Topic 1

How does science work?

✦ Look at the diagram. Which stages of the scientific method do you follow in your science lessons? Give examples.

The Scientific Method

Observe

Ask questions

Make a hypothesis

Test your hypothesis in an experiment

Record and analyze the data

Make a conclusion

Language

Vocabulary

Science Nouns and Verbs
Lab Equipment
Compound Nouns

Grammar

Present Simple for Facts
Sequence Adverbs
Zero Conditional

Skills

Reading
Matching Information in the Activity and Reading Text
Predicting the Content of a Reading Text

Listening
Using Visual Information to Help You Understand
Listening for Specific Information

Speaking
Agreeing and Disagreeing
Showing Interest

Writing
Writing Instructions

Project

Experiment: Classroom Science

Vocabulary

Science Nouns

gas
liquid
shape
size
solid

Science Verbs

change
freeze
melt
pour

1 Watch the video. What is the podcast about?

✧ Watch again. Are the children happy with their project?

2 Listen and complete the poem. 2

Solids, Liquids, Gases

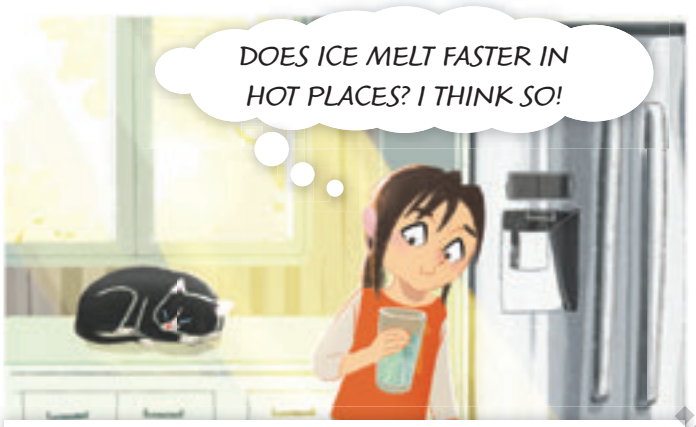
_____ don't change _____ or size.
Hold them in your hands, use your eyes.
_____ change shape, but don't change _____.
Fill your cup—you can see them with your eyes.
Gases change _____ and change size.
They're in the air.
They're hard to see, but they're there.

✧ Read the poem out loud.

3 Complete the sentences with science verbs.

1 You can _____ liquids from one container to another.
2 When solids _____, they become liquids.
3 When liquids _____, they become solids.

1 Listen and follow. 3



First, Martina asks a question and makes a hypothesis.

Then, she does an experiment and measures her results.

Finally, she studies her data and makes a conclusion.

✧ **Read the comic. Circle present simple verbs.**

2 **Complete the sentences with the present simple of these verbs.**

ask do freeze melt not melt

1 In cold temperatures, water _____ into ice.

2 Good scientists _____ lots of questions.

3 Ice cubes _____ fast in cold places.

4 _____ you _____ experiments in science class?

5 _____ ice _____ fast in warm places?

3 **Describe Martina's experiment using sequence adverbs. What does she learn about ice?**

Present Simple for Facts

I/You/ We/They	change. don't change.
He/She/It	changes. doesn't change.

Do you change?	Yes, I do. No, I don't.
Does it change?	Yes, it does. No, it doesn't.

Sequence Adverbs

These adverbs indicate the order of events: first, next/ then/after that, finally.

Science Nouns

conclusion
data
experiment
hypothesis

The Incredible Food Lab

1 Listen and follow. 4

✦ Underline important words in the Marvelabs' actions.

1 They taste the food. ☐
2 They do research. ☐
3 They look at the color and shape of the food. ☐
4 They send good ideas to the factory. ☐
5 They do tests. ☐

✦ Find the words in the text and number the actions in order.

2 Which scientists are good? Which are bad?

✦ Find examples of things that they do.

In a secret laboratory near you, teams of food scientists work on new food products every day. "Food scientists?" I hear you ask. "What do they do?" Well, I have some top secret pictures of the Incredible Food Lab.

Here is a typical day. Work starts at 8:00. The good food scientists are called Marvelabs. They arrive on time. Their job is to make fantastic new jello and ice cream. Mmmm!

