

States of matter

Introduction to solids, liquids and gases

*Year 4
Age 8 - 9*

For parents

Thank you for supporting your child's learning in science.

Before the session:

- Please read slide 2 so you know what your child is learning and what you need to get ready.
- As an alternative to paper, slide 6 may be printed for your child to record on.

During the session:

- Share the learning intentions on slide 2.
- Support your child with the main activities on slides 3-7, as needed.
- Slide 8 has further, optional activities.
- Slide 9 has a glossary of key terms.

Reviewing with your child:

- Slide 10 gives an idea of what your child may produce.



States of matter

Introduction to solids, liquids and gases

Key Learning

- There are three **states of matter**: **solid**, **liquid** and **gas**.
- A **solid keeps its shape** and has a **fixed volume**. Some solids are made up of small grains which can be poured into a heap.
- A **liquid** has a **fixed volume** but **changes in shape** to fit the container. A liquid can be poured and keeps a level, horizontal surface.
- A **gas** fills all available space; it has **no fixed shape** or **volume**.

I can...

- classify a range of objects and materials as solids, liquids or gases.

Activities (pages 3-7): 30 - 40 mins

Useful items to support learning:

- Fizzy water/drink and a glass.
- Clean sponge or foam cloth and a bowl of water.
- Household items such as jam, flour, sugar, milk, toothpaste and eggs (see p.5 for suggestions).



Use lined paper and a pencil. *Alternatively may wish to print page 7 as a worksheet.*

Find out more... (page 8): 20 - 30 mins

- You may like to find out more about the solids, liquids and gases in different fruits and vegetables.



Explore, review, think, talk...

What do you already know about solids and liquids?
(5 - 10 minutes)

How would you describe the differences between a **solid** and a **liquid**? *Watch this clip:*

<https://www.bbc.co.uk/bitesize/clips/zv4rkqt>

- Think about the differences between ice and water.



- Is lava from a volcano a solid or a liquid?



- Look at these pictures of some items you may have at home.



salt



milk



glasses

fabric

phone



toast

jam



toothpaste



soap

- Think or talk about each item. Is it a solid or a liquid? How do you know?
- Which items seem to be difficult to classify?



Solids, liquids and gases

Comparing the properties of solids, liquids and gases
(pages 4-7: 20 - 30 minutes)

Gases are often invisible but we can notice them when they are mixed with liquids or trapped within solids.



Pour out a glass of fizzy drink. You can see the carbon dioxide gas bubbles rising.

Squeeze a sponge or a foam cloth under water. You can see air bubbles rising.



Where else can we notice gases? Watch this clip for clues:

<https://www.bbc.co.uk/bitesize/clips/zrdkjsx>



Now use this BBC bitesize link to compare the properties of solids, liquids and gases. Use the descriptions to help with the next activity.

<https://www.bbc.co.uk/bitesize/topics/zkgg87h/articles/zsgwwxs>

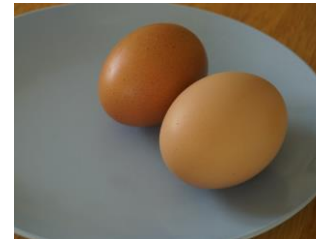
Find about 10 household items or use some the pictures opposite. Try to choose items that are trickier to classify.

- Sort the items into solids, liquids and gases.
- Some items may be 'solid and liquid', 'liquid and gas', 'solid and gas' – or 'all three'!
- Draw three overlapping circles to make a Venn diagram and record your findings.
- Explain your decisions using what you have learnt and the word bank on page 6.

Milk and a sponge are shown as examples on page 6.

