max science

MAX SCIENCE ENQUIRY BOXES

SAMPLE TEACHER'S NOTES • STAGES 1 – 6

SAMPLE WORKSHEETS • STAGES 1 – 6

SYLLABUS MAP • CAMBRIDGE PRIMARY MATHS CURRICULUM FRAMEWORK STAGE 1

Endorsed by Cambridge Assessment International Education for classroom support

Max Science Enquiry Box 1 • 9781380019912
Max Science Enquiry Box 2 • 9781380019929
Max Science Enquiry Box 3 • 9781380019936
Max Science Enquiry Box 4 • 9781380019943
Max Science Enquiry Box 5 • 9781380019950
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MAX SCIENCE ENQUIRY BOXES

Macmillan Education is a global publisher with a local presence that ensures we understand the needs of different cultures and communities. Working locally allows us to get close to the people who matter - the students, teachers, institutions and educational authorities who use our resources and with whom we've developed real and lasting relationships.

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- are designed with full English language support for teachers, students and parents whose first language is not English
- provide guidance and support for parents so they can help their children at home
- offer professional development and training for teachers
- integrate assessment as a support for both teaching and learning

OUR PROMISE TO OUR CUSTOMERS

max science enquiry boxes

eSamples Tablet IWB Cross-Curricular

PRIMARY • STAGES 1 – 6

The *Max Science Enquiry Box* series is a flexible resource that supports the development of scientific skills and follows the Cambridge Primary Science curriculum framework.

Over 6 stages, each Enquiry Box contains a range of activity cards to facilitate enquiry-based learning across the subjects of Chemistry, Biology and Physics.

Activities throughout the series support a student-centred, hands-on approach, and guide learners through the stages of collecting ideas, planning work, presenting evidence and drawing conclusions. The *Max Science Enquiry Box* series helps students develop their understanding of concepts through practical application, while teachers are supported in delivering a modern and relevant science class.

A 'Scientific Enquiry' strand is also included to support teachers and students who need to focus on the development of enquiry-based learning skills, and raise confidence with the approach.

The *Max Science Enquiry Box* series features:

- four strands to support the Cambridge international primary curriculum: Biology, Chemistry, Physics and 'Scientific Enquiry'
- support for teachers who are focusing on the development of enquiry-based learning skills with their students
- embedded language support for learners and teachers whose first language may not be English
- over 100 free, downloadable online resources for each stage which includes Worksheets, Teacher's Notes (with language support) and Answer Keys
- step-by-step guidance for teachers on how to approach and scaffold lessons appropriately to encourage students to work both independently and collaboratively on key tasks

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Sample material from *Max Science Enquiry Box 1*

14: Making a musical instrument

Objectives

Identify many sources of sound.

Model and communicate ideas in order to share, explain and develop them.

Resources

- worksheets
- objects to make instruments from: beads, marbles, various boxes and containers, sticks, cardboard tubes, funnels, bottles, and cocktail sticks
- for the worksheet:
  - six straws
  - sticky tape
  - a pair of scissors per group

Key skills

looking (observing), designing, talking about, sharing, testing

Cross-subject links

design and technology, music

Background information

By designing musical instruments the students will discover that both the materials used for an instrument and its design will have a large impact on the sounds produced. Instruments work by vibrating air – either by percussion (banging a drum or shaking a shaker), vibrating a string (guitar or piano) or by blowing air down a tube (wind instrument).

Moving heavy strings or blowing down large tubes will cause slow vibrations, and this produces lower-pitched notes. Moving light, thin strings or blowing down small, narrow tubes will cause faster vibrations and this produces higher-pitched notes.