First, the Marvelabs do research. They study fruit jello and vegetable jello! They find out how to make healthy ice cream and they research new flavors. Then, they do tests. "Is the food safe?" they ask. Next, they look at the color, shape and size of the food. After that, they taste the food. "Is it delicious or disgusting?" they ask. Finally, they send all their good ideas to the Incredible Food Factory. The factory makes the jello and ice cream and sends it to stores all over the world.

Matching Information in the Activity and Reading Text

When you do a reading activity, read the instruction and activity carefully. Underline important words in the instruction. Then look for similar words or ideas in the text.

BUT—and this is a very big *but*—not all the scientists in the lab are good. The bad scientists are called Madlabs. Madlabs often arrive late. They don't have breakfast at home, so they eat breakfast in the lab. It's not very sensible because sometimes their breakfast falls in the jello. The Madlabs ask silly questions like, "Is jello good for your hair?" "Can you swim in ice cream?" They don't often do research, but they sometimes do dangerous tests, just for fun. The Madlabs often mix their bad ideas with the Marvelabs' good ideas. Oh no!

So, the next time you have jello or ice cream, look carefully at the label. Do you see this logo?

Watch out! This food comes from the Incredible Food Factory. It may be delicious... or it may be disgusting!

Reading

1 Read "The Incredible Food Lab" again. Find these questions. Who asks them?

1 What do they do?
2 Is the food safe?
3 Is it delicious or disgusting?
4 Is jello good for your hair?
5 Can you swim in ice cream?

✧ **Read the secret recipe. Circle the ingredients on pages 10 and 11.**

2 Find the adjectives in the text and match them with the definitions.

dangerous delicious disgusting safe secret sensible

1 Something that can harm you is _____.
2 Something that tastes really bad is _____.
3 Something that very few people know is _____.
4 Somebody that has good judgment is _____.
5 Something that doesn't harm you is _____.
6 Something that tastes great is _____.

✧ **Which adjectives are opposites?**

3 Choose a character from the picture. Name your character and write three sentences about his/her day.

Name: _____

_____

_____

_____

✧ **Share your sentences. Guess if other characters are Marvelabs or Madlabs.**

Using Visual Information to Help You Understand

When you listen, look for visual information, such as pictures and photos. They can help you understand.

1 Where are the people in each dialogue? Look at the pictures and guess.

✧ Listen and check. 5

1

2

3

2 Listen again. Choose the picture that shows the end of each story.

3 Choose the correct verbs.

1 Steam condenses / freezes on cold surfaces. (gas → liquid)

2 Hot water boils and evaporates / melts. (liquid → gas)

3 Snow condenses / melts in warm weather. (solid → liquid)

4 Rain condenses / freezes and becomes snow. (liquid → solid)

Science Nouns

steam

Science Verbs

boil
condense
evaporate

4 What other things can melt, condense, freeze or evaporate? Discuss.

Speaking

Agreeing and Disagreeing

I agree. I agree with (you/them/Kelly).
I don't agree. I disagree.
Yes, I think that's right.
No, I don't think that's right.

1 Listen and mark (✓ or ✗). 6

1 The students make a hypothesis. ☐
2 Rashid agrees with Marisa. ☐
3 Johnny agrees with Marisa. ☐
4 Johnny agrees with Rashid. ☐

✧ Listen and write the temperatures for water and ketchup. 7

At WHAT temperature do these THINGS freeze?

Freezing Temperature in Degrees Celsius (˚C)	Water	Ketchup	Milk	Olive Oil	Eggs	Honey

2 Discuss the question in activity 1 for milk, olive oil, eggs and honey. Agree and disagree. Complete the chart.

–1˚C –0˚C –6˚C never freezes

I think milk freezes at –1˚C.
I disagree. I think...

✧ Listen and check. 8

3 Discuss.

1 Which things freeze at a lower temperature than water?
2 Which substance never freezes? Why?

1 Listen and follow. 9

How can you make ice cream without a freezer?

Step 1

First, pour the cream and sugar into the small bag and close it.

Step 2

Then, put the ice cubes and salt in the large bag.

Step 3

Next, put the small bag in the large bag and shake for five minutes.

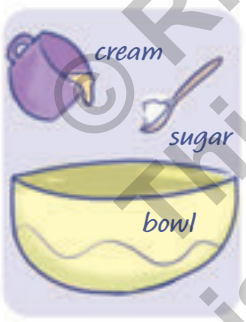
Step 4

Finally, open the small bag. Does it look like ice cream? Eat it and see!

