Process Skills and Answering Techniques

P3 & P4 PARENTS WORKSHOP

26 MARCH 2021

Workshop Content

01

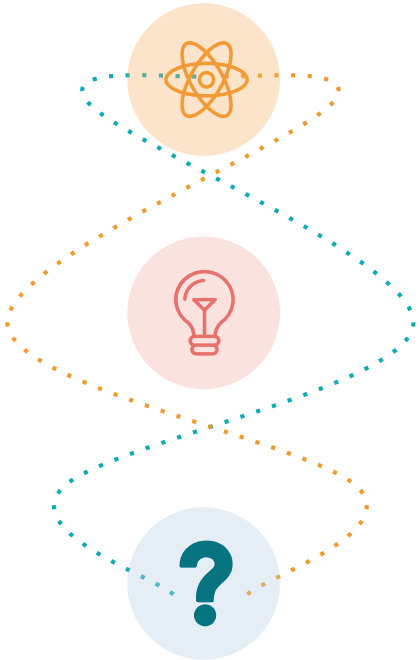
Learning Science

The “Why” and the “How”

02

Syllabus in Brief

The MOE Syllabus



03

Answering Techniques

Making Thinking Visible

04

Consolidation

Support and Feedback

Understanding the world around them

Bacteria can be useful

Understanding the world around them

Bacteria can be harmful

Second batch of eggs from Malaysia recalled after salmonella bacteria detected

Kok Yufeng

PUBLISHED MAR 19, 2021, 11:49 PM SGT

The affected batch can be identified by a stamp on the eggs that says "CEM014". PHOTO: SINGAPORE FOOD AGENCY

Extracted from Straits Times 19 Mar 2021

Understanding the world around them

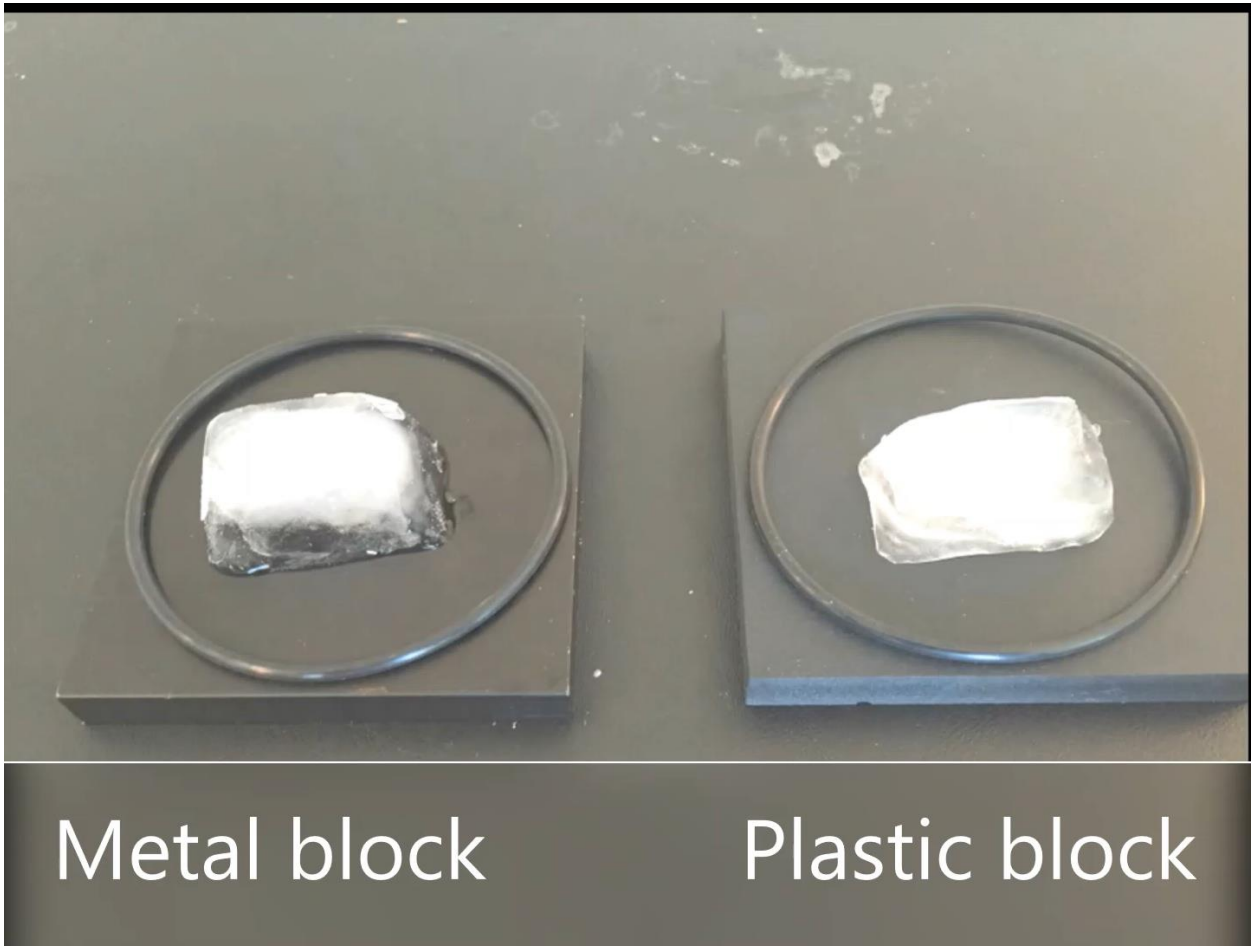
NParks to give out 3,000 seed packets to spur edible gardening

Seeds distributed by NParks in 2020. Instructions on how to grow the vegetables will come with the packs of seeds. PHOTO: NPARKS

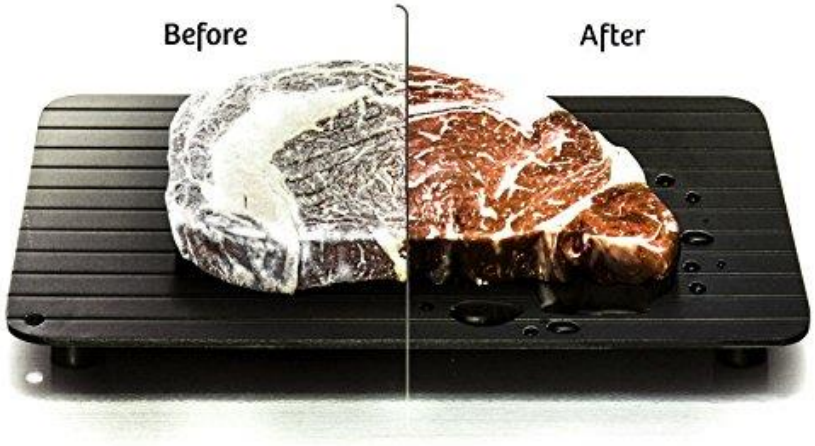
Charmaine Ng

PUBLISHED MAR 20, 2021, 10:51 AM SGT

Extracted from Straits Times 20 Mar 2021


Metal block
Plastic block

Understanding the world around them



- Learn **basic concepts** to understand themselves and things around them
- Develop skills
- Cultivate attitudes
- Have learning experiences which build on **interest** and stimulate **curiosity**
- Develop **scientific literacy**

How does my child learn science?

