paper?

Explain that paper has different properties (thickness, flexibility, waterproofed...) for different purposes.

Give your clubbers different types of paper and different writing implements.
Let them try writing on different types of paper with different things.

Discuss the varying results and establish the most paper has a purpose for which is it designed.

Main Activity (continued)

Activity 2: Making Paper

NOTE: Ensure you have pre-soaked the shredded newspaper for several days before the activity so that it is ready to use.

Activity 2a: Prepping the pulp

If the science clubbers have not been involved in the creation of the bucket of pulp, then do this short activity with them. If they were, skip straight to 2b.

Science clubbers shred newspaper and put it into a bucket of water, let them feel the consistency of it as it gets wet.

These additional buckets of pulp can be used for extra paper making the clubbers may decide to make as part of their Great Science Share for Schools question and should not be wasted.

Activity 2b: Making the paper

Now use the pre-prepared soaked newspaper.

Place a sieve over a bucket.

Scoop out the mixture from the bucket and put into the sieve.

How does it feel compared to the dry newspaper?

Press the mixture into the sieve to release the water into the bucket below.

When no more water is dripping out, provide each science clubber with some paper towels or cloth and place some of the mixture on top. Tell them to smooth it out with their hands into their desired shape. This might be square, circle, rectangle or an irregular shape.

Place a further two paper towels, or a cloth, on top of the mixture and roll it out with a rolling pin, or full bottle of water. The water will escape at the sides.

Carefully peel off the paper towels or cloth and lift your paper onto a separate fresh paper towel.

Leave to dry on a windowsill.

Tell the science clubbers, that you will all be leaving the paper to dry completely then they will be able to use it at the next science club!

The Science (5 minutes)

This section is written with the educator in mind, use as appropriate to support children's understanding of the science.

Paper is made from wood.

When the trees are felled, they are stripped of their bark and the wood logs chipped. The chips are cooked at high pressure. The high pressure removes the lignin (rigid structure) of the chips which separates the wood into cellulose fibres. The pulp is washed, bleached and dried. It is cut and packaged into the paper we know.

Some trees self seed and will grow naturally. Planting new trees after they have been felled is essential to sustain our forests. Trees absorb carbon dioxide and produce oxygen, which helps reduce the effect of climate change. Trees also help to protect against floods and soil erosion. They are home to many insects, fungi, plants and animals.

When we soak the newspaper over several days, the cellulose wood fibres are damaged and separate, becoming pulp that we use to make our paper.

Recycling has become important so that we do not waste our natural resources. Paper is a perfect material to recycle and it can be used over and over again.

EDUCATOR'S GUIDE

SESSION 2: IS PAPER A SUSTAINABLE MATERIAL?

In this My Science Club session children reflect on their recycled paper made in the last session before investigating their own question.

EQUIPMENT

QUANTITY	ITEM	NOTES
Varies	Dried recycled paper made in session 1	
1 per group	Set of 'I wonder....' speech bubbles (printable 1)	Print or display on a screen depending on your facilities.
Other equipment will vary depending on what your science clubbers decide to investigate. We have offered some suggestions throughout the guidance below		

SESSION GUIDANCE

Get thinking (5 minutes)

Have a look at the paper from last week.

What does it look, and feel like? What is it like to write on?

TOP TIP

If the paper has not dried before the session, pop it on a radiator to speed up the last part of the process.

Main Activity (55 minutes)

Depending on the age of the children in your club, we have provided some suggestions to support their scientific wonders and thinking to support them to design their own investigation as part of the Great Science Share for Schools.

The intention of the Great Science Share is to inspire 5-14 year olds to take the lead in asking, investigating and sharing scientific questions they care about with new audiences.

Therefore, the next section is more open ended in structure and does not include our usual 'The Science' section to finish with.

All ages:

Introduce Sustainable Development Goal (SDG) number 12: Responsible production and consumption in an age appropriate way. This short video might help and a range of images are on pages 15-20 of the slideshow.

Introduce the 'I wonder…' speech bubbles resource from Great Science Share for Schools (pages 21-24 of the slideshow and all printables) to support a curious mindset around their paper allowing them to lead their own further investigations. Some age specific suggestions are below:

Do you have Early Primary (age 4-7) aged children in your club?