2 Look at the pictures. Describe each step.

How long does ice cream take to freeze?

Step 1



Step 2

Step 3

Step 4

✦ Write instructions for the experiment.

Writing Instructions

When you write instructions, don't include **you**, and just use a simple verb like **put** or **pour**. Use sequence adverbs to show the order.

Topic 1

How does science work?

1 What are the stages of the scientific method?

2 What new facts about science do you know now?

Vocabulary

1 Listen and complete the song. 10

Lab SAFETY, Work SAFELY!

The lab's a dangerous place,
but you can stay safe.
Listen up, scientists,
and use the right equipment.

When you measure a liquid,
you need a _____.

When you pour a liquid,
you need a _____.

Measure! Pour!
Hot! Cold!

Use the right equipment.
Use the right equipment.

Ouch! Chemicals in your eye.
Quick! Is the _____ nearby?
Wear your _____.
Protect your eyes!
Use your _____.
Watch your hands!

Let's all stay safe.
Let's all stay safe.

Compound Nouns

We often put two nouns together to make a **compound noun**. The first noun describes the second noun. They can be two words, like **lab coat**, or one word, like **eyewash**.

Lab Equipment

beaker
cylinder
eyewash
gloves
lab coat
microscope
safety goggles
test tube

✧ **Listen again and sing along.**

2 **Write the correct lab equipment. Which are compound nouns?**

1 They protect your eyes: _____.
2 You put these on your hands: _____.
3 You use this to hold or pour liquids: _____.
4 It cleans your eyes: _____.
5 You measure liquids in this: _____.

✧ **Describe a piece of lab equipment. Can your partner guess what it is?**

1 Take the quiz. Listen and check. 11

The GREAT BIG Science Quiz!

What happens if I do that?

1

+

Raisins _____ if you put them into a glass of soda.
a don't move
b melt
c dance

2

+

Marshmallows _____ if you put them into water.
a sink
b melt
c float

3

+

If you add fresh pineapple to your jello mix,
a the jello turns yellow.
b the jello doesn't become a solid.
c the pineapple changes color.

✧ Look at the quiz again. Circle all the present simple verbs.

2 Look and write.

1  +  = sink ✓

This candy _____ when you put it in water.

2  +  = become ✗

Honey _____ a solid if you freeze it.

3  +  = change ✗

If you cover a cut apple with lemon juice, it _____ color.

3 Write two more questions for the Great Big Science Quiz.

Zero Conditional

The zero conditional describes facts. The if/when clause describes a condition, and the main clause describes the result. All the verbs are present simple:
If you put ice cubes in a hot place, they melt. Sugar dissolves when you add it to coffee.

Science Verbs

dissolve
float
mix
sink

Reading

- Look at the title, headings and pictures in the text. What do you think the text is about?
- Read and check.

Predicting the Content of a Reading Text

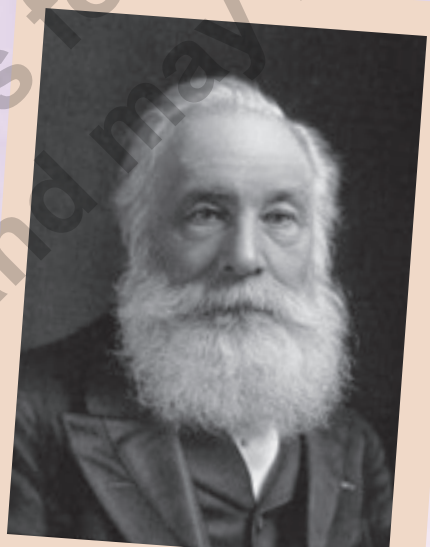
Before you read a text, look at the title, headings and pictures. They can help you predict what the text is about.

AN ACCIDENTAL EXPERIMENT

Scientists spend hours doing experiments or looking at things under microscopes, but sometimes they discover things when they don't expect to. Let's travel back to the 1800s to learn about one amazing discovery.

The Accident

It is the year 1856 and William Perkin, an eighteen-year-old student at the Royal College of Chemistry in London, is trying to create a medicine to fight malaria. The result is a disaster! A disgusting black compound appears in the test tube.



