

DOWNE HOUSE 16+ ENTRANCE PAPER 2012/2013

BIOLOGY

Time: 60 minutes

Name _		 	
School			

INSTRUCTIONS TO CANDIDATES

- Answer all questions in the spaces provided on the question paper
- · Show all workings
- The total mark for this paper is 56

Candidates will require:

- A ruler
- A calculator

1. State, using chemical symbols, the equation for aerobic respiration.

[3]

A student compared the respiration of germinating mung bean seeds with pea seeds using the apparatus shown in Fig. 3.1.

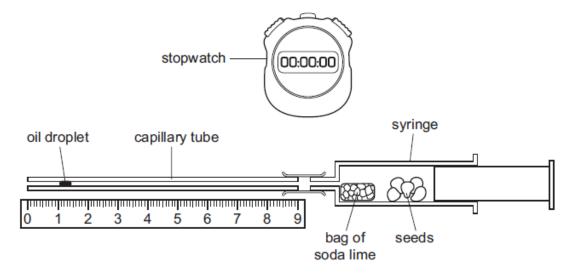


Fig. 3.1

The soda lime absorbs any carbon dioxide released by the germinating seeds. The student recorded the position of the oil droplet every minute over a period of six minutes.

(b) State three variables that should be kept constant in this investigation.

1	
2	
	••••
3	[3]
	L

(c) Table 3.1 shows the student's results.

Table 3.1

time /	germinating mung bean seeds		germinating pea seeds	
minute	position of droplet / mm	distance moved / mm per minute	position of droplet / mm	distance moved / mm per minute
0	0	0	0	0
1	12	12	10	10
2	23	11	19	9
3	36	13	28	9
4	45	9	33	5
5	48	3	36	3
6	48	0	36	0

(i)	State which way the droplet moves and explain your answer.
	[3]
(ii)	State what happens to the movement of the droplet after three minutes and suggest an explanation.
	[2]
	[Total: 11]

2. Heart surgeons may stop the heart beating during operations. While this happens blood is pumped through a heart-lung machine that oxygenates the blood.

Fig. 1.1 is a diagram showing a heart-lung machine in use.

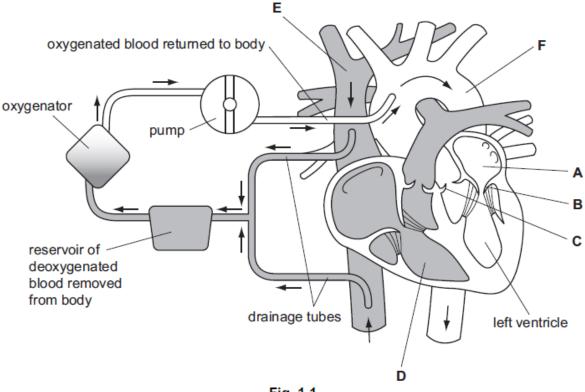


Fig. 1.1

(a) Name the structures labelled A to D.

Α	
В	
С	
D	[4]

(b) Name the blood vessels E and F.

E	
F	 [2]

(c)	The heart-lung machine is used so that surgeons can operate on the arteries supplying heart muscle. These arteries may be diseased.
	Name these arteries and explain how they may become diseased.
	name of arteries
	explanation
	[3]
(d)	Suggest why a patient is put on a heart-lung machine during such an operation.
	[2]
	mans have a double circulation system. There is a low pressure circulation and a high ssure circulation.
(e)	Explain how the structure of the heart enables it to pump blood into two circulations at different pressures.
	[4]

[Total: 15]

3. (a) Explain how water is absorbed by plant roots.

[3]

(b) Young plants were grown in pots of sand for four weeks.

Some plants were watered with distilled water at pH 7.0 (no salts).

Most pots were watered with solutions containing different concentrations of salt (sodium chloride) at pH 7.0.

The plants were kept at 20 °C.

growth as

percentages

of the plants

water

The growth of the plants was measured after four weeks.

The growth of the plants is shown in Fig. 4.1 as percentages of the growth of the plants watered with distilled water.

