

Kau Yan College

S.1 Science

Unit 5: Energy - Microwavable Heat Bag

Class: S.1 ____ Name: _____ ()

Date: _____

Determining a suitable temperature range for the heat bag

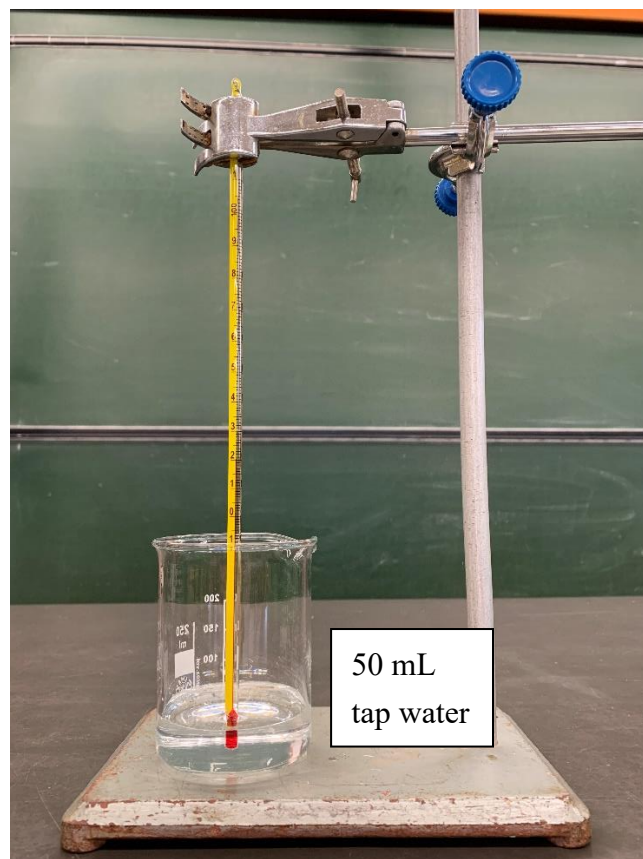
Objective: To determine a suitable temperature range for the heat bag by carrying out an experiment

Apparatus and materials (for each group):

250mL beaker	x 2	Hot water (around 70°C)	
Thermometer	x 1	Tap water	
Stand and clamp	x 1		

Procedure:

1. Setup the apparatus as shown below:



2. Touch the beaker of 50 mL tap water.
3. Add hot water into the beaker slowly.
4. Stir the water in the beaker by using _____.
5. Measure the temperature of the water by using a _____.
6. Record the temperature when you feel warm enough.
7. Keep adding hot water into the beaker slowly until you feel hot uncomfortably.
8. _____ the temperature again.

Questions:

What is the lowest temperature and highest temperature that a person would feel comfortable with?

	My own result	Whole-class result
Lowest temperature (°C)		
Highest temperature (°C)		

Scientific investigation on microwavable heat bag

Objective: To investigate different factors (sizes of heat bag / materials of heat bag) that affect the temperature change of the heat bag after microwaving.

Apparatus and materials (for each group):

Red beans	x 1 bag	Electronic balance	x 1
Thermometer	x 2	Microwave oven	x 5 for whole class
Clip	x2	100 mL Beaker	x 1
Plastic spoon x 1	x 1	Gloves	x 1 pair
Self-made heat bags	x 2	Stopwatch	x2
Wooden block	x2		

Information of the 2 chosen self-made microwavable heat bag in group:

Heat bag A

Name of student: _____

Size: _____ (small / medium / large)

Material: _____ (thin cotton / thick cotton / thick cotton with coating)

Heat bag B

Name of student: _____

Size: _____ (small / medium / large)