Step by step guide

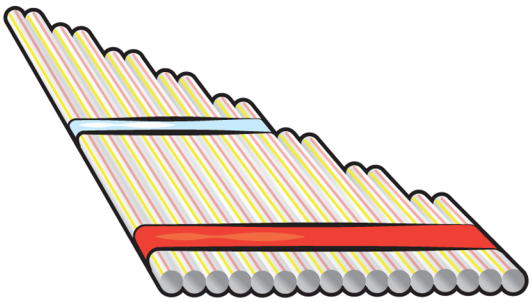
- Hand out the activity card and have the musical instrument-making materials in a box at the front of the class.
- Allow the students to work in pairs and plan their instrument. They should look through the materials and talk about possible designs.
- Once they have an idea of what to make, allow them to construct and test their instrument.
- Once they can make some notes, ask them to demonstrate their instrument to the class.
- Next, hand out the worksheets and the equipment for making the wind instrument from straws. You can read through this or allow the students to either read it themselves or follow the picture to help them to arrive at a finished instrument. You may need to help with the cutting of the straws or have pre-cut straws available.
- Finally, allow the students to test their wind instrument.

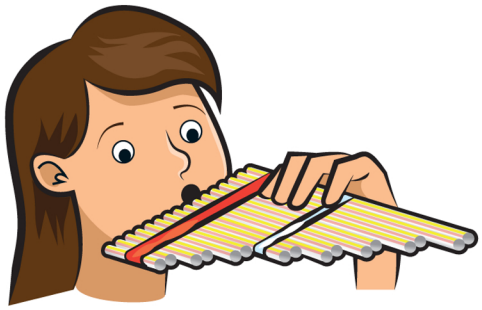
Can be used on a projector.

14: Making a musical instrument

Objectives

Identify many sources of sound.





1. Cut the straws to different lengths. Have some long ones and some short ones. Cut two straws for each length.

Stay safe!

Be careful with scissors and ask someone to help if you need to.

2. Arrange the straws in order – the longest one at one side down to the shortest one on the other side.
3. Use a long strip of sticky tape to hold the straws together.
4. Remember to arrange the straws in twos.
5. Make sure that the straws are well fixed. Use plenty of sticky tape.
6. Use coloured paper to help you to decorate your musical instrument.
7. Blow across the straws and try to make some musical notes.

Stay safe!

Only blow across your own instrument.

Stage 2: Teacher's Notes

Living things in their environment

11: Making a rain gauge

Objectives

Observe and talk about their observation of the weather

Record reports of weather data.

Make and record observations.

Take simple measurements.

Identify simple patterns and associations.

Resources

- clear plastic soda bottle
- scissors
- pebbles
- ruler
- worksheets for recording

Key skills

observing, recording, analysing, concluding

Cross-subject links

geography, DT

Background information

Students must understand that the weather can be measured and recorded and that forecasts can be made from these measurements.

Step by step guide

- Students should work in pairs or small groups for this activity. If they are cutting the bottles themselves then they will need to work together.
- Support students in the step by step instructions on the card. You may wish to prepare the gauges by cutting the top off the bottle. This can be quite tricky and often leaves the plastic sharp.
- Place some pebbles or stones in the bottom of the bottle to prevent it from being blown over.
- Remove the lid from the bottle and place it upside down in the cut end of the bottle. This will act as a funnel and reduce the amount of collected water that will evaporate.
- Encourage students to find a place where the water will easily be collected, but not so open that it could be knocked over.

Living things in their environment

Can be used on a projector.

11: Making a rain gauge

Objectives

- Observe and talk about their observation of the weather
- Record reports of weather data.

Day of the week	Rainfall (cm)
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

5: Magnetic materials

Objectives

Explore how some materials are magnetic but many are not.

Suggest ideas, make predictions and communicate these.

Make generalisations and begin to identify simple patterns in results.

Resources

- a range of magnetic and non-magnetic materials
- magnet
- worksheets

Key skills

predicting, investigating, recording

Cross-subject links

design and technology

Background information

Students have studied the properties of materials in previous grades and earlier cards. This card introduces magnetic and non-magnetic materials. Students need to know that magnetic materials will be attracted to or move towards a magnet. On the other hand, materials that are not attracted to a magnet are called 'non-magnetic'. Magnets themselves will repel or move away from another magnet. Magnetism is a property of materials that students will explore.

