Surname	Centre Number	Candidate Number
First name(s)		0

GCSE

S24-3400U30-1A

MONDAY, 8 JANUARY – FRIDAY, 9 FEBRUARY 2024

BIOLOGY – Unit 3 (3400U30)

PRACTICAL ASSESSMENT

INVESTIGATING THE EFFECT OF TEMPERATURE ON CELL MEMBRANES

SECTION A

1 hour

For Examiner's use only		
	Maximum Mark	Mark Awarded
Section A	6	

3400U301A
01

ADDITIONAL MATERIALS

A calculator.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page(s) 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.

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Introduction

Beetroot cells contain a bright red pigment called betalain.
The betalain is contained by the semi-permeable cell membrane.
You are going to investigate how temperature affects the permeability of the cell membrane.

Apparatus Required

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

eye protection
cylinders of beetroot
1 × white tile
1 × scalpel
5 × test tube containing 5 cm^3 of deionised water
1 × test tube rack
5 × 250 cm^3 beaker
1 × stopwatch
1 × thermometer
1 × forceps
1 × 30 cm ruler
1 × piece of white card

Access to:
water baths at 20 °C, 30 °C, 40 °C, 50 °C and 60 °C
paper towels

Read the method and answer question 1.(a) before carrying out the experiment and recording your results.

Method

1. Wear eye protection.
2. On the white tile, use the scalpel to cut five pieces of beetroot, 1 cm long, from the cylinders provided.
3. Wash under running water to remove the pigment released from cells during cutting.
4. Set up beakers as water baths at 20 °C, 30 °C, 40 °C, 50 °C and 60 °C.
5. Place a test tube containing 5 cm^3 of deionised water into each water bath to equilibrate for 2 minutes.
6. Place one piece of beetroot into each test tube at 20 °C, 30 °C, 40 °C, 50 °C and 60 °C for 5 minutes.
7. After 5 minutes, shake the test tubes gently to make sure any pigment is well mixed into the water, then remove the beetroot cores using the forceps.
8. Remove the test tubes from the beakers and arrange the tubes in order of temperature of the water baths in a test tube rack.
9. Place a piece of white card behind the tubes to enable you to see the depth of colour in each tube.
10. Use the colour chart of betalain concentration below to work out and record the concentration of betalain in the water at each temperature. You should also record the depth of colour in each tube.

Colour	Depth of colour	Concentration of betalain (μg/g)
	colourless	0
	very pale pink	30
	pale pink	60
	pink	90
	dark pink	120
	very dark pink	150
	purple	180
	dark purple	210

Examiner only

SECTION A

Answer **all** questions.

1. (a) Complete the risk assessment below for this experiment. [2]

HAZARD	RISK	CONTROL MEASURE

You may record raw results in the space below.

Examiner only

(b) Present your results in a table. Include all of your results. [4]

END OF PAPER

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Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

Examiner only

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