William Henry Perkin (1838–1907)

The Next Step

William washes out the test tube with alcohol and gets a big surprise. The disgusting black mixture is now beautiful purple crystals. William shares his news with his brother and a friend. They do more secret experiments together to produce more purple crystals.

The Difficulty with Dye

At this time, it's very difficult to make purple dye for clothes. It's also very difficult to find a natural dye that doesn't disappear when you wash the fabric. Factories make natural dyes from plants and animals. They need a special liquid from more than 12,000 sea snails to make one purple dress! But William has an idea.

The Perfect Solution

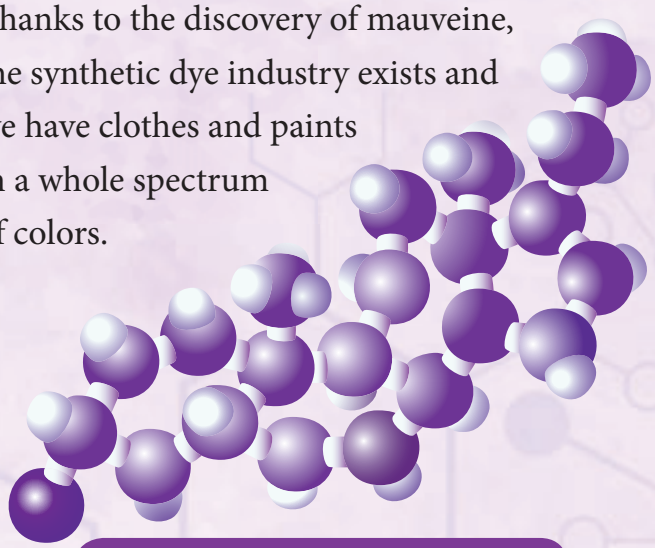
The three young chemists make a solution with the crystals. They use it to try to make some silk purple. What happens if they wash the silk? It stays purple. If they leave it outside, it doesn't change color, either. They are amazed! They call their new color mauveine. It isn't long before William opens his own factory to produce and sell mauveine, the first synthetic dye, in large quantities.

The Color Purple

Until Perkin's discovery, only kings and queens or very rich people wore purple clothes. Now everyone could have purple clothes. People loved it! But it wasn't just clothes that could be purple—the post office produced purple stamps for the first time. It was official—purple was now one of the most popular colors!

Amazing Mauveine

Synthetic dyes are now very useful in a lot of different areas of science and medicine. Thanks to the discovery of mauveine, the synthetic dye industry exists and we have clothes and paints in a whole spectrum of colors.



Look around you. How many purple things can you see?

Reading

1 Read the article again. Mark (✓ or ✗).

1 William Perkin planned to make a black chemical compound. ☐

2 The alcohol changed the black mixture into crystals. ☐

3 William told two other people about his discovery. ☐

4 If you put the solution on silk, the purple color doesn't disappear. ☐

5 Perkin's discovery changed the world of fashion. ☐

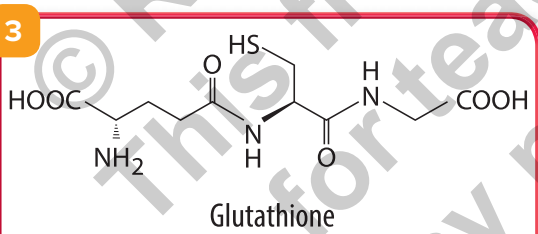
6 People only ever used mauveine to dye clothes. ☐

2 Label the pictures with these words from the text.

compound crystals drugs solution

1 

2 

3 

Glutathione

4 

✦ **Complete the sentences with the words.**

1 If you mix drink powder in water, it becomes a .....

2 If you mix two or more elements, you create a .....

3 Salt and sugar have very small white .....

4 If I get sick, the doctor sometimes gives me a ..... to help me.

3 Discuss. What does the story of William Perkin teach you about science and experiments?

1 **Listen. What equipment does Oscar use? Mark (✓ or ✗).** 12

beakers	☐	water	☐	test tubes	☐
paper towels	☐	food coloring	☐	microscope	☐
safety goggles	☐	orange juice	☐		

✦ **Listen again. Number the pictures in order.**






✦ **How does the experiment work? Complete the sentences. Then listen again and check.**

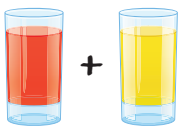
1 When you put the paper into the beaker, it ..... the water.