Step by step guide

- Students can use the image of the magnet attracting metal objects to prompt their thinking about magnetic and non-magnetic materials.
- Students should select an object from around the room that they think will be attracted to a magnet.
- They should record the name of the object. The worksheet demonstrates a useful method of recording the students' findings.
- They will then need a magnet to test their predictions. They record on the worksheet whether the prediction was correct.
- Students should then collect a further six objects that they predict will be magnetic and six that they predict will be non-magnetic.
- They should test their predictions and record them in the same way.

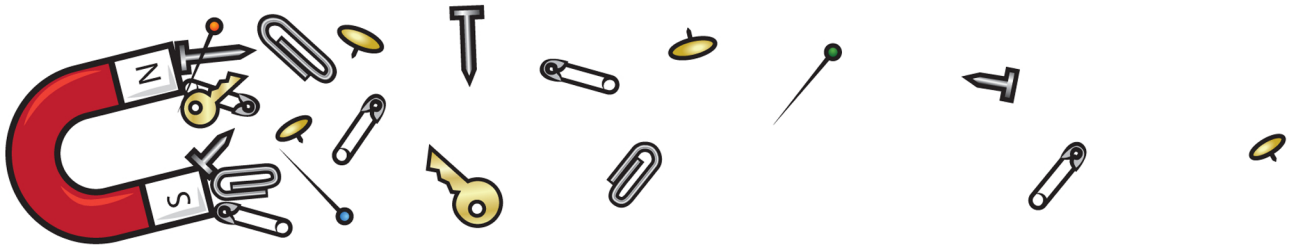
Material properties

Can be used on a projector.

5: Magnetic materials

Objectives

Explore how some materials are magnetic but many are not.



1. Look around the room and find an object that you think will be attracted to a magnet. We say such objects are 'magnetic'.
2. Write down the names of the magnetic objects.

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3. Then find an object that you predict will not be attracted to a magnet. We say these are 'not magnetic'.
4. Your teacher will give you a magnet to test the objects.
5. Was your prediction correct?
6. Now you have practised predicting and testing magnetic materials, find more objects. Try to find six objects that you predict will be attracted to the magnet and six that will not.
7. Test your predictions and record your observations in the table.

Objects I predict are magnetic	Was the prediction correct?	Objects I predict are not magnetic	Was the prediction correct?

Humans and animals

4: Body map

Objectives
Know that humans (and some animals) have bony skeletons inside their bodies.

Resources
- worksheets
- computers or books for research for the last question

Key skills
observing, recording

Cross-subject links
ICT

Background information
Students should understand that humans have a skeleton made up of specific bones. This card and worksheet are designed to support students in recalling the structure of the human skeleton.

Step by step guide
- Students should work in pairs of small groups for this activity.
- Provide students with a roll of paper. Wallpaper or baking paper is ideal for this. Alternatively, tape sheets of paper together to allow students to draw around a student.
- If there is space available, students could use chalk to draw around their body on a clean, safe surface. The schoolyard is ideal for this.
- When this is complete, students should label the following bones on the body: skull, ribs, spine, neck, shoulders, arms, elbows, wrists, fingers, thumbs, feet, ankles, shins, knees, thighs, hips.
- The worksheet task can be used to reinforce this learning. Display the completed skeletons around the room.

Support for language development
Labelling the skeleton will support students in written communication. Encourage students to say the words as they read and write them.

