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Surname						Other Names					
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Candidate Signature						Date					

For Teacher's Use	
Section	Mark
PSA	
Stage 1 Skills	
Stage 2 Skills	
Section A	
Section B	
<b>TOTAL</b> (max 50)	



General Certificate of Education  
Advanced Subsidiary Examination  
June 2014

# Biology

# BIO3T/P14/test

## Unit 3T AS Investigative Skills Assignment

### Written Test

For submission by 15 May 2014

<b>For this paper you must have:</b> <ul style="list-style-type: none"> <li>the task sheet, your results and your graph</li> <li>a ruler with millimetre measurements</li> <li>a calculator.</li> </ul>	<b>Time allowed</b> <ul style="list-style-type: none"> <li>1 hour 15 minutes</li> </ul>
<b>Instructions</b> <ul style="list-style-type: none"> <li>Use black ink or black ball-point pen.</li> <li>Fill in the boxes at the top of this page.</li> <li>Answer <b>all</b> questions.</li> <li>You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.</li> <li>Do all rough work in this book. Cross through any work you do not want to be marked.</li> </ul>	<b>Information</b> <ul style="list-style-type: none"> <li>The marks for questions are shown in brackets.</li> <li>The maximum mark for this paper is 35.</li> <li>You are expected to use a calculator where appropriate.</li> <li>You will be marked on your ability to:             <ul style="list-style-type: none"> <li>use good English</li> <li>organise information clearly</li> <li>use scientific terminology accurately.</li> </ul> </li> </ul>

**Details of additional assistance (if any).** Did the candidate receive any help or information in the production of this work? If you answer yes give the details below or on a separate page.

Yes  No

**Teacher Declaration:**

I confirm that the candidate's work was conducted under the conditions laid out by the specification. I have authenticated the candidate's work and am satisfied that to the best of my knowledge the work produced is solely that of the candidate.

Signature of teacher ..... Date .....

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**Section A**

These questions relate to your investigation into the effect of concentration of blackcurrant squash on osmosis in potato cylinders.

Use your Task Sheet, your results and your graph to answer the questions.

Answer **all** questions in the spaces provided.

**1** In this investigation, you were given potato cylinders taken from potatoes of the same variety.

Give **one** reason why this was important.

[1 mark]

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**2** Complete **Table 1** to show how to make 20 cm<sup>3</sup> of each concentration of blackcurrant squash.

[2 marks]

**Table 1**

Percentage concentration of blackcurrant squash	Volume of 100% blackcurrant squash / cm <sup>3</sup>	Volume of water / cm <sup>3</sup>
20	.....	.....
.....	12	.....

**3** Potato skin had been removed from the cylinders given to you.

Suggest **one** reason why the potato skin could have affected osmosis.

[1 mark]

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**4** In this investigation, you should have used potato cylinders that were all the same length.

Suggest and explain **one** reason why this was important.

**[2 marks]**

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**5** Describe how you would use your results for 100% blackcurrant squash to find the rate of osmosis.

**[2 marks]**

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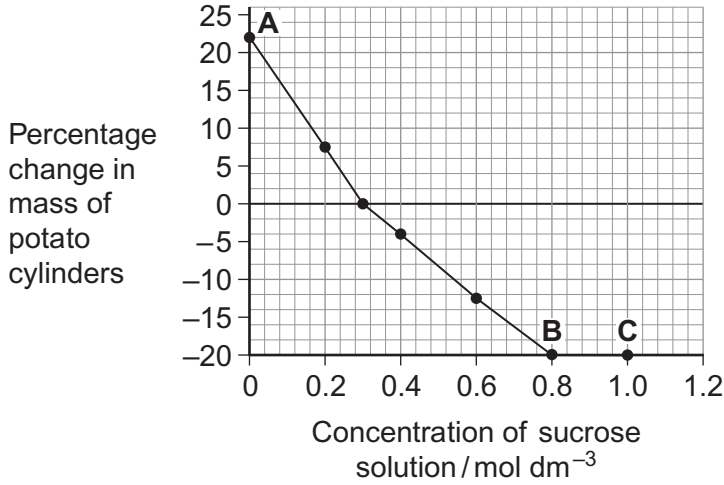
**Turn over for the next question**

**Turn over ►**

**6** A student carried out a similar experiment to yours, but she used sucrose solutions instead of blackcurrant squash.