25 Jan 2021 06:33PM
(Updated: 25 Jan 2021 10:29PM)

Bookmark

Singapore

Dengue risk remains as Aedes mosquito population has grown: NEA

An Aedes Aegypti mosquito on human skin. (File photo: AFP/LUIS ROBAYO)

SINGAPORE: Although the number of dengue cases has remained "relatively stable" for the past few weeks, the Aedes mosquito population is still high in some areas of Singapore, said the National Environment Agency (NEA) on Monday (Jan 25).

The Aedes mosquito population rose by about 8 per cent in December, said NEA.

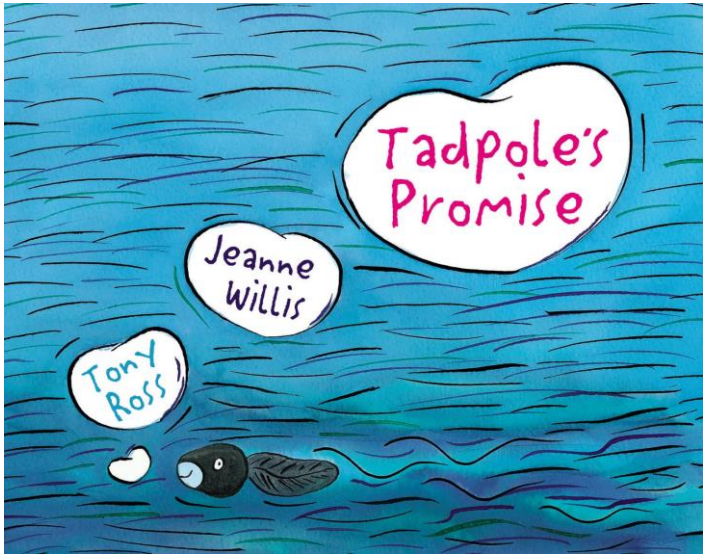
Extracted from Straits Times 25 Jan 2021

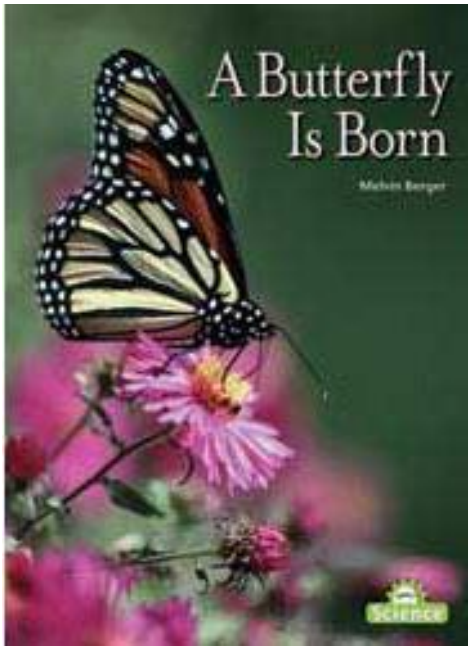
How does my child learn science?

Do disinfectants really work?

How does my child learn science?

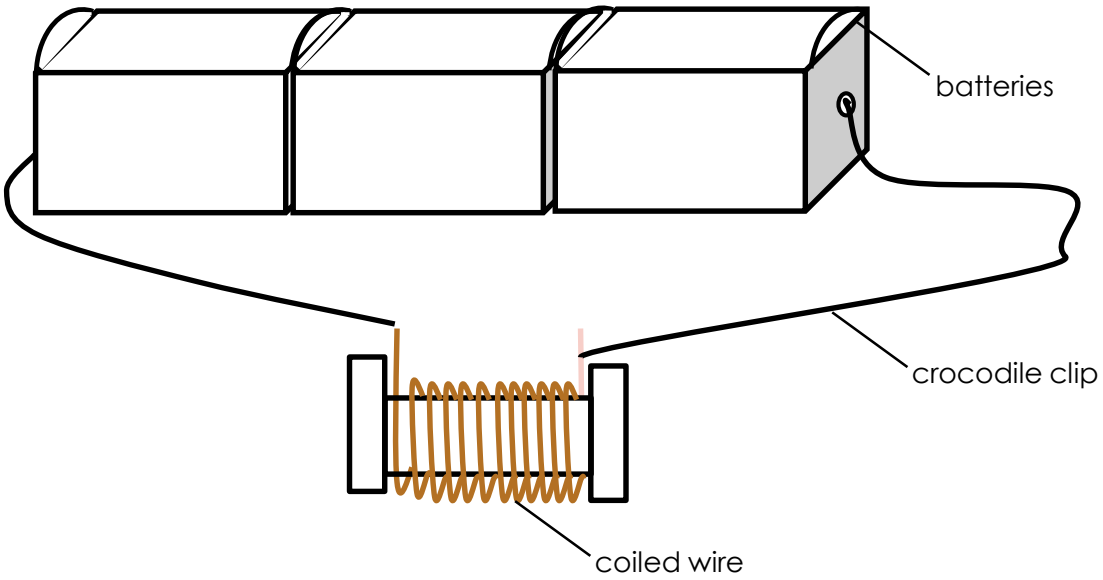
Let's learn from stories…





How does my child learn science?

Let's conduct an experiment…



The MOE Syllabus

Themes	Lower Block (P3-P4)	Upper Block (P5-P6)
Diversity	• Diversity of living and non-living things (General characteristics and classification) • Diversity of materials	
Cycles	• Cycles in plants and animals (Life cycles) • Cycles in matter and water (Matter)	• Cycles in plants and animals (Reproduction) • Cycles in matter and water (Water)
Systems	• Plant System (Plant parts and functions) • Human System (Digestive system)	• Plant System (Respiratory and circulatory systems) • Human System (Respiratory and circulatory systems) • Cell System • Electrical System
Interaction	• Interaction of forces (Magnets)	• Interaction of forces (Frictional force, gravitational force, force in springs) • Interaction within the environment
Energy	• Energy Forms and Uses (Light and Heat)	• Energy Forms and Uses (Photosynthesis) • Energy Conversion

Note: Topics which are underlined are not required for the Foundation Science.