Humans and animals

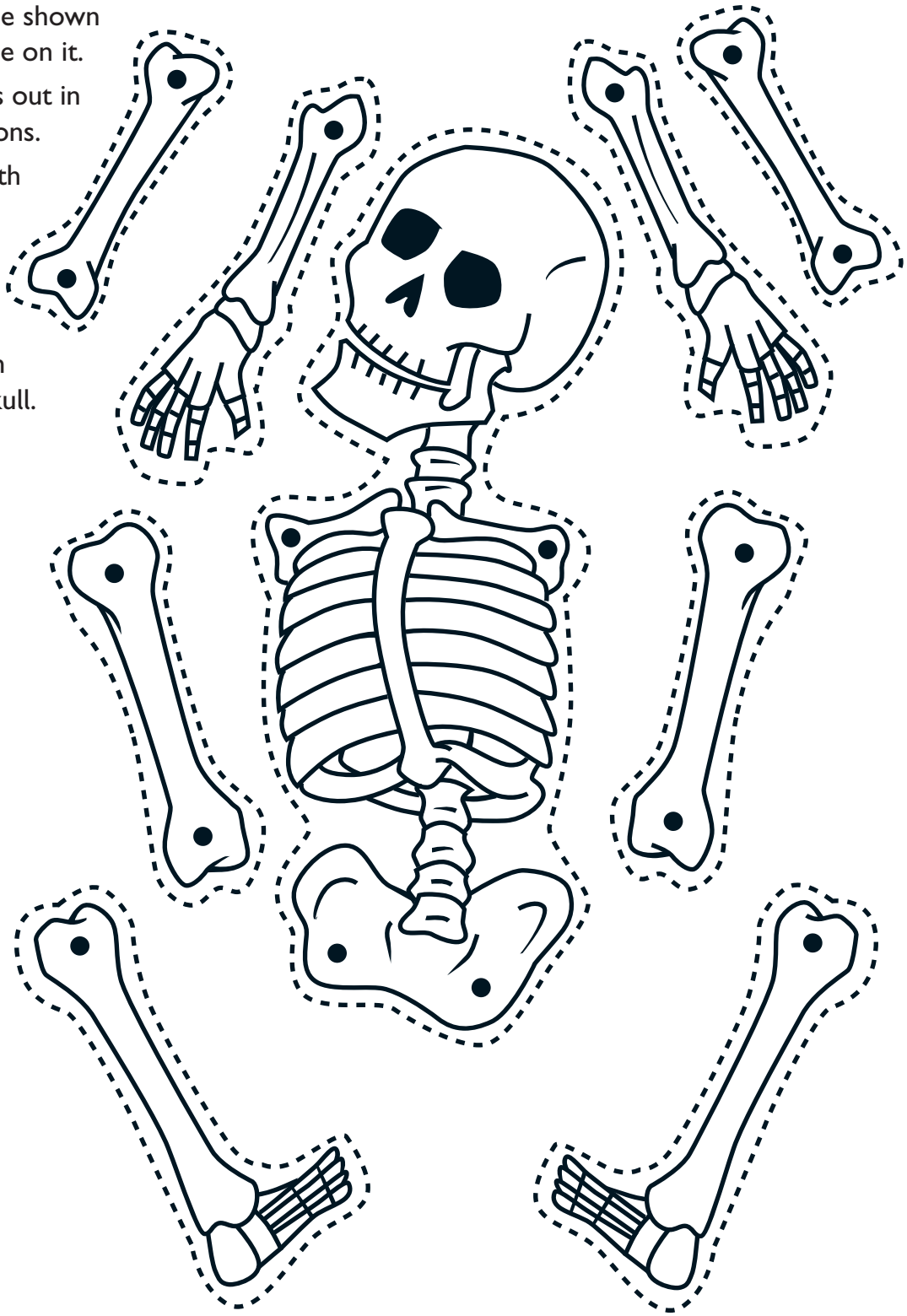
Can be used on a projector.

4: Body map

Objectives

Know that humans (and some animals) have bony skeletons inside their bodies.

- Cut out each bone shown and write its name on it.
- Lay out the bones out in the correct positions.
- Join the bones with paper fasteners or tape.
- Display the skeleton by hanging it up with string from the skull.



7: The water cycle

Objectives
Know that condensation occurs when a gas turns into a liquid and that it is the reverse of evaporation.

Resources
- worksheets
- materials for building the water cycle – such as cardboard boxes, card, cotton wool, coloured paper, glue, sticky tape

Key skills
observing, identifying, designing, constructing, explaining

Cross-subject links
geography

Background information
The water cycle is driven by heat from the sun. This evaporates water, especially from the oceans, and the water vapour rises. As the water vapour ascends into the atmosphere, it cools and condensation occurs. The water droplets formed can fall as rain or, if it is even colder, as snow or hail. All these are types of precipitation.