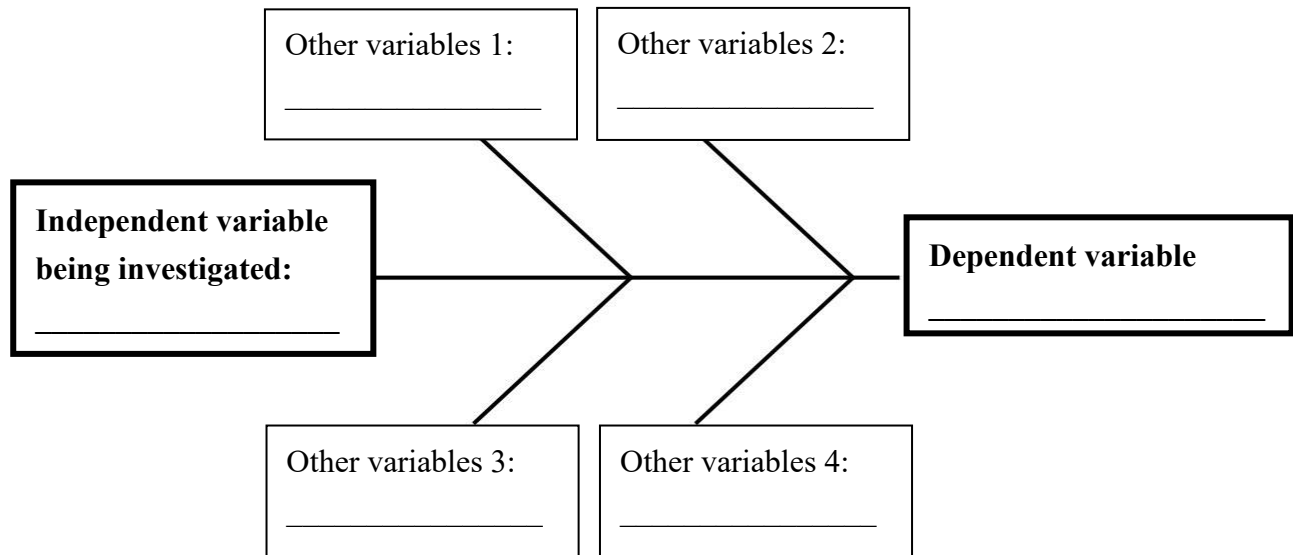
Material: _____ (thin cotton / thick cotton / thick cotton with coating)

Time of microwaving: 20 s

Mass of beans: 70 g

Setting up variables:

Fill in the fish bone diagram below about the variables of your investigation. Identify the variables by studying the objective.

**Procedures:**

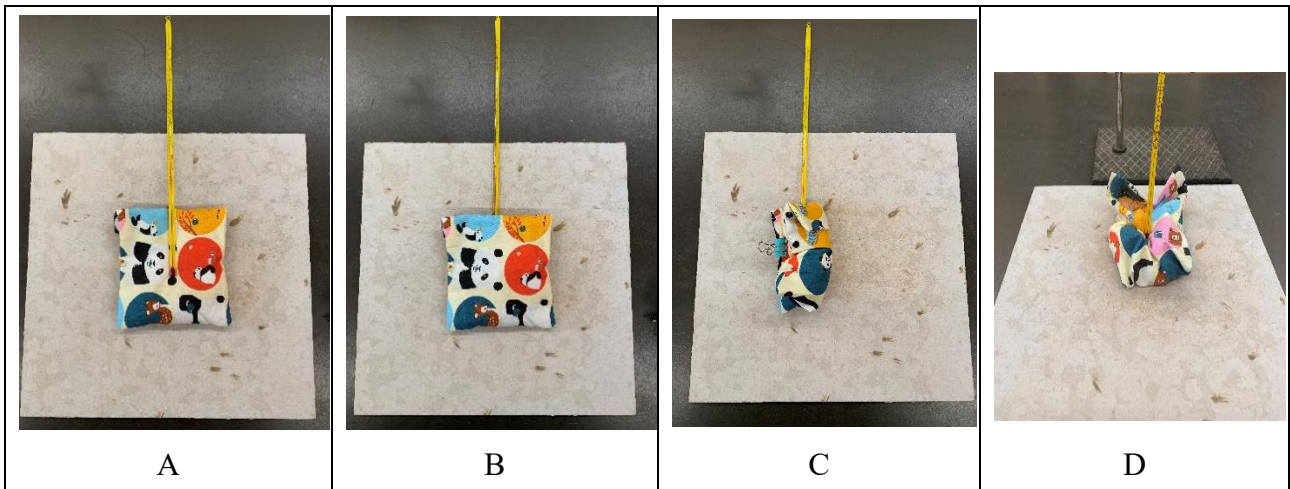
1. Setup your investigation with the materials and apparatus provided.
2. Use Surface tablets to **take a photo** on how you make your measurement and share it to the Powerlesson2 platform.
3. **Record the data** and share it to the google excel on PowerLesson2 platform