**Figure 1** shows her results.

**Figure 1**



**6 (a)** Explain the changes in mass of the potato cylinders between **A** and **B**.

**[3 marks]**

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**6 (b)** Explain why the percentage change in mass of the potato cylinders is the same in solutions **B** and **C**.

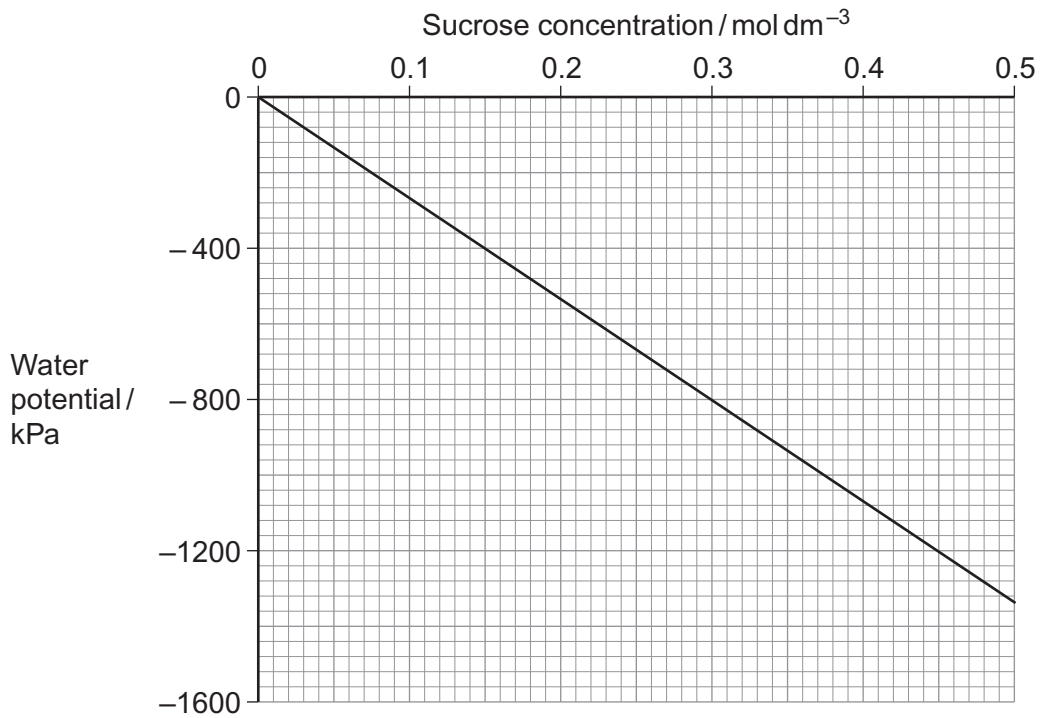
**[1 mark]**

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6 (c) **Figure 2** shows the relationship between sucrose concentration and water potential.

**Figure 2**



Use **Figure 1** and **Figure 2** to work out the water potential of the potato tissue.

Explain how you arrived at your answer.

**[3 marks]**

Water potential of potato tissue ..... kPa

Explanation .....