Activity 1: Strength testing their paper:
Is their new paper as 'strong' as the newspaper it was made from? Support ways in which they can design, test and measure strength of paper. If needed, some suggestions may include making bridges and putting weights on the paper, hanging things, pulling them.

Activity 2: Purpose of the new paper:
Can their new paper be used for the same things as the newspaper it was made from? Support ways to design, test and decide this. If needed, some suggestions may include wrapping, writing, painting and refer to Activity 1 from session 1 where purpose was discussed.

Do you have Middle Primary (age 7-9) aged children in your club?

Activity 3: Growing from the paper:
Can their new paper be planted and support the growth of new plants? Support ways to design, test and evaluate how effective this is. If needed, some suggestions may include adding seeds to the pulp when making some more new paper, the clubbers could send a postcard to a family or community member inviting them to plant the paper and provide instructions to help it grow.

Activity 4: Exploring the pulp:
Does the type of paper that makes the pulp lead to different uses of the new paper? Support ways to plan, test and evaluate the effectiveness of these. If needed, some suggestions may include making several different pulps (second hand wrapping paper, paper towels, scrap paper from the classroom…) to make a range of new paper and investigating if the start material affects the uses of the new paper.

Do you have Upper Primary (age 9-11+) aged children in your club?

Activity 5: Recycle again and again and again:
How many times can the paper be recycled into new paper? Support ways to plan, test and evaluate the usefulness of the paper the more times it is recycled. If needed, some suggestions may include designing an effectiveness test drawing on their ideas of what makes a good newspaper for example.

Activity 6: Decomposing paper:
Does the paper they have made decompose? Support ways to plan, test and evaluate the process of decomposing, what speeds it up, what slows it down and how do you decide if it has decomposed…? If needed, some suggestions may include researching decomposing, designing some simple tests to observe over a period of time what constitutes complete decomposition.

ADDITIONAL ACTIVITIES FOR LATER SCIENCE CLUBS USING PAPER AS A STIMULUS:

Decorating the Paper

Your science clubbers might want to add extra decoration to the paper and it is important to do so before it is dry. This might include:

- Adding flower heads (either fresh or pre-dried)
- Adding leaves
- Adding glitter (biodegradable, plastic free)

Adding to the pulp stage

- Adding seeds so the paper can be planted when it is finished with. This is especially effective if you want to make your paper into a greeting card or message so it can be repurposed when it is finished with
- Add food colouring to the water before soaking the paper for some more unusual paper!
- Add scent to the pulp before making the paper!

Developing responsible consumption and production further

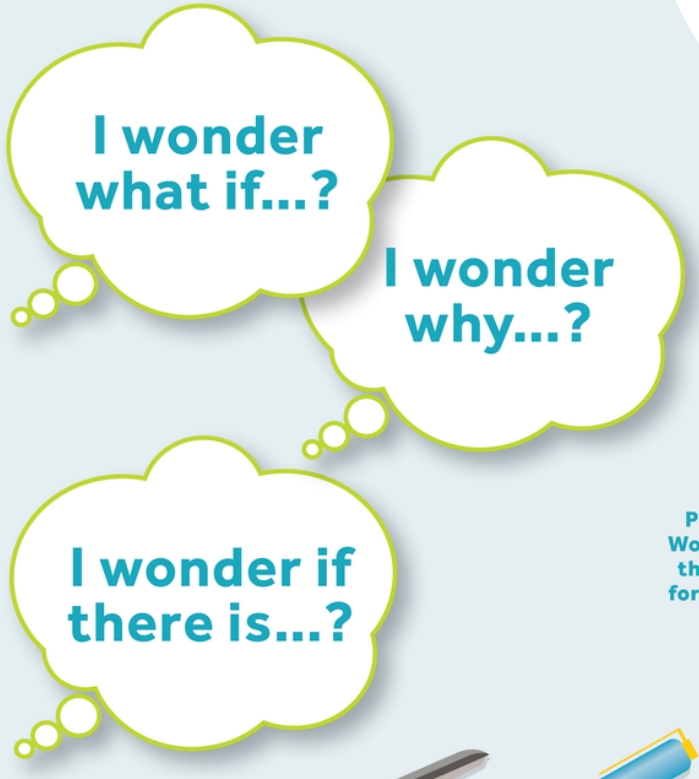
- Explore other materials that are sustainable
- Carry out a waste paper audit and develop plans for reducing paper use as a result
- Explore how much of the paper that goes into recycling could be used again first

Whilst these are not exhaustive, they are some suggestions that may support further science clubs or ideas for investigations for Great Science Share for Schools.

