



Mystery Box Challenge

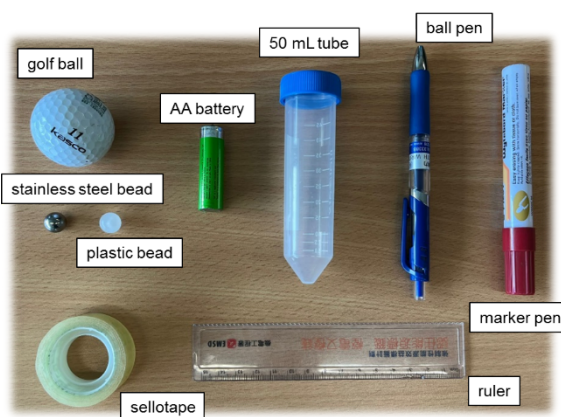
Task 1

Your classmate, Andy, is interested in science, and he wants to learn more about the methods scientists use to study how things work in the natural world. He has come to you for help and presents you with a souvenir he obtained from a science exhibition—several label cards containing the key steps of the *scientific inquiry process*. How would you explain to him what the process of *scientific inquiry* looks like using the label cards?

Note: You can write down any additional important steps on the blank labels if you want. You can also add text or draw lines to connect the steps as needed.

Task 2

Andy has also given you a mystery box from the science exhibition—a cardboard box containing unknown object(s). According to the instructions on the box, you are ***not*** allowed to open it. However, he wants you to determine the contents, including the number and name of the object(s) inside. Based on the instruction, it is known that the mystery box contains one or more of the following objects.



Examine the mystery box ***individually***. (Do NOT discuss with your classmates)

- (a) make *at least* three observations (or more!) that can provide hints about the content of the mystery box.
- (b) make inference(s) about the content of the box.

Observation	Inference of the content of the box

- (c) Based on (b), propose a hypothesis (i.e., educated guess) of the content of the box:

I propose that the mystery box contains

because

Task 3

Share your hypothesis of the content of the mystery box with your classmates.

- (a) Come to a *consensus* (i.e., an agreement between the groups) for a hypothesis of the content of the box:

Our group thinks that the mystery box contains

because

- (b) Propose ways that your group can collect further evidence to support your group's hypothesis of regarding the content of the mystery box.

Note: You are free to propose any methods (except opening the boxes) (e.g., using tools or instruments) to test your hypothesis.

Way to test the hypothesis	Predictions from the hypothesis

Task 4

Your group is now provided with (1) an electronic balance, (2) two magnets, (3) an empty box and (4) some objects.

(a) Discuss with your groupmates to determine how you will use the tools and materials to test your group's hypothesis.

(b) Collect data to test your group's hypothesis:

Data collected	Support or reject the hypothesis <i>(Put a '✓' into the approximate boxes.)</i>	Revision of hypothesis (if any)
	<input type="checkbox"/> Support <input type="checkbox"/> Reject	
	<input type="checkbox"/> Support <input type="checkbox"/> Reject	
	<input type="checkbox"/> Support <input type="checkbox"/> Reject	

Task 5

Your group is going to share with other groups the proposal of what is the content of the mystery box in a 2-minute presentation. Fill in the following poster.

In the sharing, your group should consider the following questions:

- What does your group think is inside the mystery box?
- What is the evidence that supports your group's proposal?
- How does your group know it?
- How certain is your group's proposal of the content of the mystery box? Why do you think so?

Task 6

As you perform the *Mystery Box Challenge*, how does it help you respond to Andy's question? Let's work together in groups to reconsider the key steps of the *scientific inquiry process* (on the label cards).

Note: You can write down any additional important steps on the blank labels if you want. You can also add text or draw lines to connect the steps as needed.

Take home assignment:

- Did the *Mystery Box Challenge* deepen what your understanding of the nature of scientific knowledge (i.e., NOS)? If so, how?
 - Did the activity make you understand any aspects of the nature of scientific knowledge (i.e., NOS) that you were not aware of before? If so, what are those aspects?
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Supplementary materials

Inquiry steps for poster-making in Task 1 and Task 6

Communicating the Findings	Proposing a Hypothesis	Drawing Conclusions
Analysing the Data	Gathering Data	Observing
Defining a Question to Investigate		

Poster templates

<div style="border: 2px solid yellow; padding: 10px; text-align: center;"> <h1 style="color: magenta; margin: 0;">Scientific Inquiry Process</h1> <div style="display: flex; justify-content: center; gap: 10px; margin-top: 10px;"> </div> <div style="height: 300px; border: 1px solid black; margin-top: 20px;"></div> </div>	<div style="border: 2px solid yellow; padding: 10px; text-align: center;"> <h1 style="color: magenta; margin: 0;">??? Mystery Box Challenge</h1> <div style="display: flex; justify-content: center; align-items: center; margin-top: 10px;"> </div> <p style="margin-top: 10px;">We think that the mystery box contains:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="padding: 5px;">Our evidence</th> <th style="padding: 5px;">How we obtained this piece of evidence</th> </tr> </thead> <tbody> <tr><td style="height: 30px;"></td><td></td></tr> <tr><td style="height: 30px;"></td><td></td></tr> <tr><td style="height: 30px;"></td><td></td></tr> </tbody> </table> <p style="margin-top: 10px;">Our level of certainty: <small>(The number of stars indicates a higher level of certainty)</small></p> <div style="display: flex; justify-content: center; gap: 10px; margin-top: 10px;"> </div> </div>	Our evidence	How we obtained this piece of evidence						
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For Task 1 and Task 6	For Task 5								