Syllabus at Punggol View

Syllabus Requirement		
Themes	**Lower Block (Primary 3)**	**Lower Block (Primary 4)**
Diversity	• Diversity of living and non-living things (General characteristics and classification) • Diversity of materials	
Cycles	• Cycles in plants and animals (Life cycles)	• Cycles in matter and water (Matter)
Systems	• Plant system (Plant parts and functions) • Human system (Digestive system)	
Interactions		• Interaction of forces (Magnets)
Energy		• Energy forms and uses (Light and heat)

Skills & Processes

Students to use concepts and integrate skills and processes to inquire things and phenomena around them

<table>
<tr><th></th><th>Engaging with an event, phenomenon or problem through:</th><th>Collecting and presenting evidence through:</th><th>Reasoning; Making meaning of information and evidence through:</th></tr>
<tr><td rowspan="2">Skills</td><td>• Formulating hypothesis
• Generating possibilities
• Predicting</td><td>• Observing
• Using apparatus and equipment</td><td>• Comparing
• Classifying
• Inferring
• Analysing
• Evaluating</td></tr>
<tr><td colspan="3">Communicating</td></tr>
<tr><td>Processes</td><td colspan="3">Creative problem-solving, Investigation and Decision-making</td></tr>
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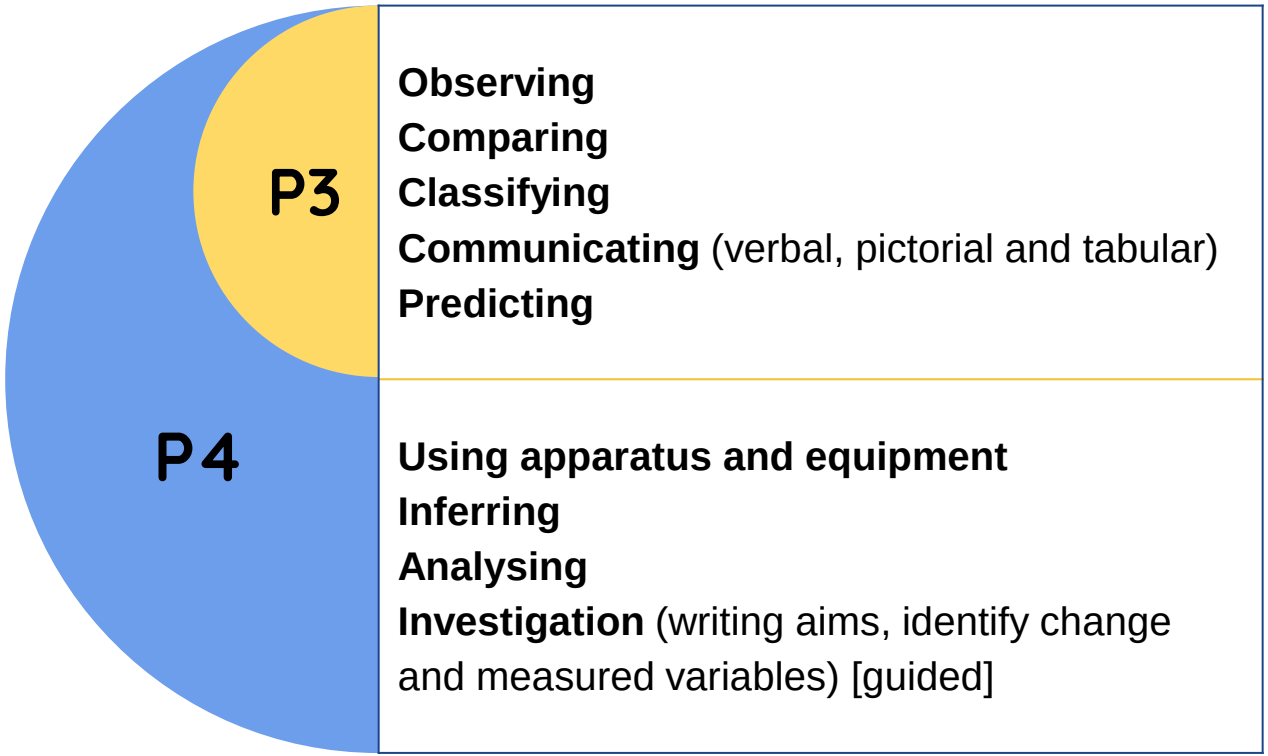
Skills & Processes at Punggol View



Purpose of Assessment

The science paper assesses students' attainment in Science with respect to the aims of Primary Science Education as stated in the 2014 Science Syllabus.

Examination Format
Semestral Assessment

The examination consists of one written paper comprising two booklets, Booklet A and Booklet B.

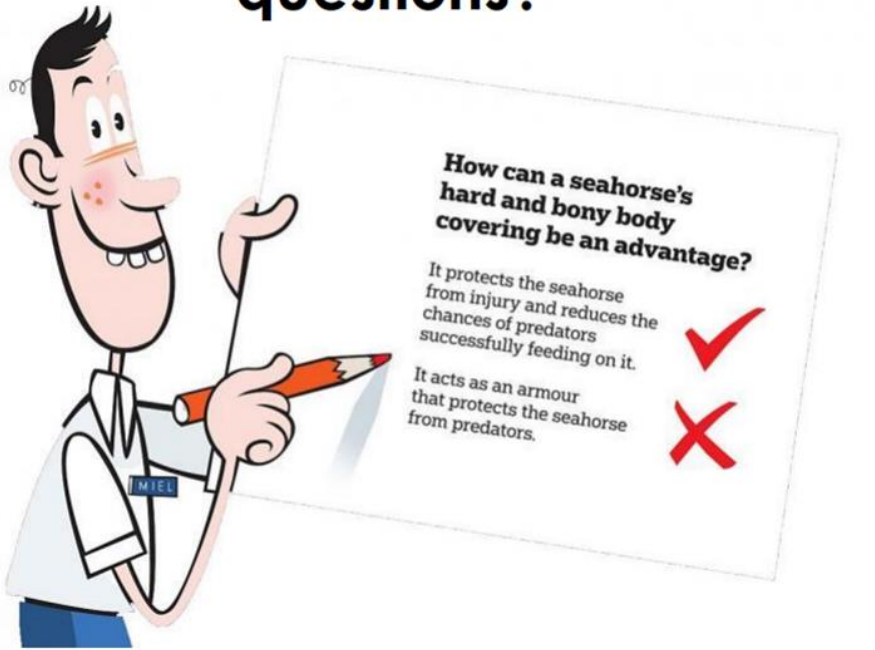
P3 Weighted Assessment

Term 1	Term 2	Term 3	Term 4
Learning Review (Non-weighted)	Weighted assessment (15%)	Weighted assessment (15%)	SA2 (70%)
Total: 30 m MCQ Open-ended	**Total: 50 m** MCQ Open-ended **Total: 30 m** Performance Task	**Total: 50 m** MCQ Open-ended	**Total: 70 m** MCQ Open-ended