Links:
Great Science Share for Schools
Sustainable Development Goals
My Science Club

AGE GROUP: Early, Middle & Upper Primary
SCIENCE: Chemistry
THEME: Great Science Share for Schools paper special
SESSION: 2 of 2

Question Wonder



What you need?

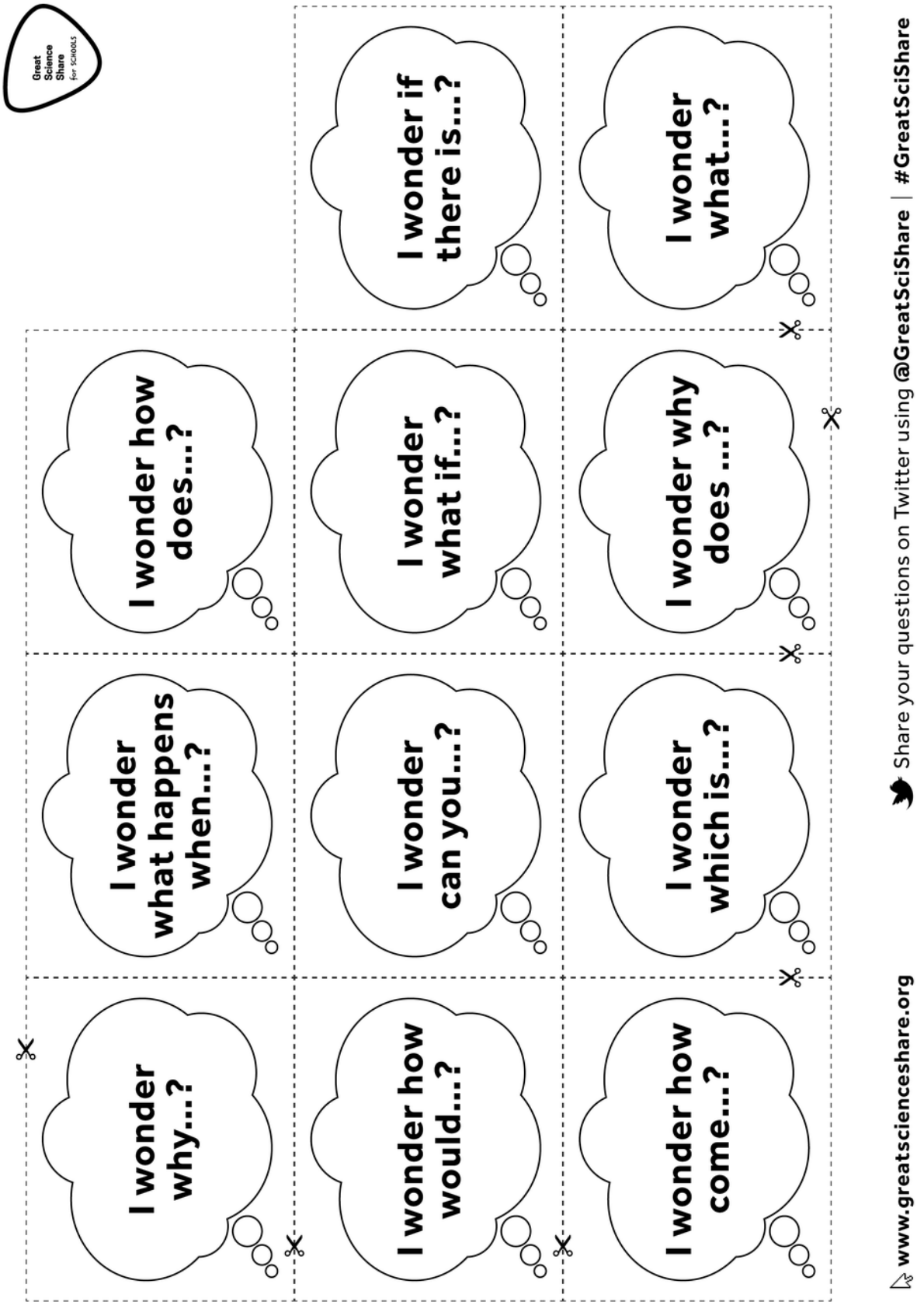
Scissors, pen.

