



States of Matter: Solids, Liquids and Gases Teaching Ideas

Learning Objective: To understand that matter can exist in three states.

Success Criteria:

- To define matter.
- To state the three types of matter.
- To compare and contrast the three states of matter.

Context: This is the first lesson of the new topic of 'States of Matter' in key stage 3 chemistry.

Starter

As students enter the classroom and settle, on slide 3 is a question 'What is matter?' and 'How do we know it exists?' This helps the teacher to gauge how many students are familiar with the term 'matter', what evidence we have for it and can use the time to clarify any misconceptions.

Main Activities

Matter Key Points

Slides 4-5: Give background information to the students covering the basics.

Identifying Types of Matter

Slides 6-8: Students copy down the subheadings on slide 6. Students are shown slide 7 and write in pairs any solids, liquids or gases they can see in the classroom. Students are asked to circle their most unique answer as stated on slide 8. Students are encouraged to add to their notes by listening to their peers, as prompted on slide 9.

Properties of Types of Matter

Slides 9-11: Show the definition and examples of properties on slide 10. Students work in small groups to describe the properties of solids, liquids and gases, guided by questions. Support is given and also an extension task to write a description in twenty words or less.

Properties Key Points

Slides 12-14: Give background information to the students covering the key properties of solids, liquids and gases.

Solids, Liquids and Gases Activity

Students follow the worksheet to define matter, identify solids, liquids and gases in everyday situations and compare and contrast properties of solids, liquids and gases. At the end of the sheet are tick boxes that can be completed by either the student, peer or teacher matching to each point of the success criteria.

Solids, Liquids and Gases Quick Assessment

Students follow the worksheet to demonstrate their knowledge of the three states of matter by answering exam style questions. There is also a teacher assessment sheet that could be completed after the lesson where formative feedback can be given.

Plenary

Students create a Haiku poem as a mini plenary on shown slides 16-17 of the PowerPoint. Students write in their books a poem about the key points of the three states of matter with five syllables in the first sentence, seven syllables in the second sentence and five syllables in the third and final sentence. Two examples are given on slide 17. Remind the students of today's success criteria on slide 18 of the PowerPoint.

Suggested Home learning:

Students could research and produce a poster on 'Non Newtonian Fluids'.

Solids, Liquids and Gases Quick Assessment

Write the state of matter before and after in each situation. The first one has been done for you:

	State of Matter Before	State of Matter After
making ice cubes	Liquid	Solid
the wax of a lit candle		
boiling water		
heating butter		
a puddle drying out		
lava from a volcano cooling		

5 marks

Use the numbers given (not lines) to match each state of matter to its correct properties. Some properties might match to more than one state of matter:

1. liquid

2. gas

3. solid

Fixed shape.

Can flow.

Takes the shape of the container it is in.

Cannot flow.

Can be compressed (squashed).

Cannot be compressed.

9 marks

Learning Objectives:

- I can independently identify solids, liquids and gases in everyday situations.
- I can independently identify the properties of solids, liquids and gases.

Quick Assessment Answers

Write the state of matter before and after in each situation. The first one has been done for you:

	State of Matter Before	State of Matter After
making ice cubes	liquid	solid
the wax of a lit candle	solid	liquid
boiling water	liquid	gas
heating butter	solid	liquid
a puddle drying out	liquid	gas
lava from a volcano cooling	liquid	solid

5 marks

Use the numbers given (not lines) to match each state of matter to its correct properties. Some properties might match to more than one state of matter:

1. liquid

2. gas

3. solid

3 Fixed shape.

1, 2 Can flow.

1, 2 Takes the shape of the container it is in.