P4 Weighted Assessment

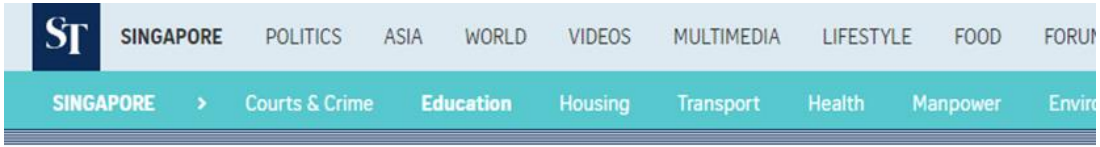
Term 1	Term 2	Term 3	Term 4
Learning Review (Non-weighted)	SA1 (30%)	Learning Review (Non-weighted)	SA2 (70%)
Total: 50 m MCQ Open-ended	**Total: 80 m** MCQ Open-ended	**Total: 50 m** MCQ Open-ended	**Total: 100 m** MCQ Open-ended

Only one right answer to science questions?



Retrieved from The Straits Times; Published FEB 23, 2015

03 Answering Techniques



Several parents wrote to The Straits Times Forum page earlier this month, calling for schools to be more flexible. Most said their children were unduly penalised for answers that had the same meaning as the correct ones, but did not contain the right "key words".

The children had been told by teachers to stick to key phrases and words found in textbooks, in order to get full marks in assignments or tests.

On top of those who wrote in, nine in 10 parents contacted by The Straits Times felt that the teachers have been overly strict.

Psychologist Inez Perera, 49, whose daughter was in Primary 6 last year, recalled: "She had to memorise so many model answers. Some made sense, but does it have to be so rigid?"

Ms Elizabeth Tan, whose son is in Primary 6, said he resorted to writing key phrases and sentences repeatedly to remember them for his examinations.

"You're teaching children that there's only one answer for every question, and they can't think out of the box," said the 41-year-old housewife.

"Children are meant to explore ideas and discover things in science... but it seems key words are more important."

Retrieved from The Straits Times; Published FEB 23, 2015

Our Stand

The primary science curriculum encourages pupils to learn science through **understanding basic concepts and applying what they have learnt in different contexts**. While there are certain scientific terms and concepts taught in the primary science syllabus, pupils can **demonstrate their understanding by using their own words in explaining concepts**.

The focus of learning science **is not on giving "standard answers“ or keywords, but on developing students' ability to inquire, understand and explain scientific phenomena**. We do not encourage students to reproduce "standard answers" or be fixated with memorising keywords, as different application contexts would require different responses.

The learning of science does **require a certain level of clarity** though, in the way concepts are explained, given the context of the question. Otherwise, we may end up endorsing misconceptions in students or rewarding them for ambiguous responses.

Sng Chern Wei, Director, CPDD1, 9 May 2015, ST

Our Stand

- Students are encouraged to **understand** basic concepts and **applying** what they have learnt in different contexts.
- Students demonstrate their understanding by **using their own words** in explaining concepts.
- The focus is to develop students' **independent ability to inquire, understand and explain** scientific phenomena.
- Students must be **clear in explaining** concepts, given the context of the question.

What makes a good answer?

- A good answer must be anchored with the correct scientific concept.

- Using the scientific concept, to fulfil the requirement of the question stem.

Example

Look at Animal A shown below.

Animal A

Explain why Animal A is not an insect. [1m]

An insect has 6 legs and 3 body parts.

How would the student score for this answer?

What makes a good answer?

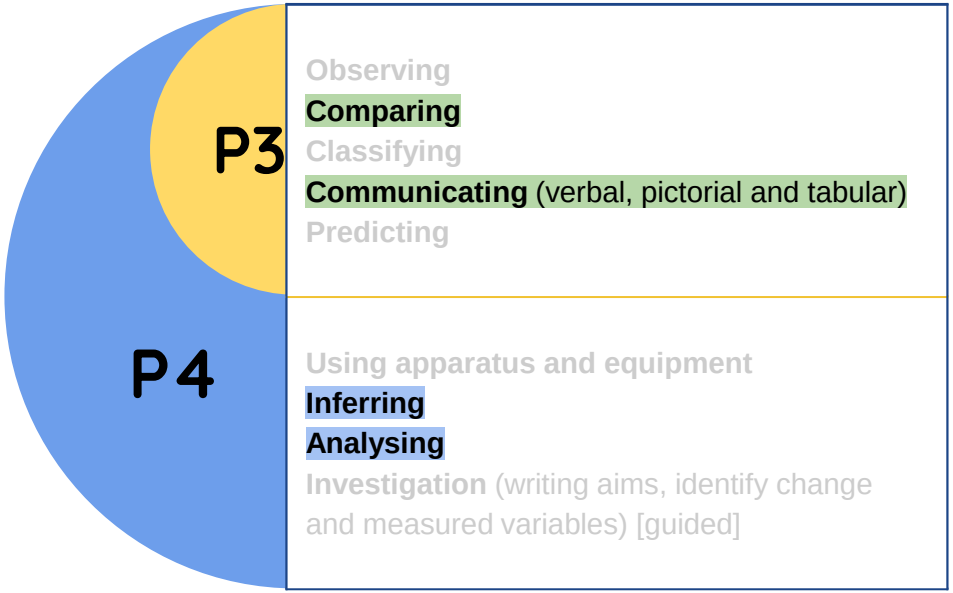
- A good answer must be anchored with the correct scientific concept.

The student identified the correct concept

- Using the scientific concept, to fulfil the requirement of the question stem.

However, student did not explain "why" it is not an insect.
He/she only stated the characteristics of an insect.
The requirement of the question stem was not fulfilled.

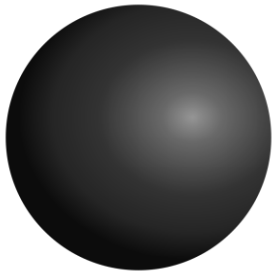
03 Answering Techniques



Getting students to
use concepts
and
integrate skills & processes
when answering questions

Comparing

Observe and compare the two objects.



Object A

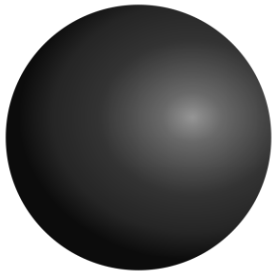
Object B

State a similarity between both of them. [1m]

Both are round.