How does it work?

1. Print and cut out the Wonder Bubble Cards.
2. Spend some time looking or walking around the spaces you're in.
3. Carefully, look, listen, hear, touch and smell the things around you.
4. Shuffle the Wonder Bubble cards and use as many as you wish to describe different wonderings you have.
5. If you can, share a few wonderings with someone else and find something that you both are curious about. Write this into the big bubble and share it with us!

Print off the Wonder Wall on the next page for cutting out!

SESSION 2


I wonder why...?
I wonder how would...?
I wonder how come...?
I wonder what happens when...?
I wonder can you...?
I wonder which is...?
I wonder how does...?
I wonder what if...?
I wonder why does ...?
I wonder if there is...?
I wonder what...?
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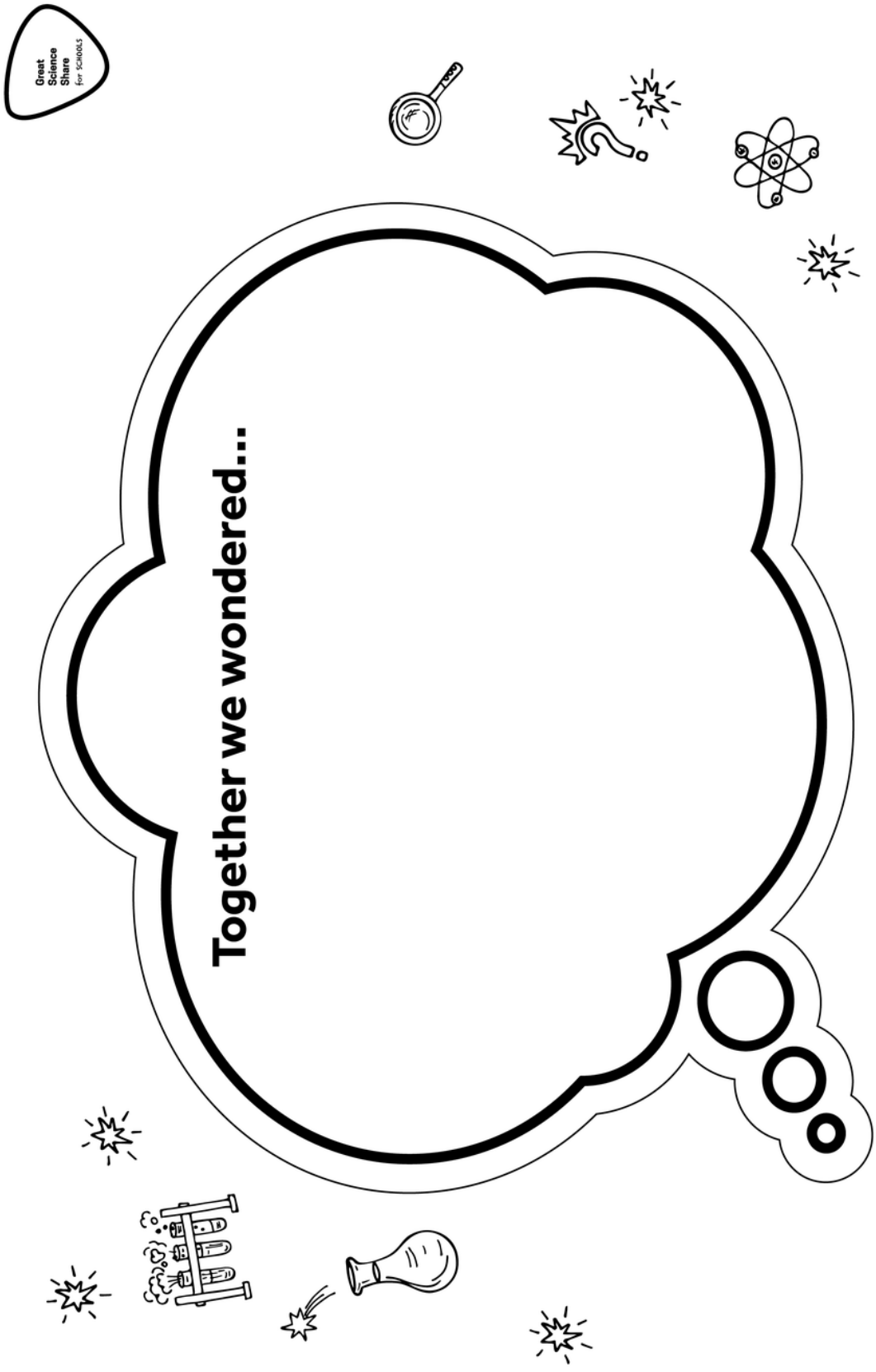
SESSION 2