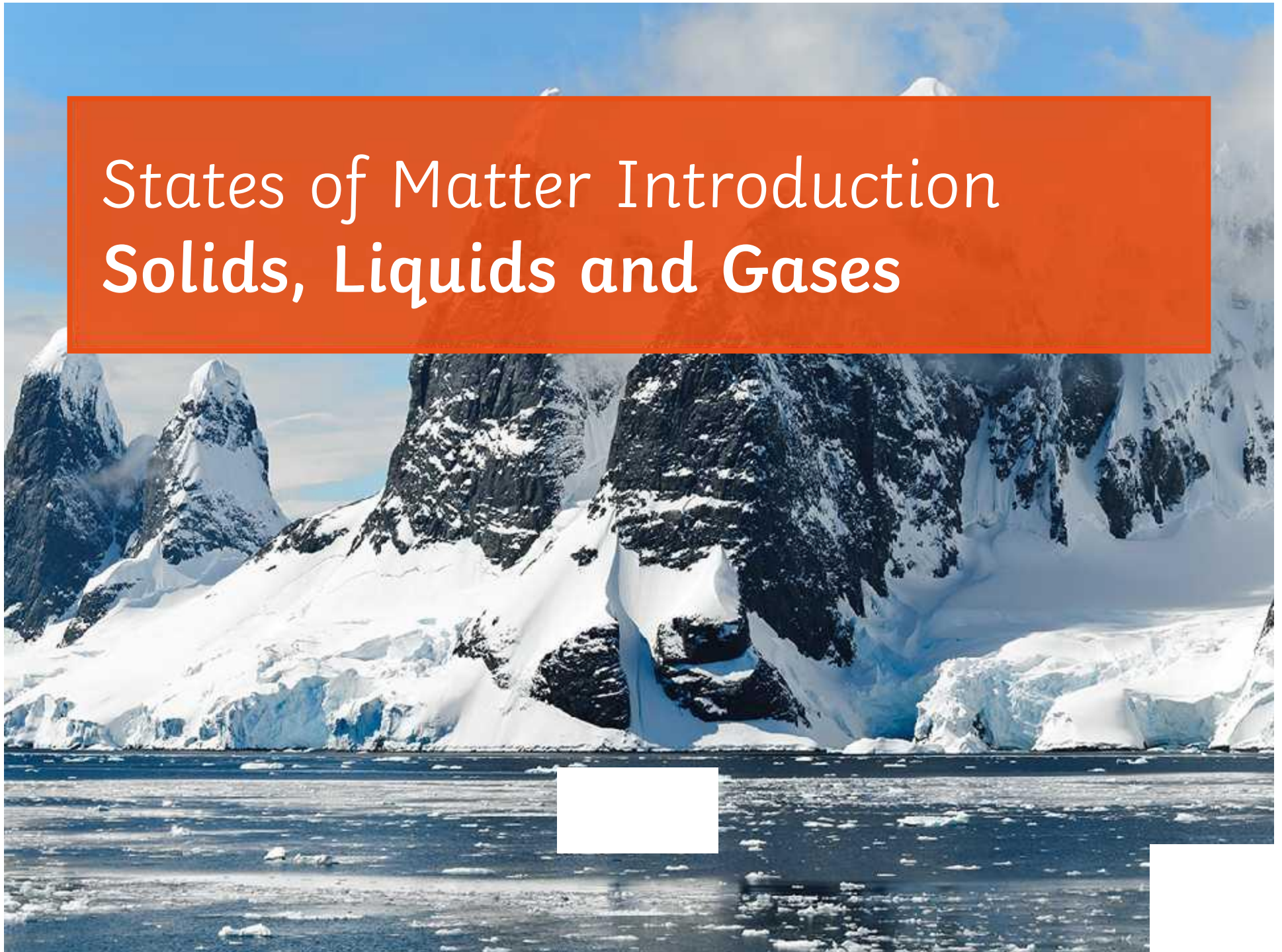
3 Cannot flow.

2 Can be compressed (squashed).

1, 3 Cannot be compressed.

9 marks

States of Matter Introduction Solids, Liquids and Gases





Learning Objective

- To understand that matter can exist in three states.

Success Criteria

- To define matter.
- To state the three states of matter.
- To compare and contrast the three states of matter.

Starter: What Is Matter?

- Everything is made up of matter.
- So what is matter?
- How do we know it exists?



Matter

- Everything is made up of matter.
- Matter is any substance that has **mass** and takes up space (**volume**).
- Your desk is made of matter.
- Your pencil is made of matter.
- You are made of matter!



Matter

There are **five** states of matter.

You will learn about three of these in KS3 Science.