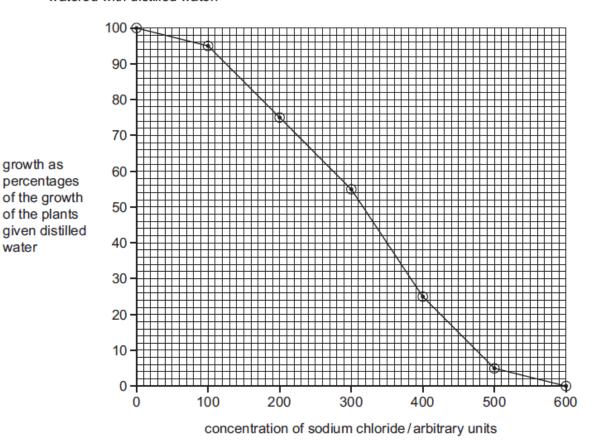
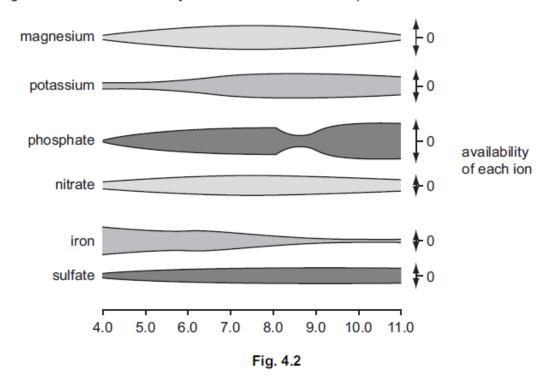


Fig. 4.1

(i)	Describe the results shown in Fig. 4.1.	
	You will gain credit for using the figures in the graph to support your answer.	
		[3]
(ii)	Explain the difference in growth between the plants watered with le concentrations and those watered with high concentrations of salt solution.	ow
		[4]

The pH of soils influences the availability of ions to plants.

Fig. 4.2 shows the availability of ions in soils of different pH.



(c) Name the ion that is least available in soils of pH 4.0 and in soils of pH 11.0.

pH 4.0	
pH 11.0	[2]

(d)	Plants grown in soils of pH 10 may show symptoms of deficiency. They are stunted and their leaves are yellow.
	Explain how deficiencies of magnesium ions and nitrate ions lead to the symptoms described.
	magnesium ions
	nitrate ions
	nitrate ions
	[4]
	[Total: 16]

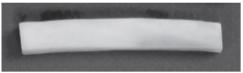
An investigation was carried out to find the effect of salt (sodium chloride) solution, on potato tissue.

A large potato was cut into long thin strips, called chips. Each chip measured 60 mm in length.

One chip was placed in a concentrated salt solution and another chip was placed in distilled water.

After three hours these chips were removed from the liquids.

The chips are shown in Fig. 2.1.



salt solution distilled water

Fig. 2.1

(a) (i) Measure the length of the chips in Fig. 2.1.
Calculate any change in length.
Record your measurements in Table 2.1.

Table 2.1

	chip in salt solution	chip in distilled water
length / mm		
change / mm		

[2]

(ii)	Explain the changes that you have recorded for these two chips.
	[4]

(b) A similar investigation was carried out by a group of students.

They measured the mass of five chips before putting each chip in a different concentration of sucrose solution.

The chips were left in the solution for two hours.

After two hours each chip was removed from the sucrose solution and its mass measured.

Their results are shown in Table 2.2.

Table 2.2

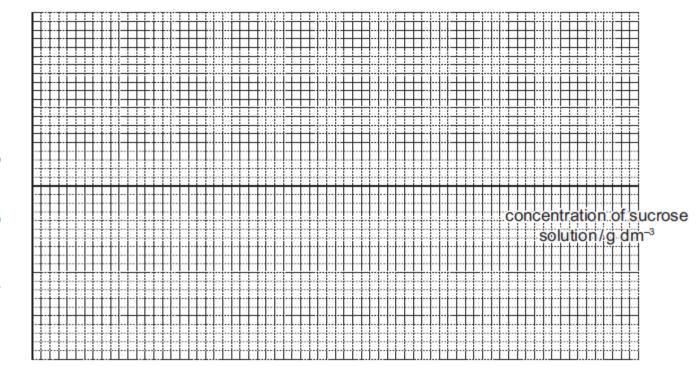
concentration of sucrose solution / g dm ⁻³	mass at start	mass after 2 hours / g	difference in mass / g	percentage change
0.0	1.36	1.49	+0.13	+9.56
35.0	1.41	1.48	+0.07	+4.96
70.0	1.46	1.47	+0.01	+0.68
175.0	1.47	1.38	-0.09	-6.12
345.0	1.45	1.31	-0.14	

(i)	Complete	Table :	2.2 by	calculating	the	percentage	change	in	mass	for	the	most
	concentrat	ed solu	ıtion. S	how your w	orkir	ng.						

[1]

(ii)	Suggest why it is necessary to calculate the percentage change in mass who comparing the chips.	en
		[1]

(iii) Plot a graph to show the percentage change in mass against the concentration of the sucrose solution. Use the grid and axes provided.



[4]

(c)	(i)	Use your graph to find the concentration of sucrose solution in which the mass of chip would stay the same.
		g dm ⁻³ [1]
	(ii)	Explain why the mass of a chip in this solution would stay the same.
		[1]
		[Total: 14]

End of paper: Total marks: 56