

Cambridge IGCSE[™]

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	
BIOLOGY			0610/62
Paper 6 Alterna	tive to Practical		May/June 2022

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer all questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do not write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [].

1 hour



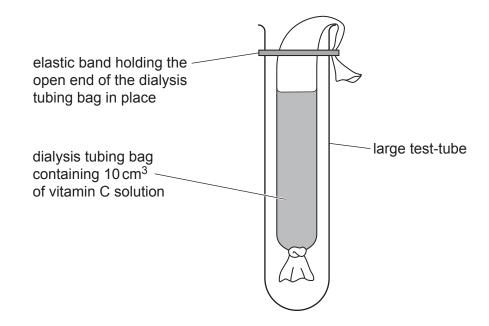
1 A student investigated the effect of temperature on the diffusion of vitamin C.

Vitamin C is an important part of a balanced diet and is found in some fruits and vegetables. When vegetables are boiled in water the vitamin C diffuses out into the surrounding water. A dialysis tubing bag filled with vitamin C solution was used to represent a vegetable.

The blue dye DCPIP was used as an indicator for the presence of vitamin C. High concentrations of vitamin C decolourise DCPIP quickly.

The student used the method described in step 1 to step 14.

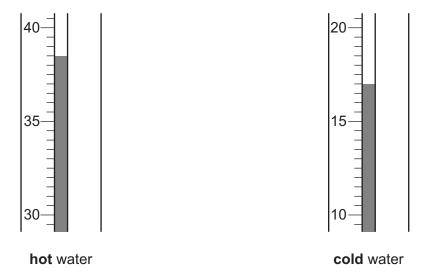
- Step 1 A syringe was used to fill a dialysis tubing bag with 10 cm³ of vitamin C solution.
- Step 2 The outside of the filled dialysis tubing bag was rinsed by dipping it into a beaker of distilled water.
- Step 3 A large test-tube was labelled **hot**. The dialysis tubing bag was put into the large test-tube and secured in place with an elastic band, as shown in Fig. 1.1.
- Step 4 Steps 1 to 3 were repeated with a second dialysis tubing bag and a large test-tube labelled **cold**.





- Step 5 The large test-tube labelled hot was half-filled with hot water.
- Step 6 The large test-tube labelled **cold** was half-filled with cold water.
- Step 7 The temperature of the water in the large test-tube labelled **hot** was measured.
- Step 8 The temperature of the water in the large test-tube labelled **cold** was measured.

Fig. 1.2 shows the readings on the thermometer used in step 7 and step 8.



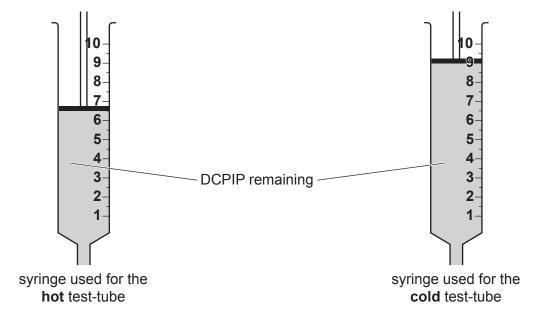


(a) (i) State the temperatures of the hot water and the cold water shown on the thermometers in Fig. 1.2. Include the unit.

temperature of the **hot** water temperature of the **cold** water

[2]

- Step 9 The dialysis tubing bags were left in the large test-tubes for 15 minutes.
- Step 10 After 15 minutes, the dialysis tubing bags were removed from the large test-tubes and discarded. 1 cm³ of the liquid remaining in the large test-tube labelled **hot** was put into a clean standard test-tube.
- Step 11 A syringe was filled with 10 cm³ of DCPIP solution.
- Step 12 One drop of DCPIP was added to the liquid in the standard test-tube and swirled to mix. After a few seconds the blue colour disappeared.
- Step 13 The student continued to add drops of DCPIP until the blue colour remained after mixing.
- Step 14 Steps 10 to 13 were repeated with 1 cm³ of the liquid remaining in the test-tube labelled **cold**.