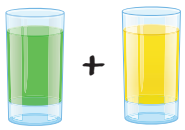
2 The colored water ..... along the paper towel and into the middle beaker.

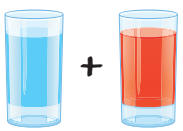
3 When the blue and yellow water .....,

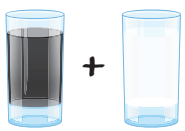
it ..... to green.

2 **Discuss. What happens if you do the experiment with these colors?**

1  = ?

2  = ?

3  = ?

4  = ?

Listening for Specific Information

Before you listen, read the activity and identify what type of information you need to listen for, such as a name, a number or a place. Then listen carefully for the information.

Speaking

1 **Listen and follow. How does Sam show that he's interested?** 13

Gina: Do you want to help me with my experiment?

Sam: Sure!

Gina: Great! We need two oranges, one with the skin and one without, and a bowl of water.

Sam: OK. What do I do?

Gina: First, put the orange with the skin in the water. What happens?

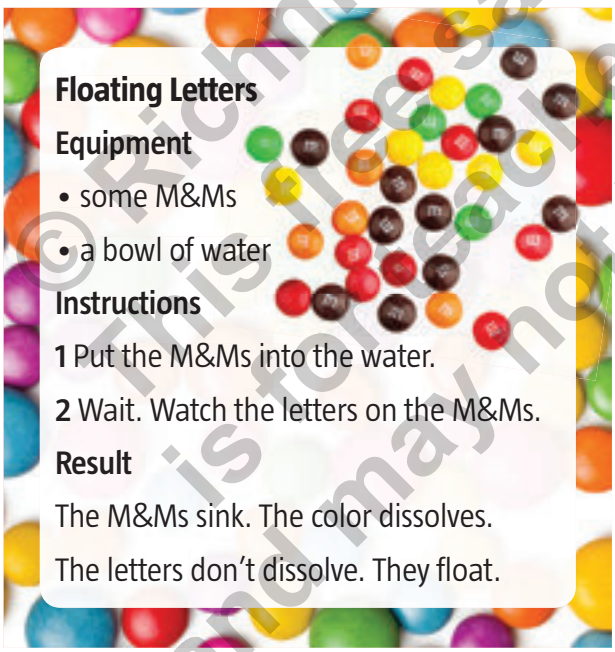
Sam: It floats. That's interesting.

Gina: Now, what happens if you put the orange without the skin in the water?

Sam: It sinks. That's amazing! Why does that happen?

✧ **Discuss. Why does this happen? Listen and check.** 14

2 **Choose an experiment. Read about it.**



Floating Letters

Equipment

- some M&Ms
- a bowl of water

Instructions

1 Put the M&Ms into the water.

2 Wait. Watch the letters on the M&Ms.

Result

The M&Ms sink. The color dissolves.

The letters don't dissolve. They float.

Floating Lemons and Sinking Limes

Equipment

- two lemons
- two limes
- a bowl of water

Instructions

1 Put one lemon and one lime into the water.

2 Take the skin off the other lemon and lime.

3 Put them into the water.

Result

The lemons float with and without the skin.

The limes sink with and without the skin.

Showing Interest

Really?
That's interesting.
That's amazing!
Wow!

3 **Role-play your experiment.**

Do you want to help me with my experiment?

Sure. We need two lemons, and two limes.

✧ **Discuss. Why does this happen?**

1 Look and match.

1 Equipment 2 Instructions 3 How It Works

Invisible Ink

- lemon or lime juice
- water
- spoon
- beaker
- cotton swab
- sheet of paper
- lamp

1 Mix some lemon juice and water in the beaker.
2 Dip the cotton swab in the mixture to make it wet.
3 Write a secret message for a friend on the paper using the swab.
4 Wait for the paper to dry.
5 Give your secret message to your friend. He/She heats the paper near a lamp and reads it.

The water and lemon juice mixture is difficult to see on the paper. If you heat lemon juice, it changes color and becomes brown.

2 Do the invisible ink experiment or choose another. Follow the scientific method.

✦ Share your results. Identify the steps in the scientific method.

Experiment: Classroom Science

Do an experiment following the scientific method. Make a conclusion and share the results with the class.

Topic 1

How does science work?

1 Choose an experiment. Explain how the science works.

2 In your opinion, which experiment in Topic 1 is the most interesting?