After precipitation, any snow and hail can melt and all of the water runs downhill to eventually enter groundwater or return to the sea. The water in the sea is salt water, but the evaporation results in fresh water. In this way, the water cycle ensures a recycling of fresh water for use by animals and plants.

Step by step guide
- Hand out the card and ask the students to study the water cycle.
- They should find changes of state as water evaporates from the sea and condenses to form precipitation. They should also identify freezing and melting near the mountaintops.
- Next, show the students the material they have available for their model water cycle. They can then design their model and construct it. Allow them to write and add information labels. They can then present their model to the class and you can make a display to show other classes and parents.
- Hand out the worksheet and allow the students to complete the diagram as a review and revision task, or you might prefer to use it as an introduction to elicit prior understanding.

Support for language development
Explain that the word 'cycle' is related to the word 'circle' – it means that the water on earth moves round and round.

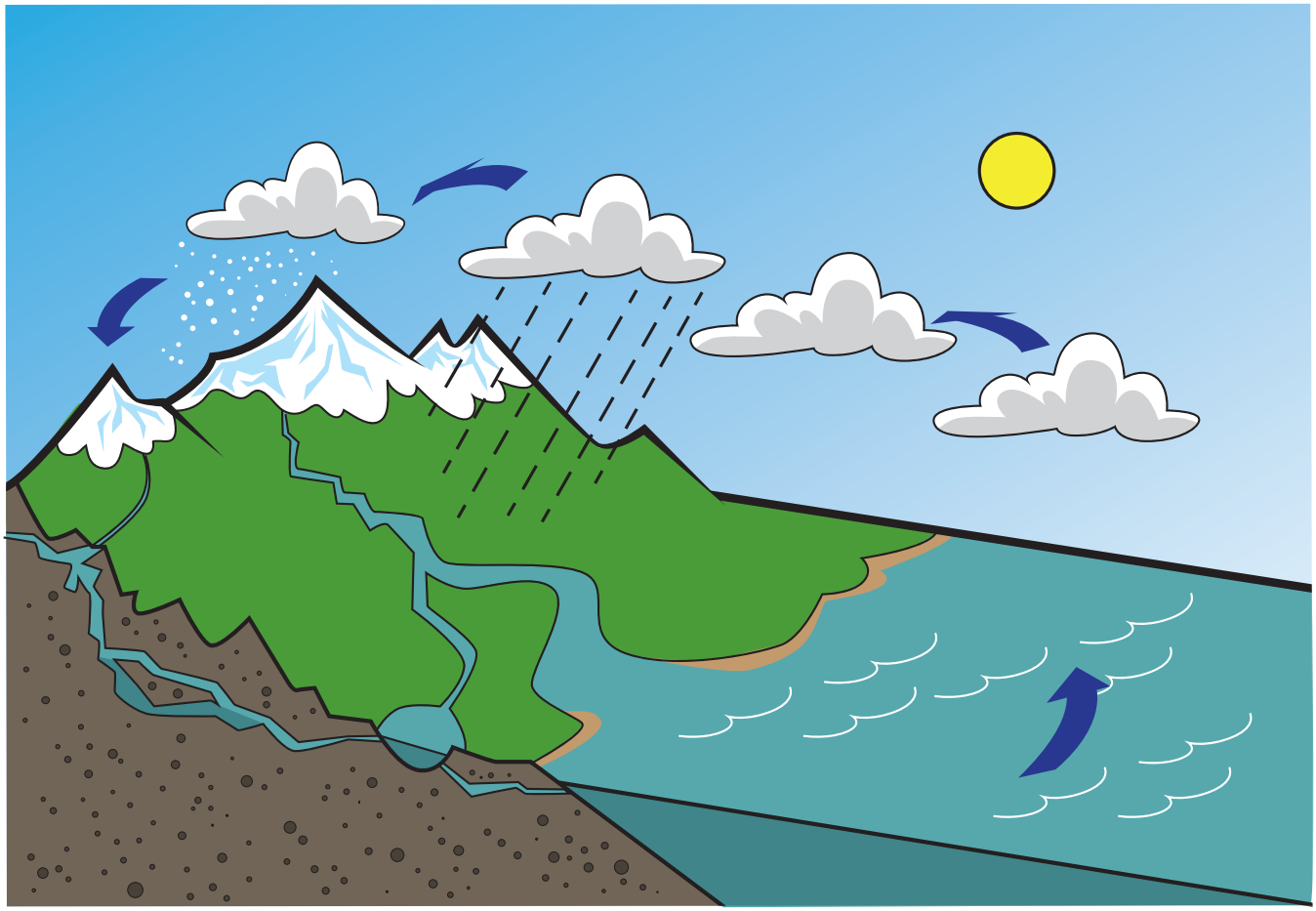
States of matter

Can be used on a projector.

7: The water cycle

Objectives

Know that condensation occurs when a gas turns into a liquid and that it is the reverse of evaporation.



1 Label the diagram of the water cycle. Include the key words.

Key words clouds condensation evaporation freezing heat from the sun melting precipitation

2 Explain what would happen to life on Earth if the water cycle stopped.

5: Walking on the Moon

Objectives

Distinguish between mass measured in kilograms (kg) and weight measured in Newtons, noting that kilograms are used in everyday life.

Make a variety of relevant observations and measurements using simple apparatus correctly.

Use tables, bar charts and line graphs to present results.

Resources

- scales
- calculators
- worksheets
- the internet

Key skills

researching, calculating, recording

Cross-subject links

maths

Background information