The **unused** volumes of DCPIP **remaining** in the syringes are shown in Fig. 1.3.



(ii) Record the volumes of the DCPIP remaining in the syringes shown in Fig. 1.3.

syringe used for the **hot** test-tube

syringe used for the **cold** test-tube

[1]

(iii) Prepare a table to record the volume of DCPIP that has been **used** in each test-tube, in the space provided.

Use your answer in **1(a)(ii)** and the equation to calculate the volume of DCPIP that has been **used** in each test-tube:

volume of DCPIP used = 10 – volume of DCPIP remaining in the syringe

(iv)	State a conclusion for these results.
	[1]
(v)	Suggest why the dialysis tubing bag was rinsed in step 2.
	[1]
(vi)	Identify one source of error in step 5 or step 6 and suggest a suitable piece of equipment to overcome this error.
	error
	equipment
	[2]
(vii)	Identify the variable that the student changed (independent variable) and the variable that was measured (dependent variable) in this investigation.
	independent variable
	dependent variable
	[2]
(viii)	Suggest why repeating the procedure several times would improve the investigation.
	[1]

(b) Dialysis tubing acts as a partially permeable membrane and can be used to represent a model cell to investigate osmosis.

Plan an investigation to find out how different concentrations of sugar solutions affect the movement of water into or out of dialysis tubing.

[6]
[Total: 19]

BLANK PAGE

7

2 Nautiluses are a genus of marine animals that live in shells. Fig. 2.1 is a photograph of a nautilus shell.





(a) (i) Make a large drawing of the shell shown in Fig. 2.1.

https://xtremepape.rs/

(ii) Line **AB** represents the width of the nautilus shell.

Measure the length of line **AB** in Fig. 2.1.

length of line AB in Fig. 2.1 mm

The actual width of the shell is 130 mm.

Calculate the magnification of the shell in Fig. 2.1.

magnification = $\frac{\text{length of line } AB \text{ in Fig. 2.1}}{\text{actual width of the shell}}$

Give your answer to two significant figures.

Space for working.

[3]

(b) Fig. 2.2 shows a fossilised nautilus shell.





Describe **one** visible similarity and **one** visible difference between the nautilus shell in Fig. 2.1 and the fossilised nautilus shell in Fig. 2.2.

similarity difference (c) A population of one species of nautilus was studied. The widths of the nautilus shells were measured and recorded.

10

The results are shown in Table 2.1.

width of shell/mm	number of shells
101–110	8
111–120	84
121–130	138
131–140	98
141–150	22

Table 2.1

(i) Plot a histogram on the grid of the data in Table 2.1.