Items you may like to use:

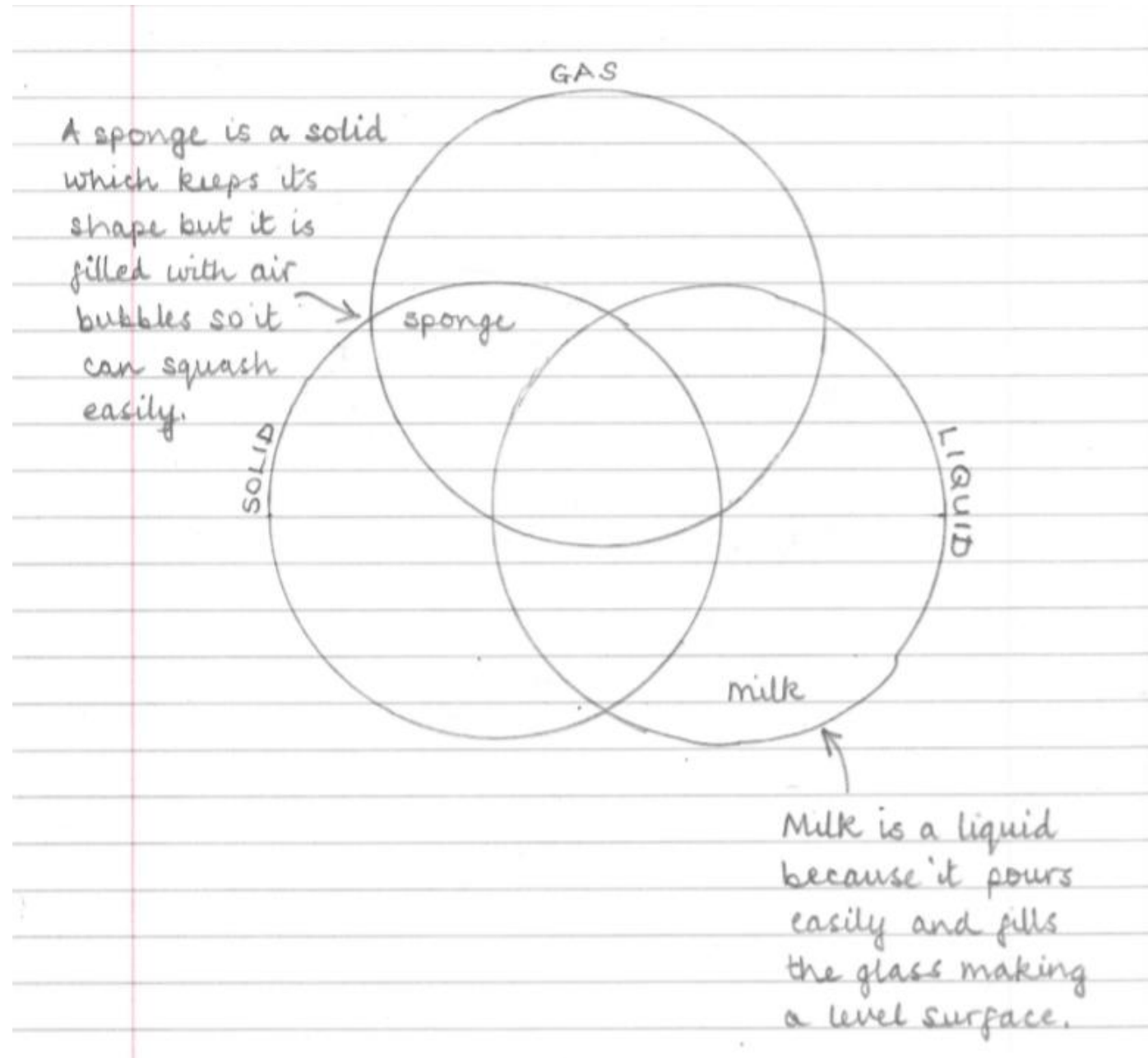
fruit jam, flour, rice, bubble wrap, sugar, fizzy drink, ketchup, honey, milk, air freshener, toothpaste, uncooked egg, elastic band, sponge.



Useful phrases

- keeps its shape
- changes its shape
- fits the container
- can be twisted or stretched
- can be squashed
- can be cut
- can / cannot be poured
- is invisible
- has a fixed volume
- spreads out
- fills the available space
- forms a heap
- forms a puddle
- keeps a level, horizontal surface