Comparing

Observe and compare the two objects.



Object A

Object B

State a difference between both of them. [1m]

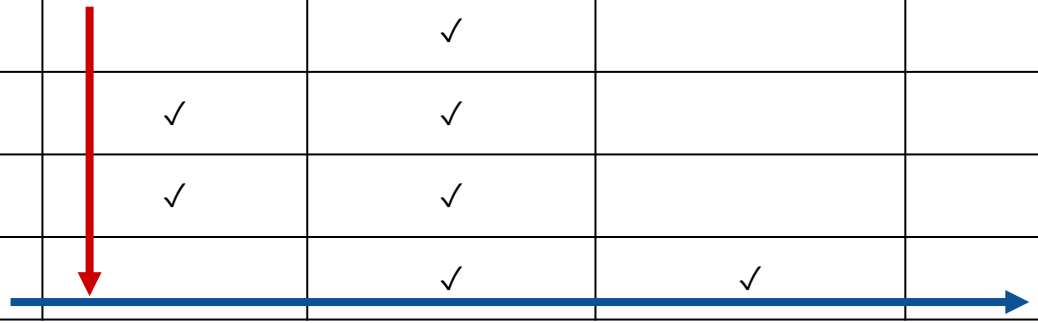
Object A is big but object B is small.

How to read a table

Communicating

Look at the table below. A tick (✓) shows that the animal has the characteristic.

Animals	Characteristics			
	Has scales	Lays eggs	Has six legs	Use gills to breathe
M		✓		
N	✓	✓		✓
O	✓	✓		
P		✓	✓	



Reading of characteristics

ie. **Animals N and O have scales.**

Characteristics each animal has

ie. **Animal P lays eggs and has six legs.**

Communicating

The table below describes the properties of 3 objects, A, B and C, made of different materials. A tick (✓) shows the property of material observed.

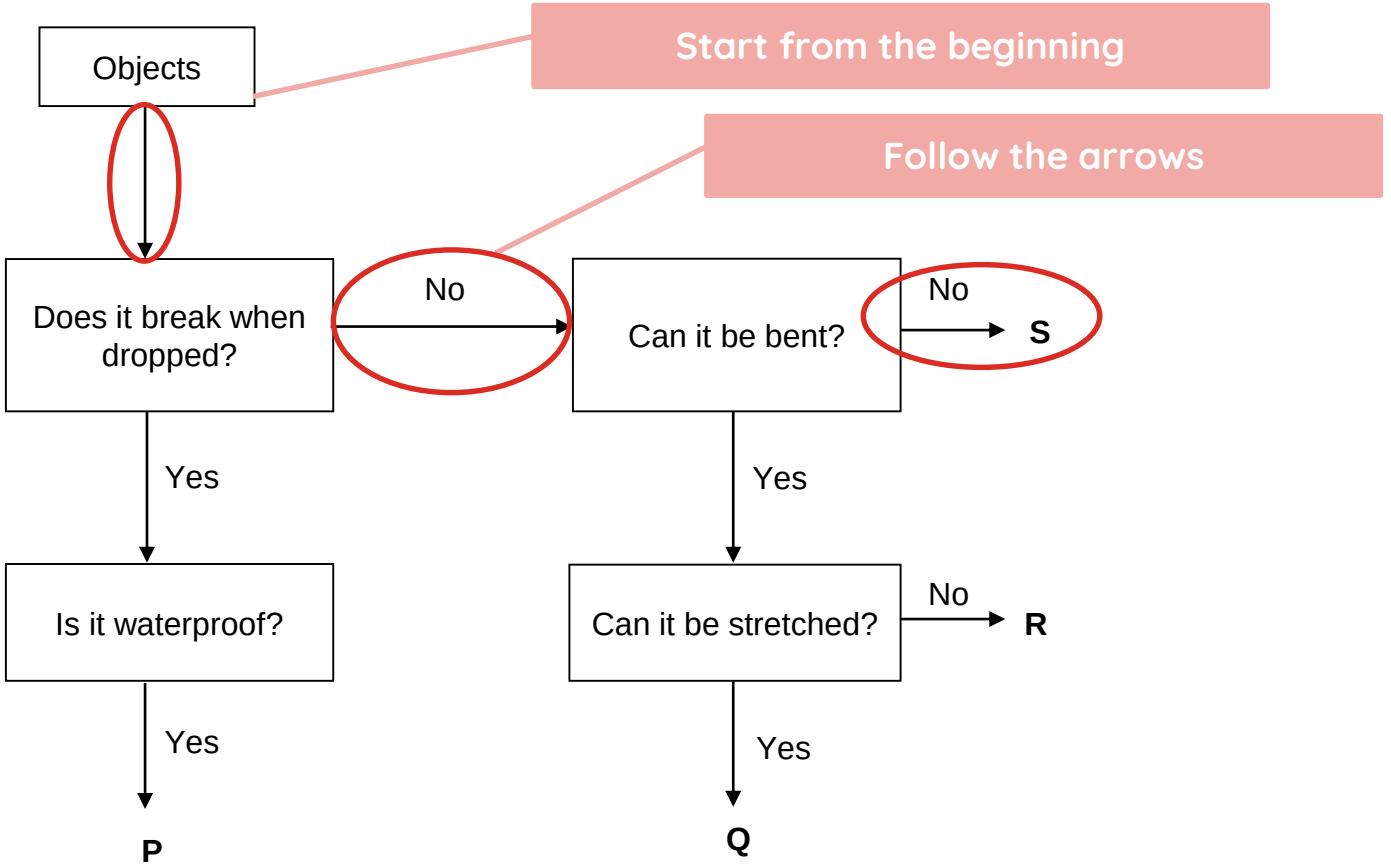
Property of material	A	B	C
It breaks easily when dropped			✓
It is flexible	✓	✓	
It is waterproof	✓		✓

Based on the information from the table, what are the properties of Material A?

Material A does not break easily when dropped. Material A is flexible and waterproof.