The 3 states of matter you need to know are:

solid

liquid

gas



Identifying Types of Matter



Write the following subheadings in your book with 3-4 lines in between each of them:

Solids in the Classroom

Liquids in the Classroom

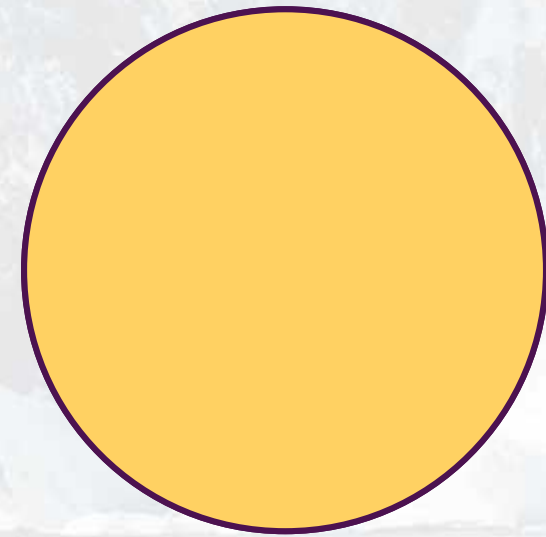
Gases in the Classroom



Identifying Types of Matter



Now in pairs you have **two minutes** to look around the classroom and write down as many solids, liquids and gases you can think of!



Time's up!

Identifying Types of Matter



Now in pairs you have **two minutes** to look around the classroom and write down as many solids, liquids and gases you can think of!

Circle one answer that you think no-one else in the class has written down.

Add at least three new answers as you listen to your classmates.



Properties of Types of Matter

What makes a **solid** different from a **liquid**, or a **gas**?

These **features** are called **properties**.
(In science this doesn't mean a house!)

For example:
hard, soft, can flow, invisible.

You have already used some properties to successfully identify solids, liquids and gases in the classroom.



Properties of Types of Matter

What makes a **solid** different from a **liquid**, or a **gas**?



Properties of Types of Matter



In small groups you are going to **describe the properties** of the three states of matter: solids, liquids and gases.

Points to include:

- What does it feel like?
- What does it look like?
- Can you squash it? Pour it?
- Plus anything else you can think of!

Not sure where to start? Imagine you were describing your state of matter to an alien from outer space!

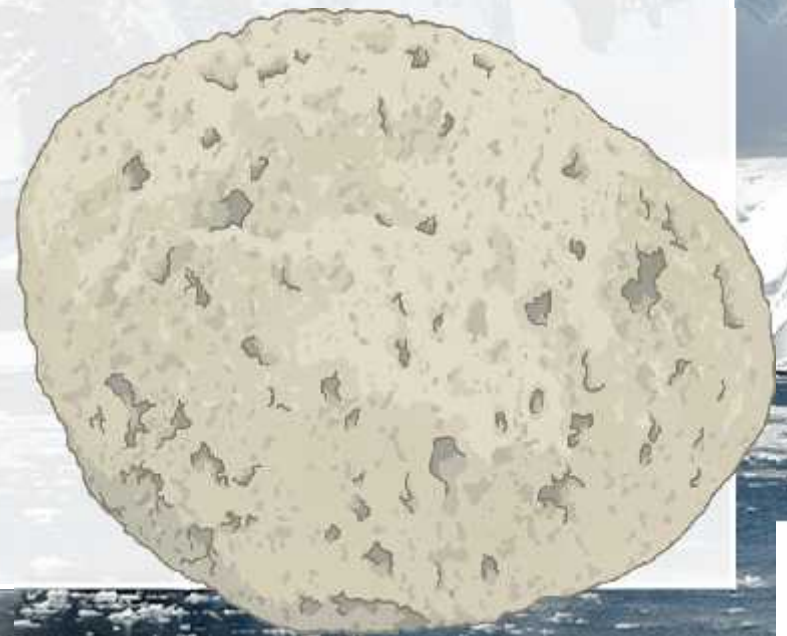
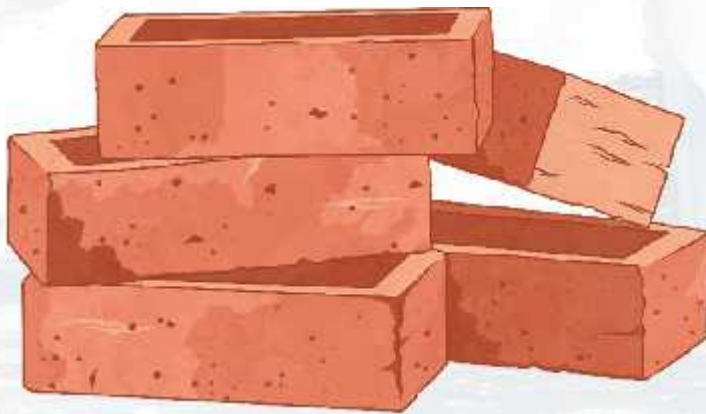
Challenge:

Can you write your description in 20 words or less?