				_		Т	П			_				_	_				П	-		_				_	<u> </u>	_		-		-					_		_	
\vdash	+		++	+	++	+			+	+			+	+	+	+	+	-		+	+	+			+	+		+		+		+		+			+		+	Н
				+	\square	+			H						+						\square											1	H					H		Η
			\square		\square	+			\square						\perp					\perp	\square				+			_					\square						_	Ш
	+	_	\vdash	+	++	╇		_	\square	+	+		\square	+	+	\square	+	-	\vdash	+	+	+			+	+	\vdash	+	++	+	$\left \right $	+	\square	+		-	+	\square	+	Н
	+	_	++	+	++	╋	+	_	\vdash	+	+		+	+	+	+	+	-	\vdash	+	+	+			+	-	$\left \right $	+		+		+	\square	+			+	++	+	Н
			++	+	++	+	+		\vdash	+	+		+	+	+	+	+	+	\vdash	+	+	+	+ +		+	+	+	+	++	+		+	$\left \right $	+		+	+	++	+	Н
				+		+			H	+			H	+	+	H	+	1	H	+	H	+				-		+		+		+	H	-			+		+	Η
									\square																															
\vdash	+	_	\vdash	+	++	+		_	\square	+	$\left \right $		\square	-	+	\square	_	-	\square	+	\square	_			+	_	\square	+	+	+	\vdash	+	\square	_			+	\square	+	Н
	+	-	++	+	++	⊢	+	-	\vdash	+	+	-	+	+	+	+	+	-	\vdash	+	+	+		-	+	-	\vdash	+	+	+		+	\square	+		-	+	++	+	Н
	+	-	++	+	++	+		-	\vdash	+	+		+	+	+	+	+	+	\vdash	+	+	+	+ +	-	+	+	+	+	++	+		+	H	+		+	+	++	+	Н
				+		+			H	+	\square		Ħ	+	+	H	+	+	H	+	Ħ	+				-		+		+		+	H	+			+	H	+	Η
H	ЦŢ	_	\square	1	+1	T.	ЦĪ		ЦĪ		+1			1	+	\square	1		Цſ	+	+1	1	+1	_	+	-	H	-	H	1	\square	1	ĻТ	1	+	1	1	H	-	\square
\vdash	++	+	++	+	++	+	++	+	\square	+	+		+	+	+	+	-	-	\vdash	+	+	+	+	+	+	-	\vdash	+	++	+	++	+	\square	+	+	+	+	++	+	H
\vdash	+	+	++	+	++	+	++	+	+	+	+	-	+	+	+	+	+	+	\vdash	+	+	+	+	+	+	+	+	+	++	+	++	+	+	+	+	+	+	+	+	H
\vdash	+	+	++	+	++	+	+	+	\vdash	+	+		+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	++	+	++	+	+	+	+	+	+	++	+	H
	\square		Ħ		\square	T			H		\square			+		\square					\square						\square						H					Ħ		Ħ
																																								\Box
\vdash	+								H		+			-							+				+		\square						\square		+	-		11		Н
++	+	+	++	+	++	+	$\left \right $	+	\vdash	+	+	-	+	+	+	+	+	+	\vdash	+	+	+	+	+	+	+	\vdash	+	$\left \right $	+	++	+	$\left \right $	+	+	+	+	++	+	H
\vdash	+	+	++	+	++	+	+	+	\vdash	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	+	++	+	+	+	+	+	+	+	+	Н
H	+	+	Ħ	+	++	+	H	+	H	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	$^{++}$	+	++	+	++	+	H	+		+	+	++	+	H
				+		+			H		Ħ		Ħ			H			H	+	Ħ						H					1	H					Ħ		Н
																																								\Box
\square			\square	_	\square	+				_					_					+					+			_					\square				_		_	Ш
\vdash	+	_	++	+	++	╋	$\left \right $	-	\vdash	+	+		+	+	+	$\left \right $	+	-	\vdash	+	+	+		-	+	+	\vdash	+	++	+	$\left \right $	+	$\left \right $	+		-	+	$\left \right $	+	Н
H	+	-	++	+	++	+	+	-	\vdash	+	+		+	+	+	+	+	-	\vdash	+	+	+	+ +	+	+	+	\vdash	+	++	+		+	\vdash	+		+	+	++	+	Н
		-	++	+	++	+		-	\vdash	+	+		H	+	+	H	+	-		+	+	+	+ +		++	+		+		+		+	H	+			+		+	Н
\vdash	+	_	++	+	++	╇		_	\square	_	+		\square	+	+	\square	_	_	\square	+	+	_	+	_	+	_	\vdash	_		+	++	+	\square	+		_	+	\square	_	Н
		-	++	+	++	+		-	\vdash	+	+	-	+	+	+	+	+	-	\vdash	+	+	+		-	+	-	\vdash	+	++	-		+	\square	-		-	+	$\left \right $	+	Н
		-	++	+	++	+	++	-	+	+	+	+	+	+	+	+	+	+		+	+	+		+	+	+		+	++	+		+	+	+			+	++	+	Н