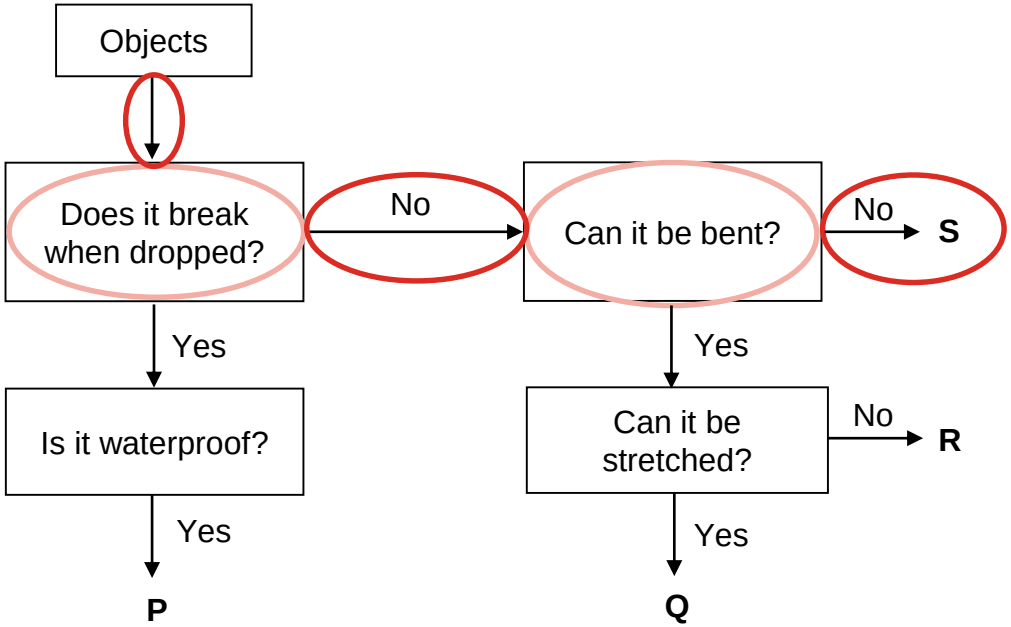
How to read a flowchart

Communicating



Communicating

Look at the flowchart below.

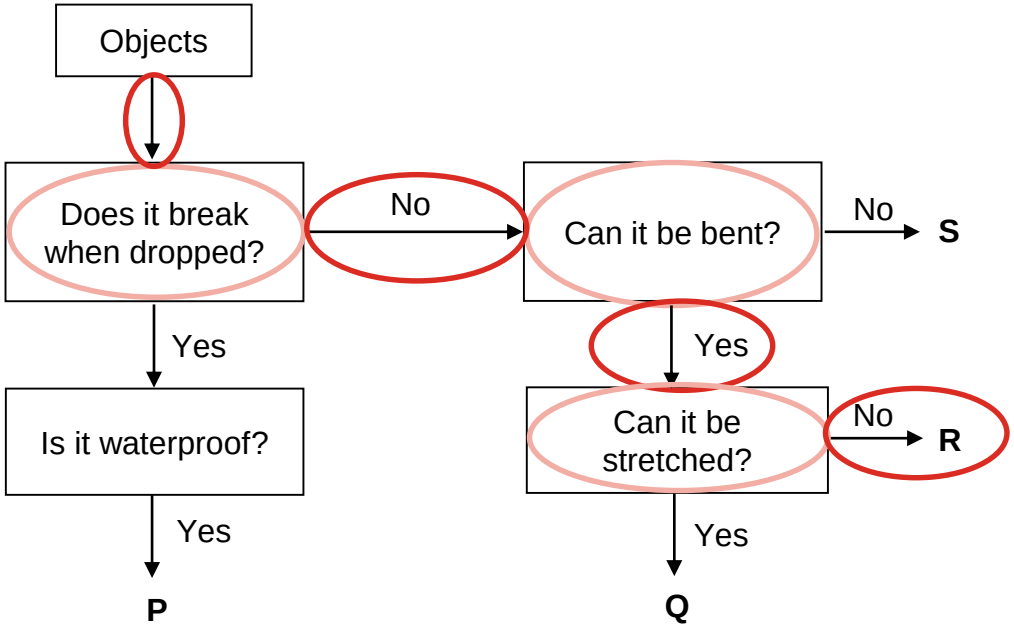


Based on the information from the flowchart, state the properties of S.

Material S does not break when dropped and cannot be bent.

Communicating

Look at the flowchart below.

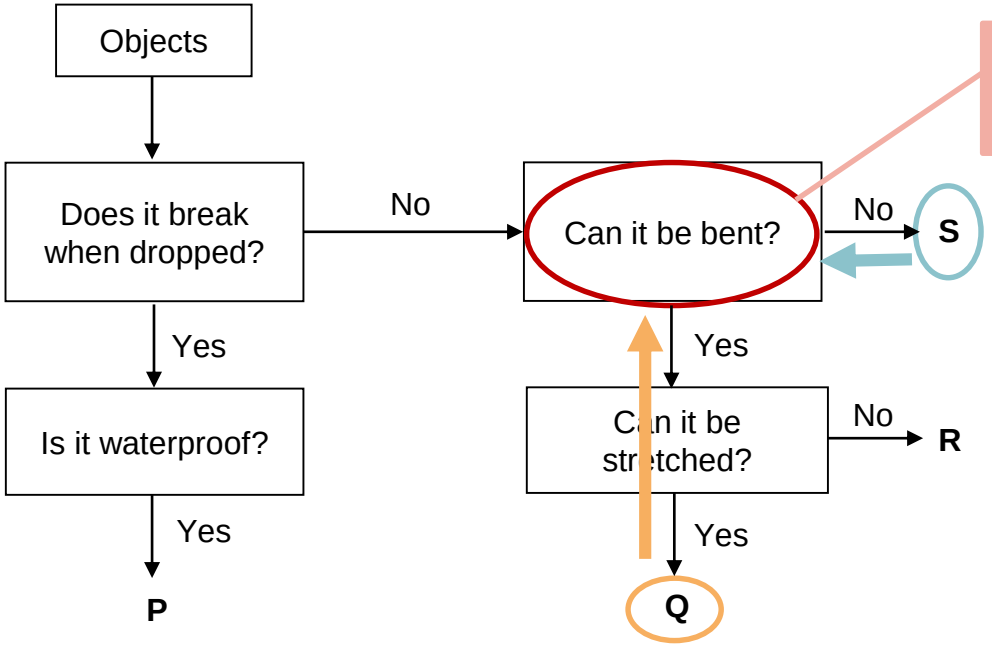


Based on the information from the flowchart, state the properties of R.

Material R does not break when dropped, can be bent but not stretched.

Communicating

Look at the flowchart below.



