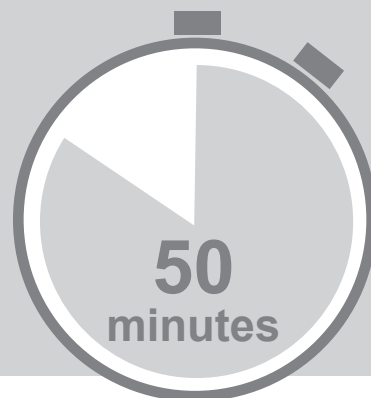




Science in Practice General course

Externally set task sample two



DO NOT WRITE IN THIS AREA AS IT WILL BE CUT OFF

DO NOT WRITE IN THIS BOX

WA student number: In figures

--	--	--	--	--	--	--	--	--

In words



Before starting this task **check** that you have:

- pens (blue/black preferred)
- pencils (including coloured)
- sharpener
- correction fluid/tape
- eraser
- ruler
- highlighters
- a calculator of the type used in classroom assessments



Copyright

© School Curriculum and Standards Authority, 2023

This document – apart from any third party copyright material contained in it – may be freely copied, or communicated on an intranet, for non-commercial purposes in educational institutions, provided that it is not changed and that the School Curriculum and Standards Authority (the Authority) is acknowledged as the copyright owner, and that the Authority's moral rights are not infringed.

Copying or communication for any other purpose can be done only within the terms of the *Copyright Act 1968* or with prior written permission of the Authority. Copying or communication of any third party copyright material can be done only within the terms of the *Copyright Act 1968* or with permission of the copyright owners.

Any content in this document that has been derived from the Australian Curriculum may be used under the terms of the Creative Commons [Attribution 4.0 International \(CC BY\)](https://creativecommons.org/licenses/by/4.0/) licence.

Total time for the task:	50 minutes
Total marks:	40 marks
Weighting:	15% of the school mark

Question 1**(19 marks)**

A group of students were learning about the Titanic, a cruise ship that sank in the Atlantic Ocean in 1912. Many of the passengers died after only 30 minutes in the water, even though they were wearing life jackets. The students had a discussion on why that could happen. One student suggested they died of hypothermia because water was a lot colder than air. Hypothermia is a condition where the body gets too cold to function and simply shuts down.

The students decided to design an investigation to test this idea. The equipment and method they used to carry out the investigation are outlined below.

Equipment

- 6 x sticky labels
- 6 x large test tubes (to represent passengers)
- 6 x thermometers
- 6 x rubber stoppers with holes in them to fit thermometers
- 1 roll of plastic wrap (to represent the life jacket)
- 500 mL beaker of warm water, temperature at 37 °C (to represent human body temperature)
- 50 mL measuring cylinder
- 500 mL beaker of iced water
- test tube rack
- freezer

Method

1. Label the test tubes 1 to 6.
2. Wrap all six test tubes in the same amount plastic wrap.
3. Pour 30 mL of warm water into each wrapped test tube.
4. Place a thermometer through the holes in each rubber stopper, then place the stopper into each test tube.
5. Place three test tubes in a test tube rack, then place the rack in the freezer to simulate near freezing air temperature.
6. Place three test tubes in the iced water, then place the beaker into the freezer to simulate the ocean temperature.
7. Record the temperature of each test tube every two minutes for 20 minutes.

Question 1 (continued)

- (a) State a suitable hypothesis for this investigation. (2 marks)

- (b) Identify the independent and dependent variable for the investigation. (2 marks)

Independent: _____

Dependent: _____

- (c) State **two** variables that were controlled in the investigation. (2 marks)

One: _____

Two: _____

The results collected by the students are shown in the table below.

Temperature of water (°C)												
		Minutes elapsed										
Test tube	Condition	0	2	4	6	8	10	12	14	16	18	20
1	Air	37	32	29	27	24	22	16	10	7	5	5
2	Air	37	31	28	26	25	22	16	9	6	4	4
3	Air	37	32	29	27	25	23	16	10	7	3	3
Average		37	31.7	28.7	26.7	24.7	22.7	16	9.7	6.7	4	
4	Iced water	37	25	20	16	14	10	7	5	4	3	3
5	Iced water	37	24	19	17	14	10	8	5	3	3	2
6	Iced water	37	25	20	15	14	10	8	6	4	3	3
Average		37	24.7	19.7	16	14	10	7.7	5.7	3.7	3	

- (d) Complete the table above by calculating the average temperatures for the test tubes in air and iced water after 20 minutes. (2 marks)

- (e) Graph the average temperatures for the test tubes in air and iced water on the grid below. (6 marks)



DO NOT WRITE IN THIS AREA AS IT WILL BE CUT OFF

A spare grid is provided at the end of this booklet. If you need to use it, cross out this attempt and indicate that you have redrawn it on the spare grid.

Question 1 (continued)

- (f) Propose a conclusion for the investigation that is supported by the data and your graph. (3 marks)

- (g) Describe **one** change the students could have made to improve their investigation in order to increase the accuracy of their results. (2 marks)

DO NOT WRITE IN THIS AREA AS IT WILL BE CUT OFF

Question 2

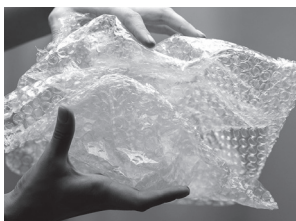
(21 marks)

Following the results obtained in the previous investigation, the students wanted to answer the question ‘which material will be the best at reducing heat loss in humans in ice cold water?’

The students have access to all the equipment used in the investigation in Question 1, as well as samples of aluminium foil, bubble wrap and some cotton fabric.



Aluminium foil



Bubble wrap



Cotton fabric

You are tasked with designing an investigation for the students that will enable them to answer the question above.

