



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.

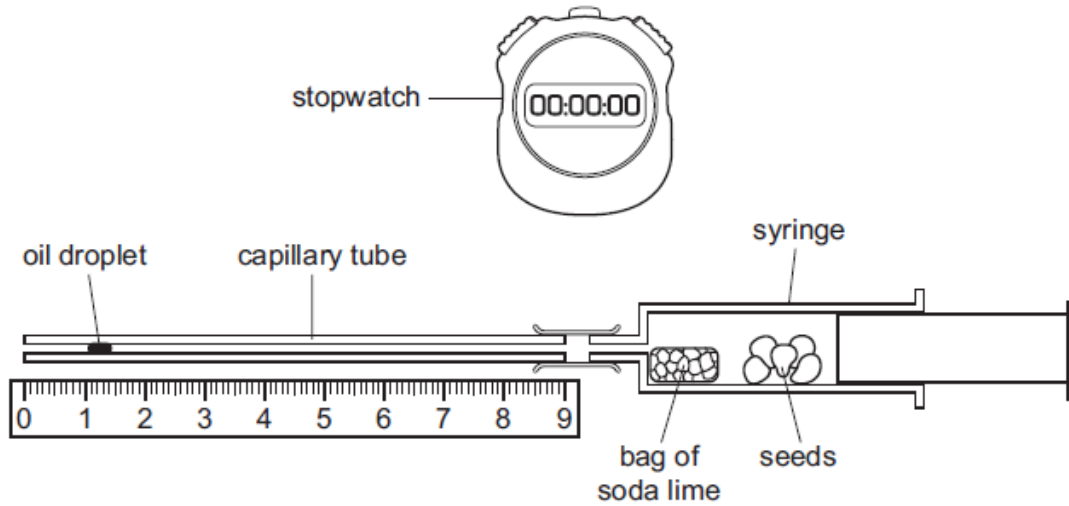


Fig. 3.1

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]

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

Table 3.1

time / minute	germinating mung bean seeds		germinating pea seeds	
	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.

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..... [3]

(ii) State what happens to the movement of the droplet after three minutes and suggest an explanation.

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..... [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.