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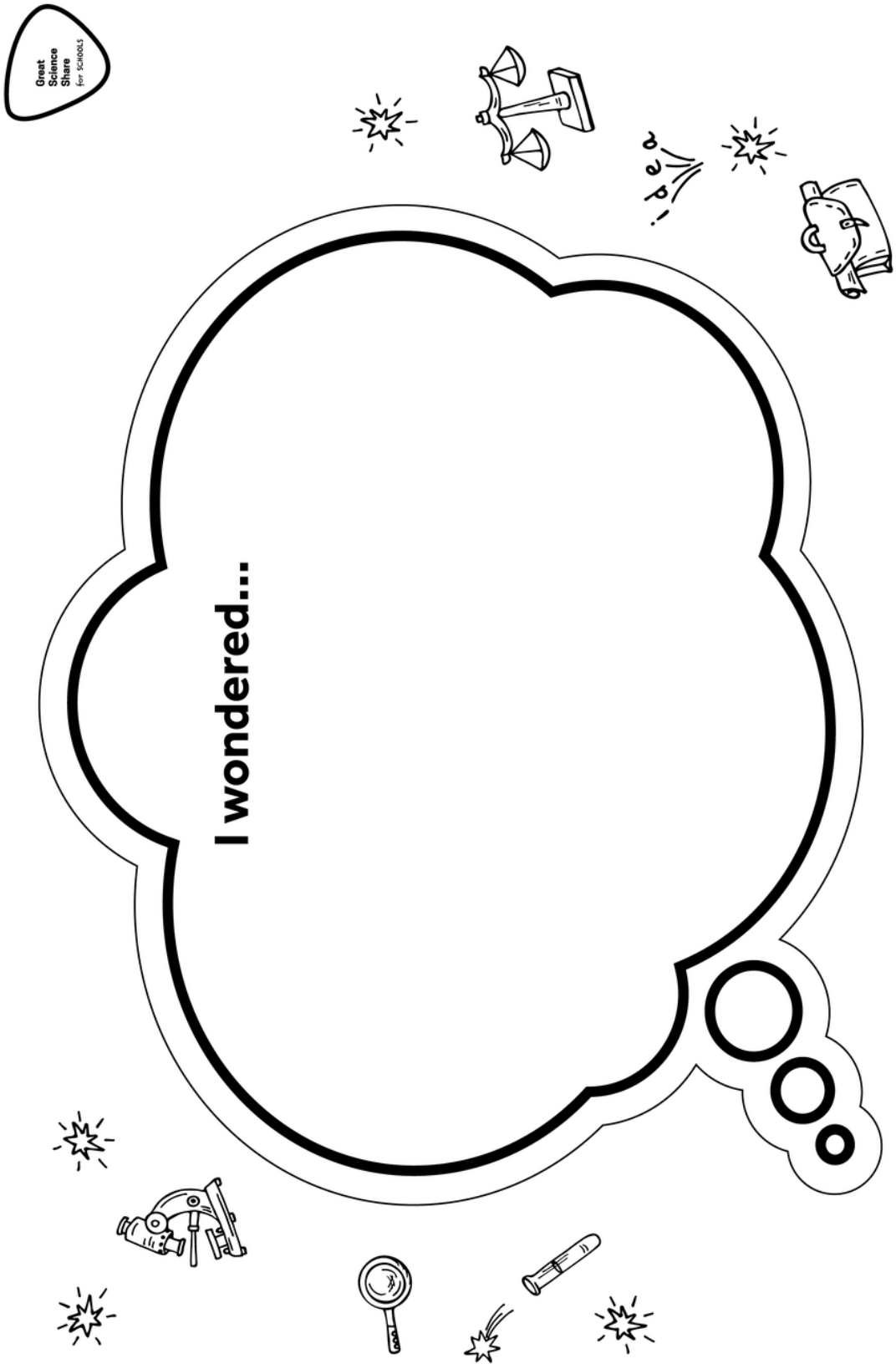