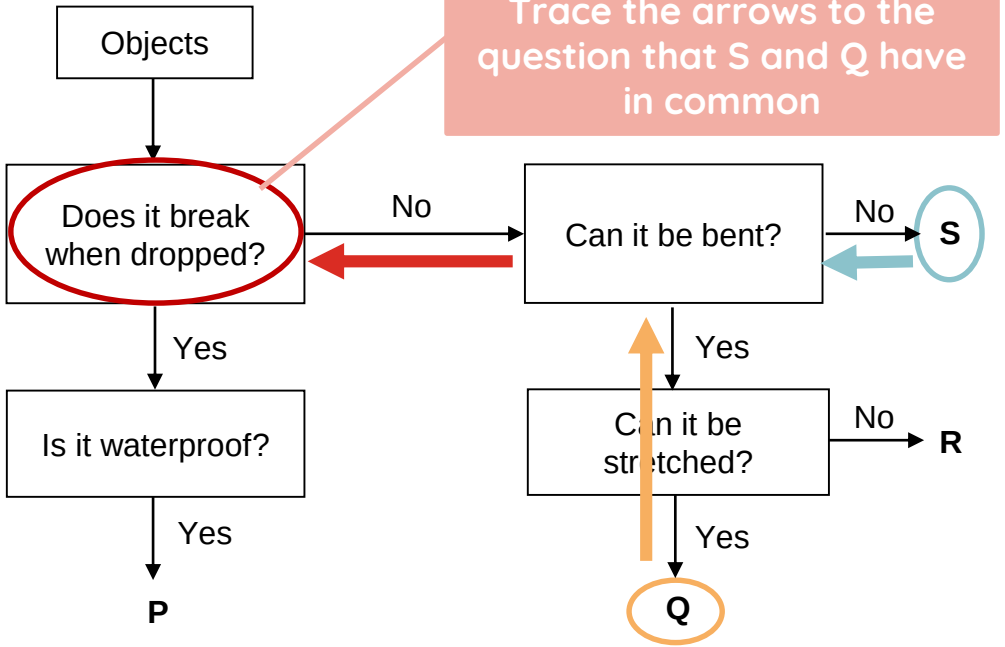
Trace the arrows to the question that S and Q differ

What is the difference between S and Q?

Material S cannot be bent but material Q can be bent.

Communicating

Look at the flowchart below.



What is the similarity between S and Q?

Both material S and material Q do not break when dropped.

Analysing tables

Analysing

	Week 1	Week 2	Week 3	Week 4
Number of fish	2	2	3	6
Number of worms	80	55	30	5

Identify trends or patterns

What do you notice about the number of fish?

Increasing or decreasing?

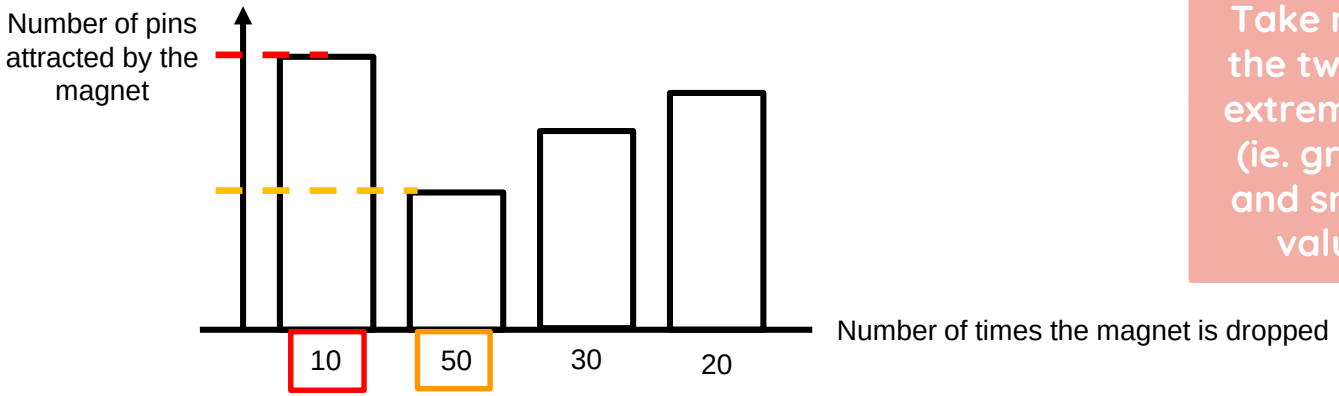
What do you notice about the number of worms?

Increasing or decreasing?

Analysing bar graphs

Analysing

Samantha wanted to find out how dropping a magnet will affect its magnetic strength. She dropped a magnet many times from the same height and plotted her results in the graph below.



Take note of the two most extreme data (ie. greatest and smallest values)

What can Samantha conclude from her results?

(1) The size of the magnet affects the magnetic strength.

(2) The number of pins attracted by the magnet is not affected by the number of times it is dropped.

(3) When the magnet is dropped 50 times, the magnetic strength is the strongest.

(4) The more times the magnet is dropped, the weaker the magnetic strength.

Inferring

Inferring

Inferring is to **draw a conclusion** based on observations or analysing data or information.

2. What can we tell from the evidence?

What do the results or evidence tell you?

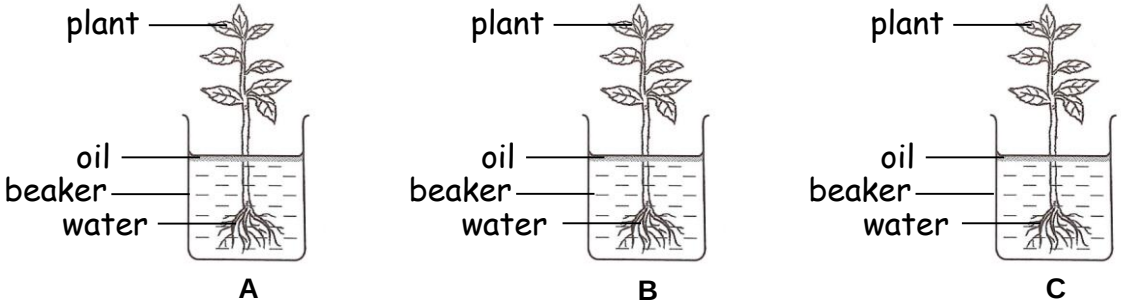
What are the scientific concepts that can help you?

1. Where can we find the evidence?

- Tables
- Diagrams
- Charts
- Graphs

Inferring

Three different plants were placed in three identical containers filled with 200ml of water. A layer of oil was poured into each container as shown below.



1. Where can we find the evidence?

Container	Volume of water (ml)	
	Day 1	Day 2
A	200	180
B	200	175
C	200	200

The volume of water in each container was recorded on the 7th day as shown in the table below.

Which of the containers A, B and C contained a plastic plant? Give a reason.