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## Resource Sheet

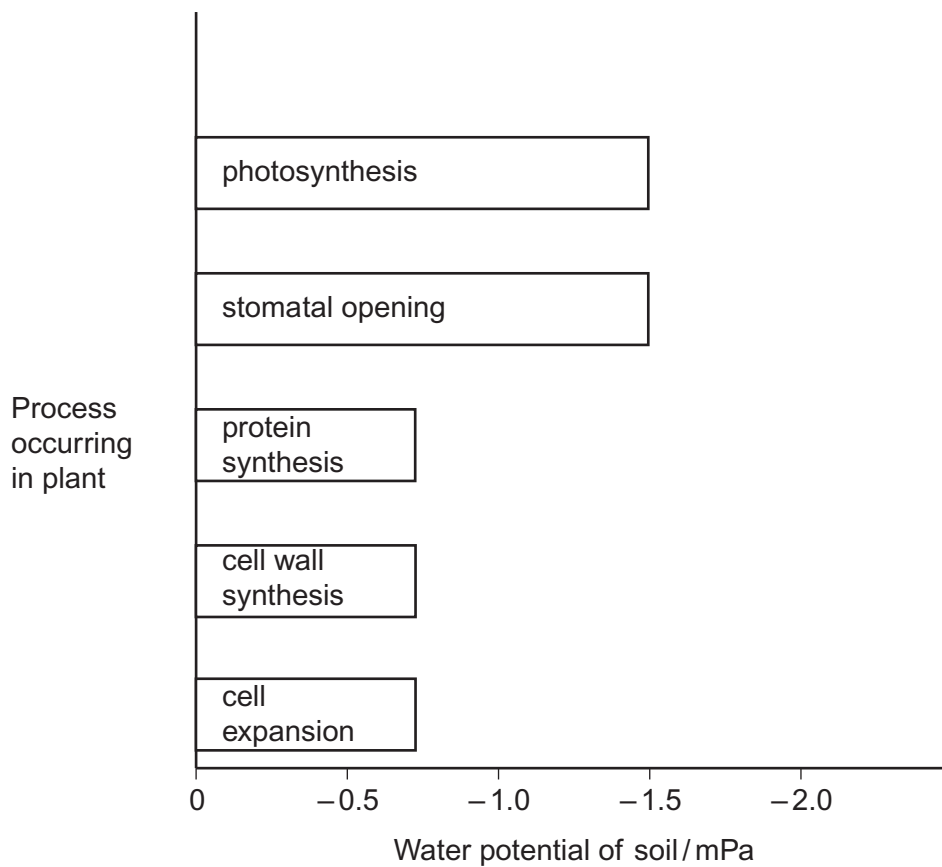
### Resource A

Scientists investigated the effect of the water potential of soil water on plant growth. They investigated the effect of this water potential on several plant processes.

**Figure 3** shows their results in the form they were presented. The bars show whether or not each process was occurring.

The plants stopped growing when the water potential of the soil water was below  $-0.7$  mPa. All of the changes in the plants were related to the ability of the roots to take up water from the soil.

**Figure 3**



**Resource B**

If red blood cells are placed in pure water, water enters the cells by osmosis and they burst. This is called haemolysis. As red blood cells burst they release pigment.