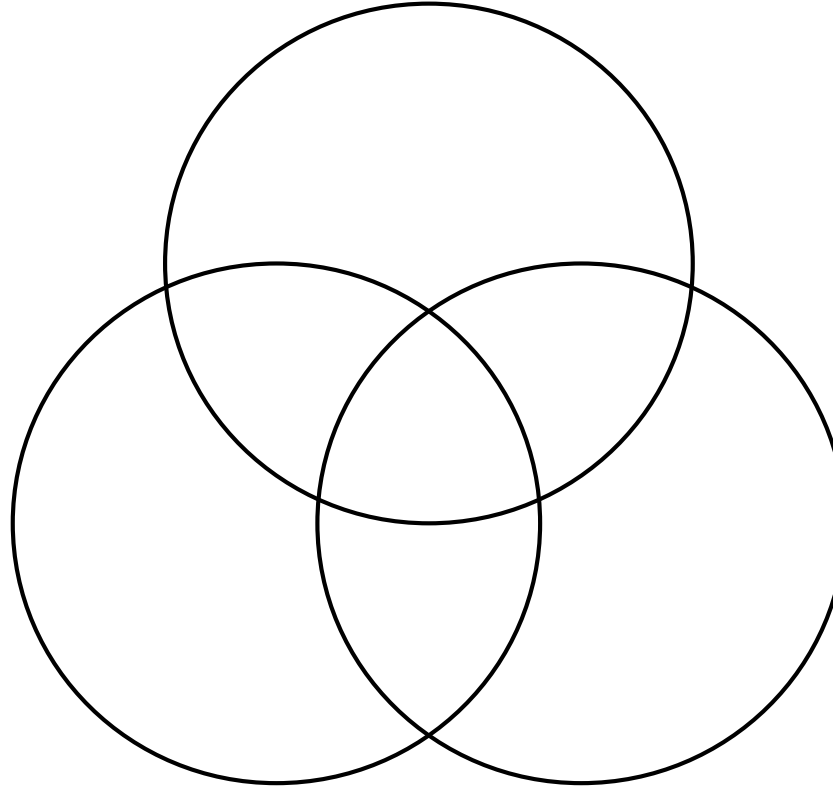
I can classify a range of objects and materials as solids, liquids or gases.



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I can classify a range of objects and materials as solids, liquids or gases.

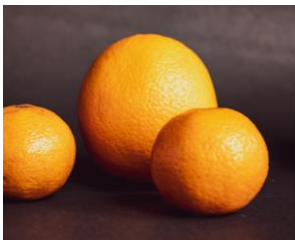




Find out more...

*Exploring solids, liquids and gases in different fruits and vegetables
(20 – 30 minutes)*

- Does an orange float in water?
- What about a banana or a potato?
- Does peeling the fruit or vegetable make a difference?



*Fruits and vegetables are not just solids.
Some have juice (a liquid) inside them.
Some have tiny pockets of air (a gas)
trapped inside them.*

Ask an adult if you can investigate floating and sinking fruits with them.

*This activity is described and explained in
Science Fun At Home 'sink or swim'.*

https://pstt.org.uk/application/files/1115/8694/0466/4.SINK_OR_SWIM.pdf

SCIENCE FUN AT HOME



Have some fun at home with
these science activities from
Science Sparks and the
Primary Science Teaching Trust



- *Decide how you are going to record your findings. You may like to take photographs.*

Glossary of terms

States of matter: There are three **states of matter**: **solid**, **liquid** and **gas**.

Solid: A **solid** is an object or material which **keeps its shape** and has a **fixed volume**. Some solids are made up of small grains which can be poured into a heap. Some solids can change shape when they are squashed, stretched or twisted. Some solids can be cut.

Liquid: A **liquid** is a material which has a **fixed volume** but **changes in shape** to fit the container. A liquid can be poured and keeps a level, horizontal surface.

Gas: A **gas** is a material which fills all available space; it has **no fixed shape** or **volume**.

Material: **Material** is the matter from which a thing is or can be made.

Volume: The **volume** is the amount of space taken up by a solid, liquid or gas.