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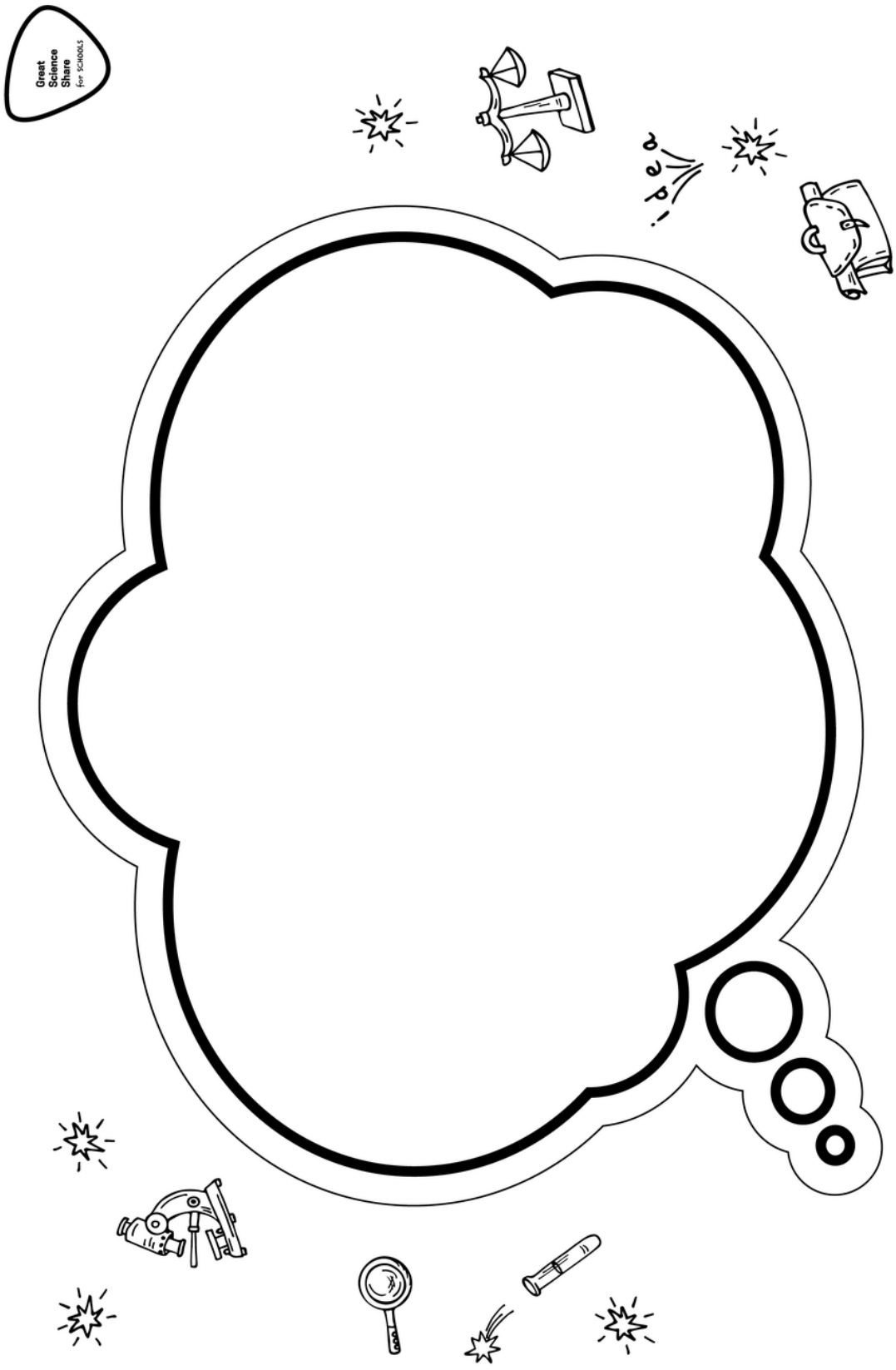

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