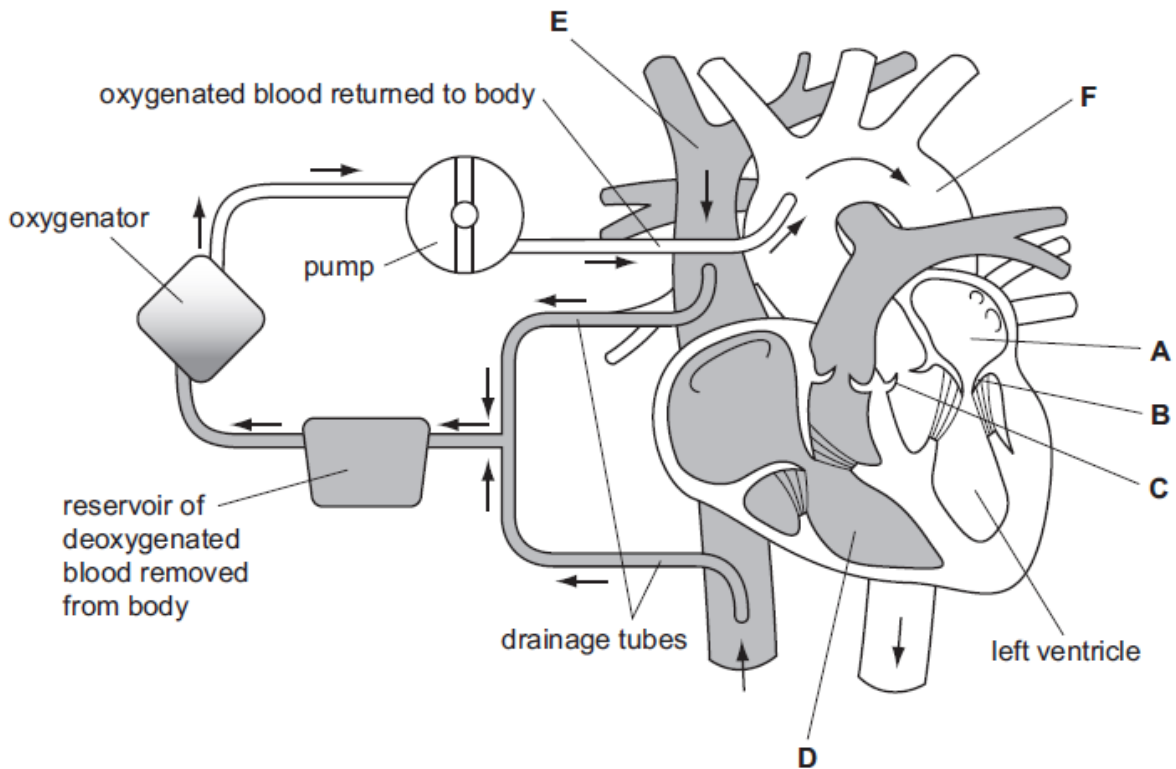


Fig. 1.1

- (a) Name the structures labelled A to D.

A
 B
 C
 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

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..... [3]

- (d) Suggest why a patient is put on a heart-lung machine during such an operation.

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..... [2]

Humans have a double circulation system. There is a low pressure circulation and a high pressure circulation.

- (e) Explain how the structure of the heart enables it to pump blood into two circulations at different pressures.

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..... [4]

[Total: 15]

(i) Describe the results shown in Fig. 4.1.

You will gain credit for using the figures in the graph to support your answer.

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[3]

(ii) Explain the difference in growth between the plants watered with low concentrations and those watered with high concentrations of salt solution.

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[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.

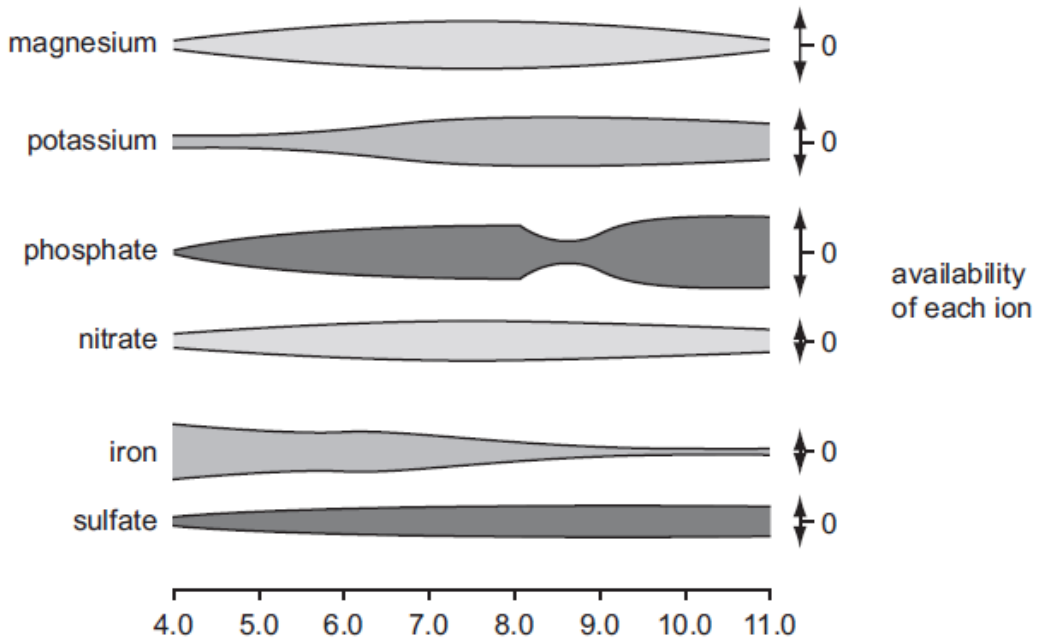


Fig. 4.2

(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

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nitrate ions

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[4]

[Total: 16]

4. 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.