- (a) Identify any change/s to the equipment list outlined on page 3 that would need to be made for this investigation. (1 mark)

- (b) Prepare a risk assessment identifying **two** potential hazards, a risk associated with each hazard and a suggested management strategy for each hazard. (6 marks)

	Hazard	Risk	Management strategy
One			
Two			

See next page

DO NOT WRITE IN THIS AREA AS IT WILL BE CUT OFF

Question 2 (continued)

(c) Propose a procedure for the investigation. (6 marks)

DO NOT WRITE IN THIS AREA AS IT WILL BE CUT OFF

- (d) In the space below, construct a table that could be used to record the data from the procedure you proposed in part (c) on page 8. (4 marks)

DO NOT WRITE IN THIS AREA AS IT WILL BE CUT OFF

See next page

Question 2 (continued)

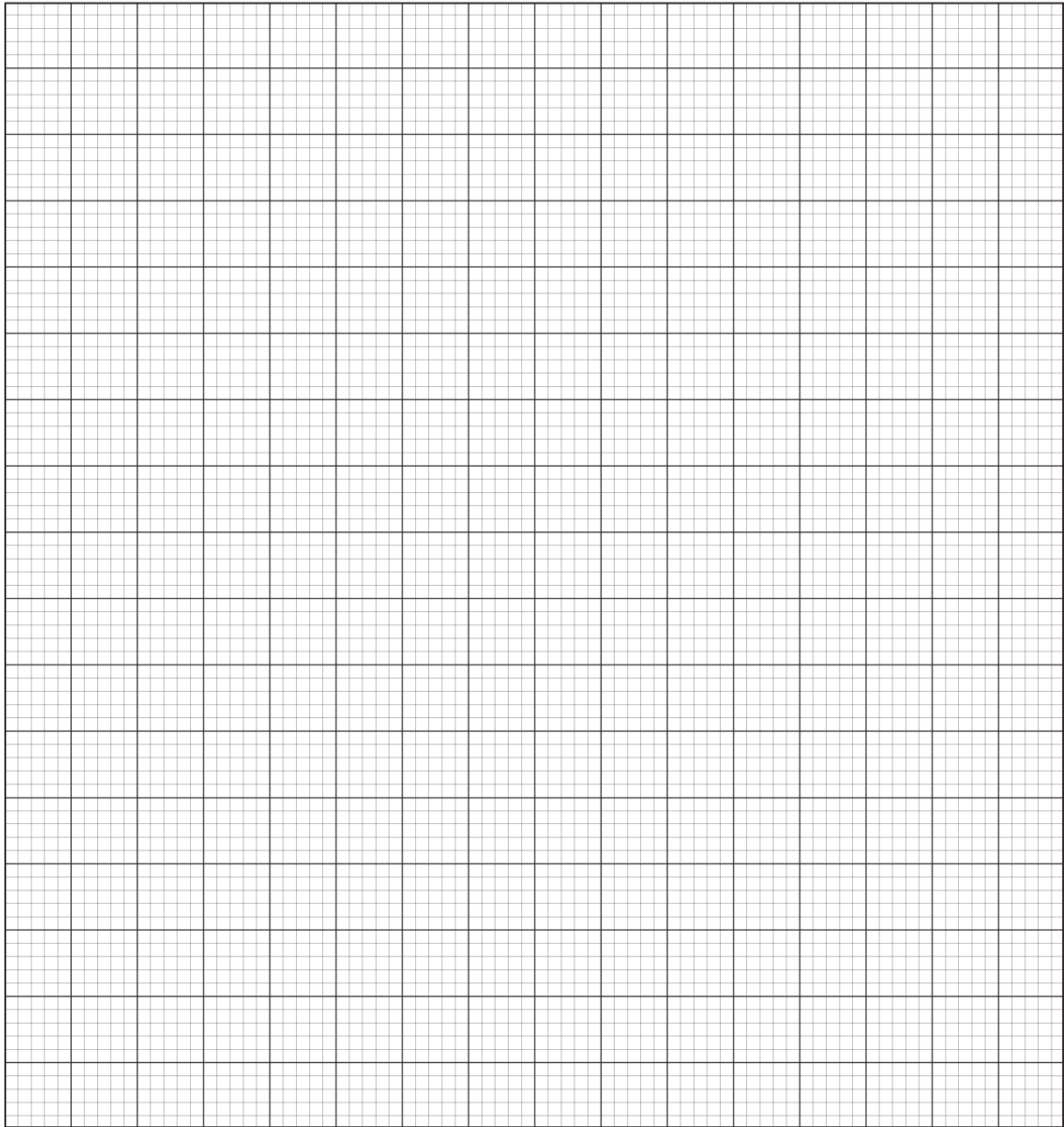
- (e) Describe how you could ensure validity and reliability in the investigation. (4 marks)

Validity

Reliability

DO NOT WRITE IN THIS AREA AS IT WILL BE CUT OFF

Spare grid for Question 1(e)



DO NOT WRITE IN THIS AREA AS IT WILL BE CUT OFF

ACKNOWLEDGEMENTS

- Question 2** Adapted from: Becker, F. (2022). [Photograph of screwed up aluminum foil]. Retrieved September, 2023, from <https://pixabay.com/photos/aluminum-foil-background-texture-7088454/>
- Adapted from: Lach, R. (2020) *Person Holding a Bubble Wrap* [Photograph]. Retrieved September, 2023, from <https://www.pexels.com/photo/person-holding-a-bubble-wrap-7829815/>
- Adapted from: Monfocus. (2016). [Photograph of a roll of cotton fabric on a wooden spool]. Retrieved September, 2023, from <https://pixabay.com/photos/sink-cotton-cotton-cloth-roll-1913458/>