2. What can we tell from the evidence?

Inferring

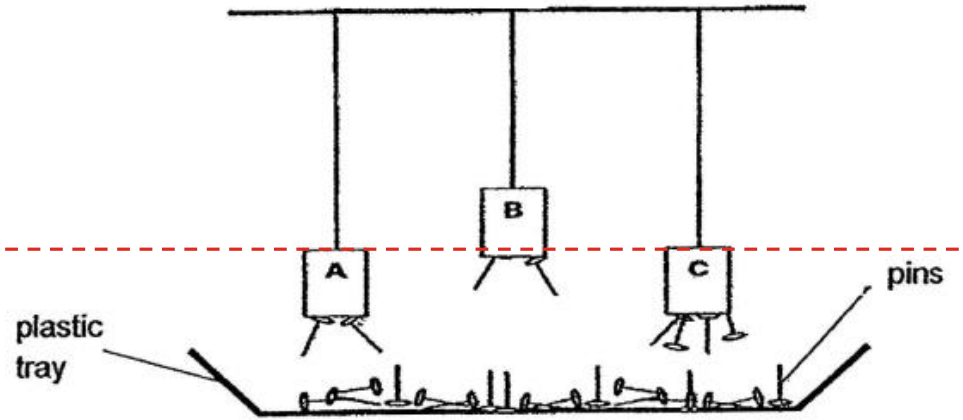
Container	Volume of water (ml)	
	Day 1	Day 2
A	200	180
B	200	175
C	200	200

Which of the containers A, B and C contained a plastic plant? Give a reason.

Container C contained a plastic plant. (conclusion from the experiment) There was no change in the amount of water. (observation / evidence) This shows that the plant is a non-living thing as it does not need water. (application of concept)

Inferring

Randy hung three magnets of equal sizes on a rod. The following diagram shows his results.



1. Where can we find the evidence?

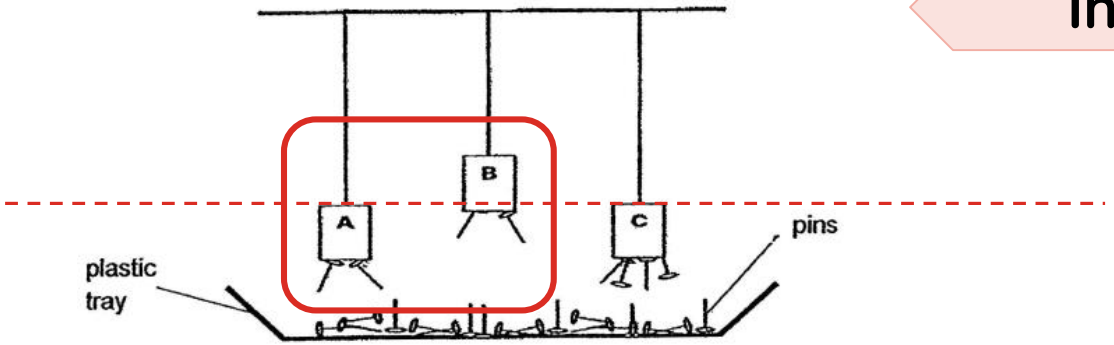
2. What can we tell from the evidence?

What can be inferred from his results?

(1) Magnet B is weaker than magnet A.
(2) Magnet C is stronger than magnet B.
(3) Magnet A is the weakest magnet.
(4) All the three magnets have the same magnetic strength.

(3)

Inferring



What can be inferred from his results?

Magnet A is the weakest magnet. (conclusion from the experiment) Magnet A attracted fewer pins than C even though they were hung at the same height. (observation/ evidence) So, magnet A is weaker than magnet C. (application of concept) Magnet A attracted the same number of pins as B even though magnet A is closer to the tray of pins. (observation/ evidence) So, magnet A is weaker than magnet B too. (application of concept)

Strategies for Answering Questions

1. Read and understand the question.
2. Look for contextual clues in the question.
3. Interpret the diagrams.
4. Analyse the data given in the tables or graphs.
5. Identify the underlying topic and concept(s).

Topic: Matter
Concept: Properties of solids, liquids and gases

4. Analyse data given in tables or graphs

Example 1 (MCQ)

The table below shows some properties of Matter P and Matter Q.

P could be a solid or a liquid

Properties	Matter P	Matter Q
Can it be compressed?	No	Yes
Does it have definite shape?	Yes	No

Q is a gas as only gas can be compressed.

P can only be a solid.

Matter P and Matter Q are likely to be _____ and _____ respectively.

	Matter P	Matter Q
(1)	solid	~~liquid~~
~~(2)~~	liquid	solid
(3)	solid	gas
~~(4)~~	liquid	gas

Adopt elimination strategy

(3)

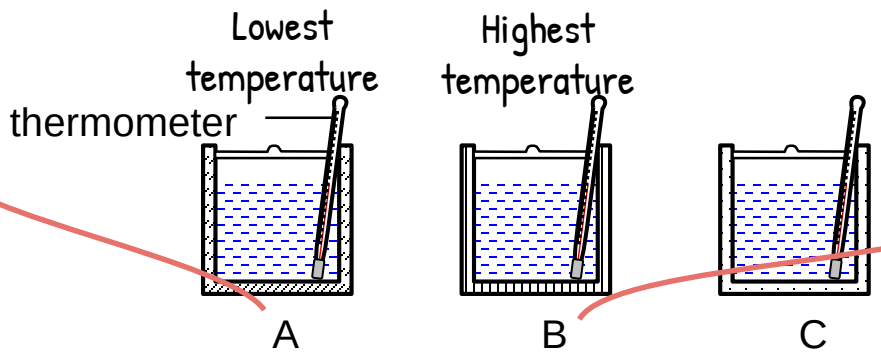
Example 2 (OE)

Topic: Heat
Concept: Heat loss and conductors

5. Identify topic(s) and concept(s)

Three containers similar size A, B and C were filled with 500 ml of boiling water each. The containers were made of different materials. A thermometer was placed in each container and were covered with a lid each as shown below. The containers were then left on a table for an hour.

Lowest temperature at the end → most heat lost → best conductor of heat



Highest temperature at the end → least heat lost → poorest conductor of heat

It was found that container B had the highest temperature, followed by C then A.

Which material is most suitable to make a flask that keeps water warm for a period of time? Explain.

Suggestions

for you to help your child! ☺

Helping Your Child to Enjoy Science

22 JUN 2016

Enjoy science in everyday life as you spend time with your children!

https://www.schoolbag.edu.sg/story/helping-your-child-to-enjoy-science

Suggestions

for you to help your child! ☺

Exploring Science Outdoors with Your Child

30 MAY 2017

https://www.schoolbag.edu.sg/story/exploring-science-outdoors-with-your-child

Suggestions

for you to help your child! ☺

1. **Engage your child** through outdoor experiences and activities.

2. **Revise** the concepts that they have learnt in school.

3. **Use questions to assess your child** to ensure that he/she can remember and apply what he/she has learnt.

If you have any queries after this session, you may drop an e-mail to:

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Ms Sylvia Wang (LH Science): wang_yong_ling_sylvia@moe.edu.sg