

**MONDAY, 8 JANUARY –  
FRIDAY, 9 FEBRUARY 2024**

**BIOLOGY – Unit 3 (3400U30)**

**PRACTICAL ASSESSMENT**

**INVESTIGATING THE EFFECT OF  
SWEATING ON THE RATE OF COOLING**

**SECTION A**

**1 hour, plus your additional time allowance**

**Surname** \_\_\_\_\_

**First name(s)** \_\_\_\_\_

**Centre Number** \_\_\_\_\_

**Candidate Number**   0   \_\_\_\_\_



**ADDITIONAL MATERIALS**

**A calculator.**

**INSTRUCTIONS TO CANDIDATES**

**Use black ink, black ball-point pen or your usual method.**

**Write your name, centre number and candidate number in the spaces provided on the front cover.**

**Answer ALL questions.**

**Write your answers in the spaces provided in this booklet. If you run out of space, use the additional pages at the back of the booklet, taking care to number the question(s) correctly.**



## **INFORMATION FOR CANDIDATES**

**The total number of marks available for this section of the task is 6.**

**The number of marks is given in brackets at the end of each question or part-question.**

**This task is in 2 sections, A and B. You will complete Section A in one lesson and Section B in the next science lesson.**

| For Examiner’s use only |              |              |
|-------------------------|--------------|--------------|
|                         | Maximum Mark | Mark Awarded |
| Section A               | 6            |              |

## **Introduction**

**Your task is to investigate the effect of sweating on the rate of cooling.**

**When you 'paint' water onto a boiling tube wrapped in newspaper, you can model the action of sweating.**

**The rate of cooling during sweating can be measured and compared to a dry boiling tube.**

**(Turn over)**



## **Apparatus Required**

**The following apparatus is required for each group: (each group should consist of no more than three candidates).**

**eye protection**

**1 × 100 cm<sup>3</sup> measuring cylinder**

**2 × boiling tube (each covered in five layers of newspaper) in a boiling tube rack**

**1 × small beaker of cold water**

**1 × 250 cm<sup>3</sup> beaker of hot water**

**1 × thermometer**

**1 × medium sized paint brush**

**1 × stopwatch**

**1 × tray**

**ACCESS TO:**

**kettle**

**paper towels**

**READ THE METHOD ON PAGES 6 AND 7  
AND ANSWER QUESTIONS 1.(a) AND  
1.(b) BEFORE CARRYING OUT THE  
EXPERIMENT AND RECORDING YOUR  
RESULTS.**

**(Turn over)**



## Method

- 1. Wear eye protection.**
- 2. Place the boiling tube rack in the tray.**
- 3. Use the measuring cylinder to measure  $40\text{ cm}^3$  of water at  $55\text{--}60\text{ }^\circ\text{C}$ .**
- 4. Transfer this water into one of the boiling tubes.**
- 5. Record the starting temperature of the water in the boiling tube.**
- 6. Start the stopwatch. Record the temperature of the water in the tube every minute for 5 minutes. This represents the 'dry' tube.**
- 7. Use the measuring cylinder to measure another  $40\text{ cm}^3$  of water at  $55\text{--}60\text{ }^\circ\text{C}$ .**

**(Turn over)**



- 8. Transfer this water into the second boiling tube.**
- 9. Record the starting temperature of the water in this boiling tube.**
- 10. Start the stopwatch. Use the paintbrush to add water from the small beaker to the outside of the boiling tube.**
- 11. Record the temperature of the water every minute for 5 minutes whilst continually adding water with the paintbrush. This represents the 'sweating' tube.**

**(Turn over)**



# SECTION A

**Answer ALL questions.**

**1 (a) State a hypothesis for this experiment. [1 mark]**

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**(Turn over)**



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**TURN OVER**

| HAZARD                 | RISK | CONTROL MEASURE |
|------------------------|------|-----------------|
| HOT WATER<br>CAN SCALD |      |                 |

**1 (b) Complete the risk assessment on the opposite page for this experiment.  
[1 mark]**

**(Turn over)**



**YOU MAY RECORD RAW RESULTS  
IN THE SPACE BELOW.**

**(Turn over)**



**1 (c)(i)**

**Present your results in a table.**

**Include all of your results. [3 marks]**

**(Turn over)**



**1 (c)(ii)**

**Calculate the change in temperature from the start to the end of the experiment for EACH tube. [1 mark]**

**‘dry’ tube  
temperature change = \_\_\_\_\_ °C**

**‘sweating’ tube  
temperature change = \_\_\_\_\_ °C**

|          |
|----------|
|          |
| <b>6</b> |

**END OF PAPER**



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