Precaution:

1. Take out your microwaved inner bag from the microwave oven with a pair of protective gloves.
2. Wear the protective gloves to put the microwaved inner coat into your heat bag.

Guiding Questions:

1. Which of the following ways is the best to measure the heat released from the heat bag after microwaving? Explain your answer briefly.

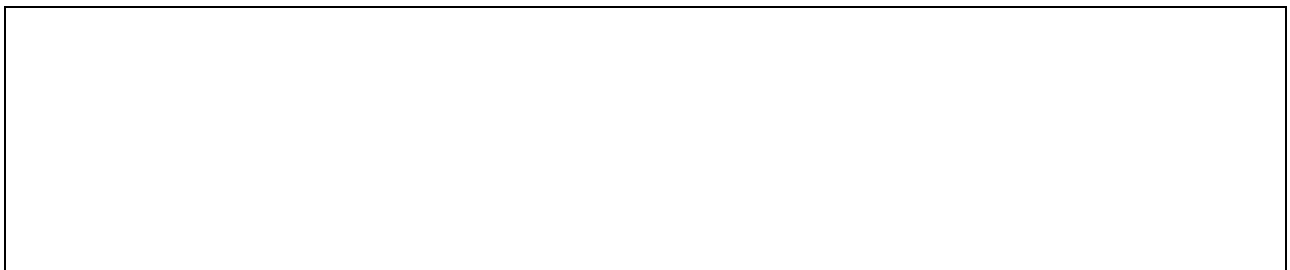


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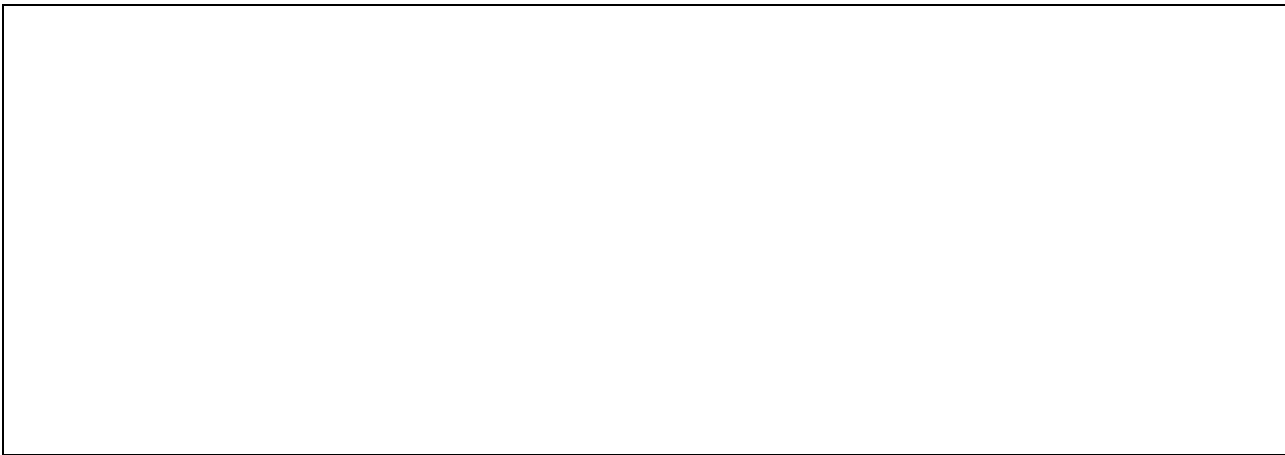
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2. Draw how you can make use of a wooden block and a clip to help making long-lasting measurements.