This activity card explores how the force of gravity is different on other planets and the Moon. Remind students that weight is the force of gravity acting on an object, so it should be measured in the same units as other forces, Newtons. Remind them that all objects are made up of smaller particles, and this means that they have mass. The amount of mass an object has is measured in kilograms. In this activity students convert the incorrect units of kilograms to Newtons by simply multiplying by 10. Students will need to measure their own mass or use an average of 55 to 60 kg if this is not appropriate. Explain that Newton discovered that the mass of objects affects the force of gravity between them.

Step by step guide

- Students should discuss the way that the astronaut is moving in the picture on the card.
- If possible, show them a video clip to demonstrate this further. Even though the astronauts have heavy spacesuits that are often weighted, they still float and move much more easily than on Earth.
- Allow students to read through the information on the card in pairs.
- They should realise that the mass of the astronaut is unlikely to change during the journey to the Moon and so the force of gravity must be different if their weight is.

5: Walking on the Moon (continued)

- If appropriate, provide students with weighing scales. They can use them to measure and record their mass.
- Students can then research the force of gravity on different planets or you could provide these for them.
- Finally, students use the forces of gravity to calculate their weight on different planets.

Can be used on a projector.

5: Walking on the Moon

Objectives

Distinguish between mass measured in kilograms (kg) and weight measured in Newtons, noting that kilograms are used in everyday life.

1. Use the internet to research how the force of gravity changes on other planets in our solar system. Smaller planets and the Moon have a smaller force of gravity because the greater the mass, the greater the gravity is.
2. Measure your mass using scales and calculate what your weight would be on each other planet.
3. You can record your research and calculations in this table.