			++	+	++	+			H	+	\square		Ħ	+	+	H	+		H	+	Ħ	+						+		+		+	H	+			+	H	+	Н
																																								\Box
\vdash	+	_	\square	+	\square	+	\square	_	\square	-	+	_		+	+	+	+	-	\square	+	+	+	+		+	_	\vdash	_	\square	-	\vdash	+	\square	-	+	+	-	\square	_	+
\vdash	++	+	++	+	++	+	+	+	+	+	+	+	+	+	+	+	+	+	\vdash	+	+	+	+	+	+	+	+	+	++	+	++	+	+	+	+	+	+	+	+	H
\vdash	+	+	++	+	++	+	++	+	H	+	+	+	+	+	+	+	+	+	\vdash	+	+	+	+	+	+	+	+	+	++	+	++	+	+	+	+	+	+	+	+	H
H	+	+		+		+	$^{++}$	+	H				\square	+	+	11		1	H	+	\square	+			+	1		1		+	\square	1		+			1	$ \uparrow$	1	H
						Γ					\square		\square							T	\square																			
H	μŢ		H	F	μŢ	F	μŢ	-	ЦĪ		+1		ЦĪ	1	ſ	μĪ	Ţ		ЦĨ	Ŧ	+1	1	+1	1	+	+	НŢ	1	μŢ	1	+	F	μŢ	1	+1	1	+	ΗŤ	1	ĻП
\vdash	+	-	\square	+	++	+	$\left \right $	-	\square	+	+	-		+	+	+	+	-	\square	+	+	+	+	-	+	-	\vdash	+	$\left \right $	+	\vdash	+	\square	+		+	-	$\left \right $	+	H
\vdash	++	+	++	+	++	+	++	+	\vdash	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	+	+	+	++	+	++	+	+	+	+	+	+	+	+	H
H	+	+	++	+	++	+	++	+	H	+	+	-	+	+	+	+	+	+	\vdash	+	+	+	+	+	+	+	+	+	++	+	++	+	H	+	+	+	+	+	+	Η
		1		t		L														1										L		L					1			
		T		Γ					Г		П	T	\square	T	T					T	П	T		T	П			T	μT					T		T	T		T	П
\vdash	+	+	\square	+	++	+	+	_	\square	+	+	_	+	+	+	+	+	-	\square	+	+	-	+		+	_	\vdash	_	\square	+	\square	+	\square	+	+	+	_	\square	_	H
\vdash	++	+	++	+	++	+	++	-	\vdash	+	+	-	+	+	+	+	+	+	\vdash	+	+	+	+	+	+	+	+	+	++	+	++	+	+	+	+	+	+	+	+	H
\vdash	+	+	++	+	++	+	H	+	\vdash	+	+	-	+	+	+	+	+	+	\vdash	+	+	+	+	+	+	+	+	+	++	+	++	+	+	+	+	+	+	++	+	Η
H	$^{++}$	+	++	+	++	+		+	+	+	+		+	+	+	+	+	-	+	+	+	+		+	$^{++}$	+	$^{++}$	+	++	+		+	+	+		+	+	$^{++}$	+	H
				t																												L								\square
		T								T	Π			T	T		T			T	\square	T		T	\square	T		T						T			T		T	П
\square	+						\square		\square		+			-						-	+	-	+		+		\square		\square				\square			-		11		Н
\vdash	+	+	++	+	++	+	+	+	\vdash	-	+	-	$\left \right $	+	+	$\left \right $	+	+	\vdash	+	+	+	+	-	+	-	+	+	+	+	++	+	+	+	+	-	+	$\left \right $	+	H
\vdash	+	+	++	+	++	+	+	+	\vdash	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	+	++	+	+	+	+	+	+	+	+	Н
H	++	+	Ħ	+	++	+	++	+	H	+	+		$^{++}$	+	+	+	+	+	+	+	+	+	+	+	++	+	$^{++}$	+	++	+	++	+	H	+		+	+	$^{++}$	+	H
	_						_																																	_

(ii) Using the information in your graph, describe the results of this study. _____[2] (iii) The study measured the width of 350 nautilus shells. Suggest why such a large number of shells were measured. (iv) Using the data in Table 2.1, calculate the percentage of the population of nautiluses that have shells that are wider than 130 mm. Give your answer to one decimal place. Space for working.% [3] (d) The nautilus feeds on fish which are an important source of protein. State the name of the test for protein. Give the result of a positive test. test for protein positive test result [2]

[Total: 21]

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of Cambridge Assessment. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which is a department of the University of Cambridge.

© UCLES 2022