Data recording:

Construct a table to record the results and share it to the **google excel** on PowerLesson2 platform.



Discussion:

1. According to your result,

(a) find the highest temperature of the heat bag after microwaving.

.....

(b) find the final temperature of the heat bag after 20 minutes.

.....

(c) calculate the percentage decrease in temperature from the highest temperature to the final temperature.

.....

.....

2. What improvement can be made to make the experimental result more accurate?

.....

.....

Conclusion:

● Based on the results within your group (choose either one):

The _____ (size) heat bag / the heat bag that is made of _____ (material)

can have longer period of time remaining in the comfortable range of temperature.

- Based on the whole-class result:

.....

.....

.....

Making a user manual of the microwavable heat bag

Objective: Construct a user manual of the self-made microwavable heat bag for suitable for elderly.

Guiding questions:

1. What is a suitable range of temperature of the microwaved heat bags that will be suitable for elderly.

2. By comparing the whole-class data, what modification are necessary for achieving the results in Q.1 with the use of your self-constructed heat-bag?

.....
.....
.....

3. What should be included in the user manual to give clear guidelines for the elderly?

.....
.....

4. Suggest some safety precautions for guiding the elderly to use your microwavable heat bag.

.....
.....
.....

5. Write down the procedures for guiding the elderly to use your microwavable heat bag.

(Hints: try to use simple and short sentences for each step; start with a verb)

(1)

(2)

(3)

(4)

(5)

(6)

(7)

User Manual:

Information of your self-made microwavable heat bag:

Size: _____ (small / medium / large)

Material: _____ (thin cotton / thick cotton / thick cotton with coating)

A large empty rectangular box with a thin black border, occupying the majority of the page below the text. It is intended for a student to draw or write details about their self-made microwavable heat bag.

Evaluation

Please ask either your parent or grandparent to evaluate your self-made microwavable heat bag. You should also provide him/her the user manual to follow.

Evaluation on the microwavable heat bag (to be completed by parent / grandparent)

Please indicate how much you agree or disagree with the following statements about the microwavable heat bags made by your child by putting a “✓” into the box.

請勾選方框，說明您同意或不同意以下關於您孩子製作的微波爐加熱袋的陳述。

	Strongly disagree 完全不同意	Disagree 不同意	Neutral 中立	Agree 同意	Strongly agree 完全同意
1 The microwavable heat bag is very comfortable to use. 微波爐加熱袋使用起來非常舒適。					
2 The heat given out from the microwavable heat bag is adequate. 微波加熱袋發出的熱量是足夠的。					
3 The heat given out from the microwavable heat bag is long lasting enough. 從微波爐加熱袋發出的熱量足夠持久。					
4 The appearance of the microwavable heat bag is very attractive. 微波爐加熱袋的外觀非常吸引。					
5 The user manual of the microwavable heat bag is clear to follow. 微波爐加熱袋的用戶手冊清晰可循。					
6 The content of the user manual of the microwavable heat bag is reliable. 微波爐加熱袋的用戶手冊內容可靠。					
7 The design of the user manual of the microwavable heat bag is simple with enough graphic illustrations. 微波爐加熱袋的用戶手冊設計簡單，有足夠的圖像說明。					
8 Overall, the user manual of the microwavable heat bag is very useful. 總體而言，微波加熱袋的用戶手冊非常有用。					

Parents signature 家長簽名: _____

Date 日期: _____