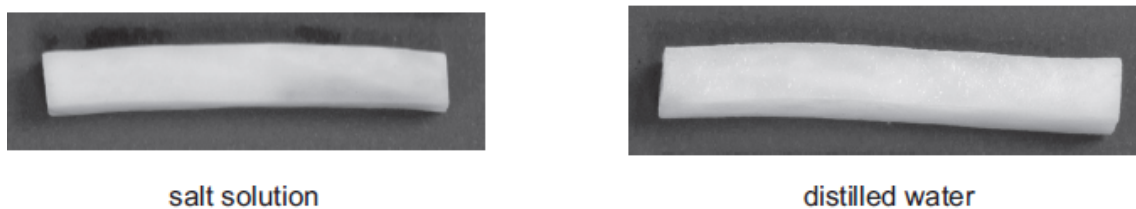


Fig. 2.1

- (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]

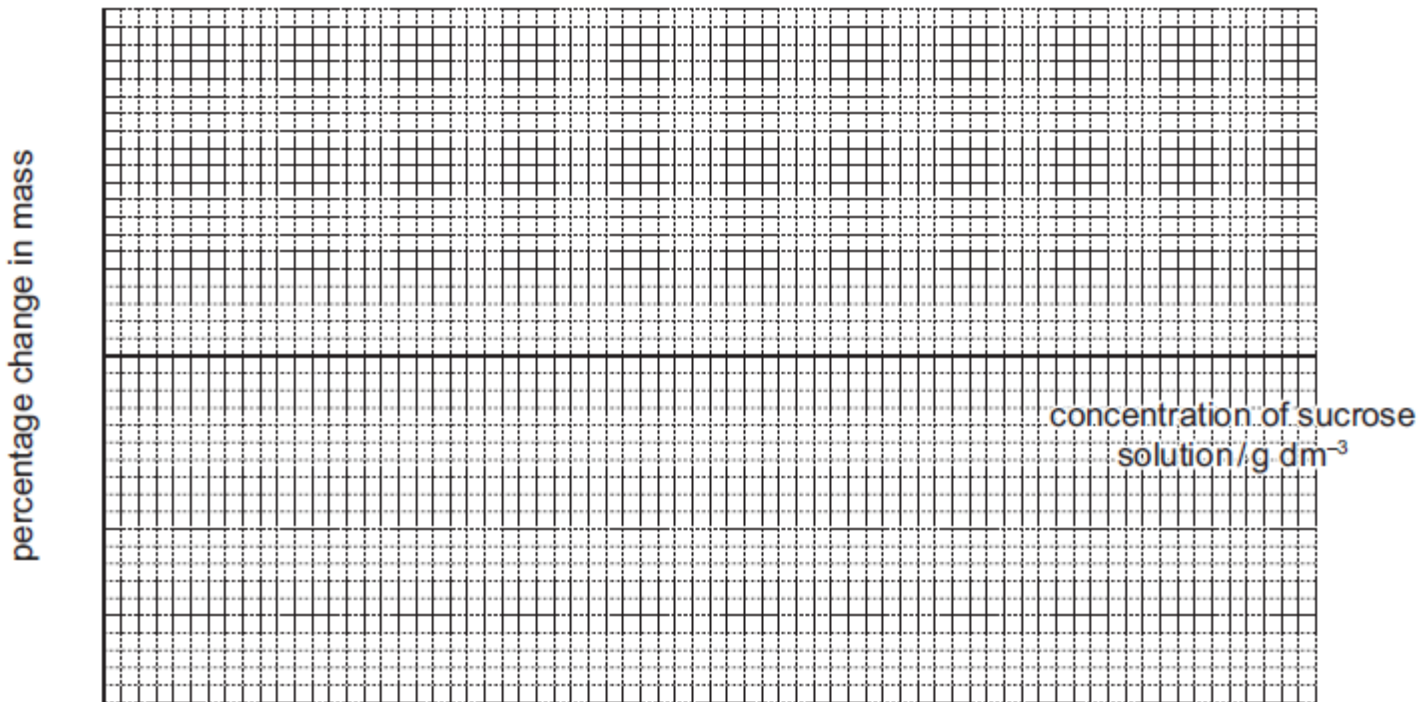
(i) Complete Table 2.2 by calculating the percentage change in mass for the most concentrated solution. Show your working.

[1]

(ii) Suggest why it is necessary to calculate the percentage change in mass when comparing the chips.

.....
..... [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.

.....
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..... [1]

[Total: 14]

End of paper: Total marks: 56