Planet	Force of gravity (kg)	Your weight (N)
Mercury		
Venus		
Earth		
Mars		
Jupiter		
Saturn		
Uranus		
Neptune		
Moon		

Biology

Stage 1

Topic	Card number														
Topic: Plants															
Know that plants are living things. (1Bp1)	2	3													
Know that there are living things and things that have never been alive. (1Bp2)	1														
Explore ways that different animals and plants inhabit local environments. (1Bp3)	10	11													
Name the major parts of a plant, looking at real plants and models. (1Bp4)	4														
Know that plants need light and water to grow. (1Bp5)	5	6	7												
Explore how seeds grow into flowering plants. (1Bp6)	8	9													
Topic: Humans and animals															
Recognise the similarities and differences between each other. (1Bh1)	12	13	14												
Recognise and name the main external parts of the body. (1Bh2)	15	16													
Know about the need for a healthy diet, including the right types of food and water. (1Bh3)	17	18	19	20	21										
Explore how senses enable humans and animals to be aware of the world around them. (1Bh4)	22	23													
Know that humans and animals produce offspring which grow into adults. (1Bh5)	24	25													

Mapping to Cambridge Primary Science Curriculum Framework

Chemistry

Stage 1

Topic	Card number														
Topic: Material properties															
Use senses to explore and talk about different materials. (1Cp1)	1	2	3												
Identify the characteristics of different materials. (1Cp2)	4	5	6	7	8										
Recognise and name common materials. (1Cp3)	9	10	11												
Sort objects into groups based on the properties of their materials. (1Cp4)	12	13	14	15											

Mapping to Cambridge Primary Science Curriculum Framework

Physics

Stage 1

Topic	Card number														
Topic: Forces															
Explore, talk about and describe the movement of familiar things. (1Pf1)	1	2	3												
Recognise that both pushes and pulls are forces. (1Pf2)	4	5	6	7	8										
Recognise that when things speed up, slow down or change direction there is a cause. (1Pf3)	9	10	11												
Topic: Sound															
Identify many sources of sound. (1Ps1)	12	13	14	15											
Know that we hear when sound enters our ear. (1Ps2)	16	17	18												
Recognise that as sound travels from a source, it becomes fainter. (1Ps3)	19	20													

Mapping to Cambridge Primary Science Curriculum Framework

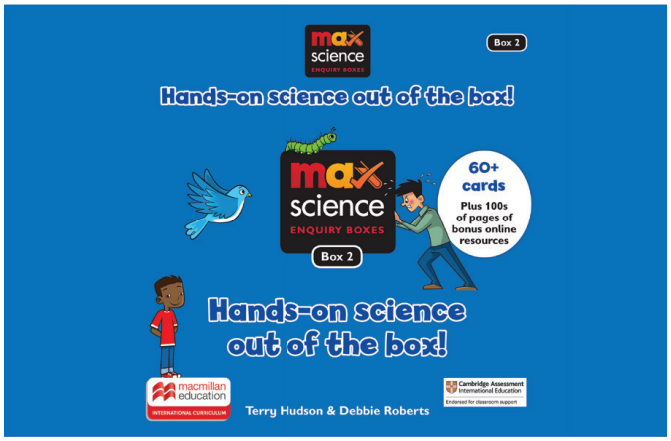
Scientific Enquiry

Max Science Enquiry boxes are designed so that an enquiry-based learning approach underpins all of the approaches adopted. However, if you wish to focus on one or more particular aspects to specifically develop specific skills and raise confidence, the following cards are recommended.

Stage 1

Scientific Enquiry skills		Biology cards	Chemistry cards	Physics cards
Ideas and evidence	Try to answer questions by collecting evidence through observation.	2, 9	11	10, 11
Plan investigative work	Ask questions and contribute to discussions about how to seek answers.	3, 5, 23	5	9, 19
	Make predictions.	7, 9	3, 6	9, 10
	Decide what to do to try to answer a science question.	7, 19	—	9
Obtain and present evidence	Explore and observe in order to collect evidence (measurements and observations) to answer questions.	1, 9, 13	2, 4, 8	7, 9, 13
	Suggest ideas and follow instructions.	7, 9	7, 8	2, 3, 6
	Record stages in work.	9, 20	7	13, 15
Consider evidence and approach	Make comparisons.	5, 6, 12	3, 6, 7, 15	9, 10
	Compare what happened with predictions.	9, 12	3, 6, 7	3, 9
	Model and communicate ideas in order to share, explain and develop them.	10, 14, 18	1, 2	1, 11, 14

max science enquiry boxes



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