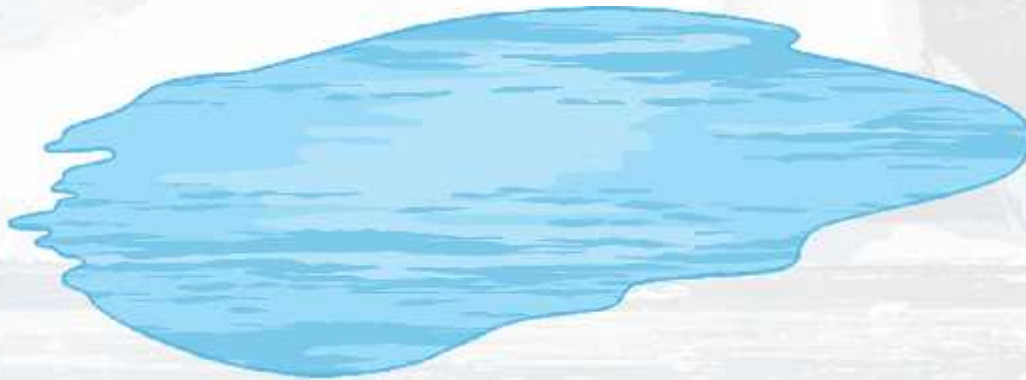
Properties Key Points: Solids

- Have a fixed shape.
- Cannot be squashed (compressed).
- Cannot flow.
- Particles cannot move, but can vibrate on the spot.



Properties Key Points: Liquids

- No fixed shape - takes the shape of the container.
- Cannot be squashed (compressed).
- Can flow.



Properties Key Points: Gases

- No fixed shape - takes the shape of the container.
- Can be squashed (compressed).
- Can flow.



Plenary: Matter Haikus

Create a haiku about matter or the three states of matter.



Each line of a haiku has a set amount of syllables and there are only three lines in total.

- The first line has **five** syllables.
- The second line has **seven** syllables.
- The third and final line has **five** syllables.

Haiku Examples

To define matter,
Anything with space and volume,
Is matter in life.

Matter has three states,
Solids, liquids and gases.
With different traits.



What Did You Achieve Today?

I can define matter.

I can state the three types of matter.

I can compare and contrast the three types of matter.





© iStockphoto.com - granted under creative commons licence - attribution

Solids, Liquids and Gases

1. What is matter?

2. Identify the solids, liquids and gases in the following situations:

a) Making a cup of tea

Solids: _____

Liquids: _____

Gases: _____

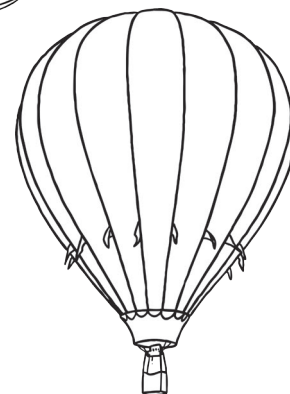


b) A hot air balloon

Solids: _____

Liquids: _____

Gases: _____



3. Properties of Matter

Complete the following table using ticks and crosses:

	Solid	Liquid	Gas
Has a fixed shape?			
Can be compressed?			
Can it flow?			
Takes the shape of the container it is in?			

Challenge: Can you think of any substances that have properties of both a solid and a liquid?

Learning Objectives:

- I can define matter.
- I can identify solids, liquids and gases in everyday situations.
- I can compare and contrast properties of solids, liquids and gases.

Solids, Liquids and Gases Answers

1) What is matter?

Matter is any substance that has mass and takes up space (volume).

2) Identify the solids, liquids and gases in the following situations:

a) Making a cup of tea

Solids: Tea bag, tea leaves, kettle, sugar, spoon, cup/mug.

Liquids: Water and milk.

Gases: Steam.

b) A hot air balloon

Solids: Balloon fabric (silk), metal frame, wicker basket.

Liquids: Fuel (liquid propane).

Gases: As the fuel is ignited (now gas propane) it reacts with oxygen to form water and carbon dioxide.

3) Properties of Matter

Complete the following table:

	Solid	Liquid	Gas
Has a fixed shape?	Tick	Cross	Cross
Can be compressed?	Cross	Cross	Tick
Can it flow?	Cross	Tick	Tick
Takes the shape of the container it is in?	Cross	Tick	Tick

Challenge: Can you think of any substances that have properties of both a solid and a liquid?

Toothpaste, tomato ketchup, hair gel etc.