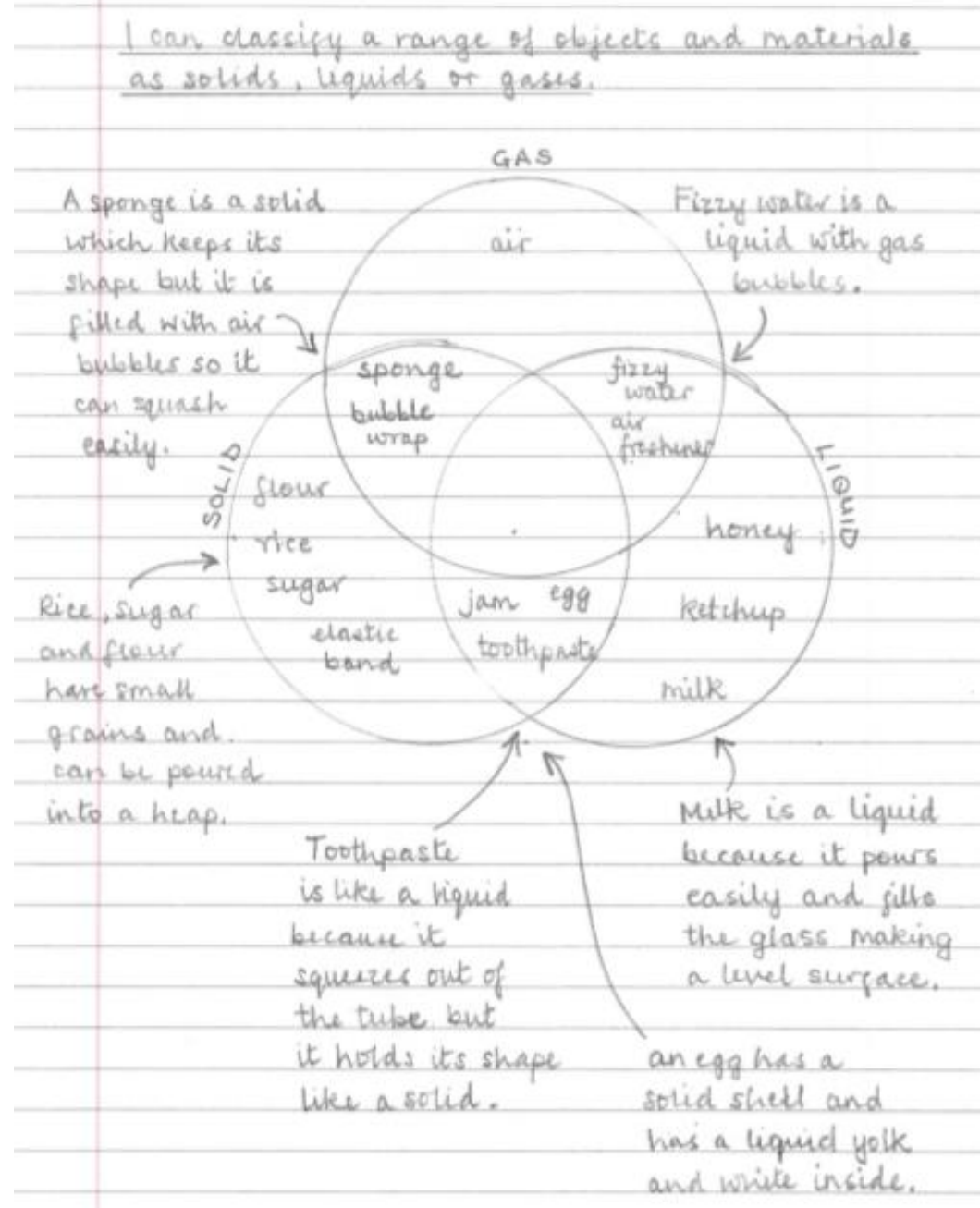
Stretchy solid objects like rubber bands only change shape when they are pulled or twisted.

Each grain of sugar or flour is a solid. The grains can be poured but they make a heap.

Toothpaste is a mixture of powdered solids and liquids. It behaves like a liquid and a solid. Scientists call it a *colloid*.

Some jams pour like a liquid. Others are stiff like jelly. Jam often has solid fruit or pips in it.

Possible learning outcome for reviewing your work:



Some solids like bubble wrap and sponges have air trapped inside them.

Fizzy drinks are liquids with dissolved carbon dioxide gas. You can see the bubbles of gas.

Air freshener is a liquid in the canister but sprays out to form a gas which spreads out.

Some liquids pour slowly like ketchup and honey but they form a level surface if left to settle.