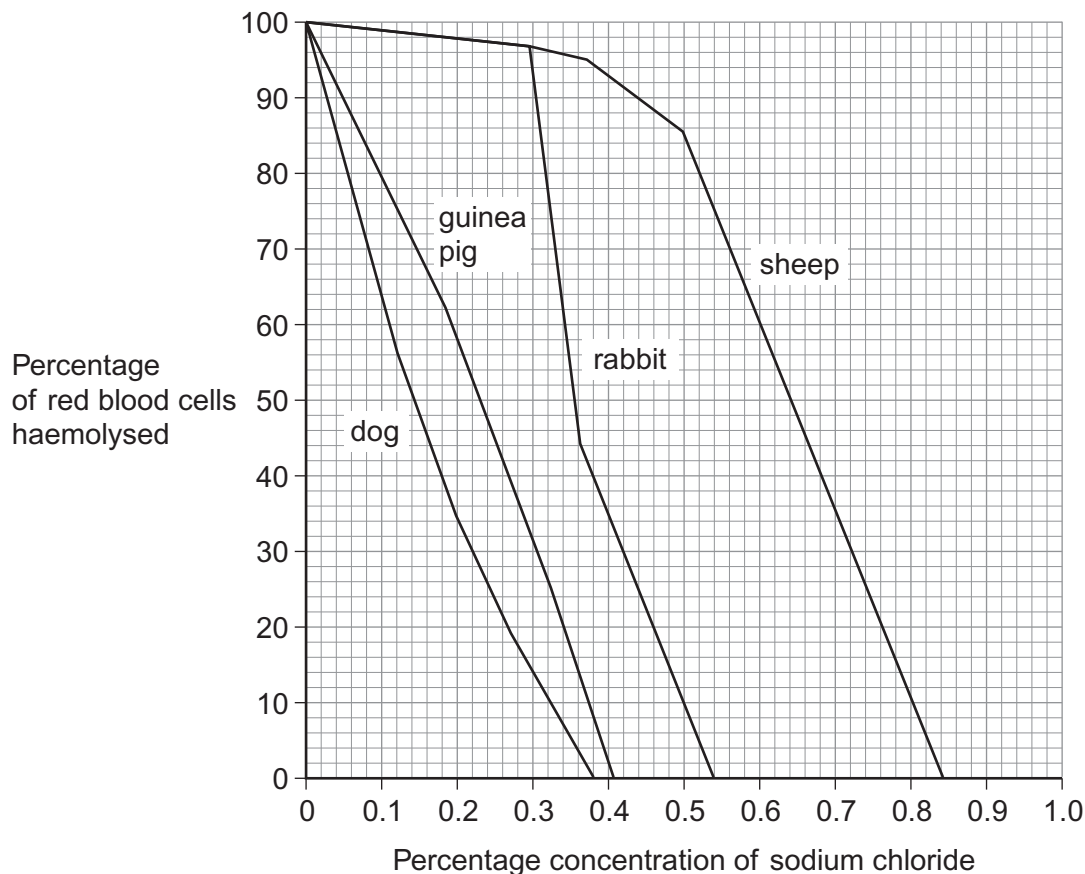
Scientists placed samples of red blood cells in different concentrations of sodium chloride solution for the same period of time. They used red blood cells from four different mammals: dog, guinea pig, rabbit and sheep.

If haemolysis had taken place, the solution turned red. The scientists measured the intensity of the red colour using a colorimeter. The more intense the red colour, the greater the amount of haemolysis.

The scientists calculated the percentage of red blood cells that were haemolysed in each sodium chloride solution.

**Figure 4** shows the scientists' results.

**Figure 4**



Turn over ►

**Section B**

Use the information in the **Resource Sheet** and your own knowledge to answer the questions.

Answer **all** questions in the spaces provided.

Use **Resource A** to answer **Questions 7 to 11**.

**7** Describe the results in **Figure 3**. **[2 marks]**

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**8** Explain the relationship between stomatal opening and photosynthesis. **[2 marks]**

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**9** Although photosynthesis is still occurring, plants stop growing when the soil water potential falls below  $-0.7$  mPa.  
Use information from **Figure 3** to suggest **two** reasons why. **[3 marks]**

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**10** Most of the water uptake in a root takes place in the region just behind the root tip.  
Explain why. **[2 marks]**

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**11** In a root, water passes through the endodermis and enters the xylem.  
Explain how. **[4 marks]**

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**[Extra space]** .....

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Use **Resource B** to answer **Questions 12 to 15**.

**12** Use **Figure 4** to give **two** differences between the results for dog and sheep. **[2 marks]**

Difference 1 .....

.....

Difference 2 .....

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**Turn over for the next question**

**Turn over ►**

**13** Calculate the difference in the percentage of haemolysed cells between sheep and rabbit at a sodium chloride concentration of 0.5%.

**[1 mark]**

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**14** Explain the relationship between the depth of the red colour of the solution and how much haemolysis has taken place.

**[2 marks]**

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**15** During treatment in a veterinary surgery, any of the mammals in **Figure 4** may be given an infusion of sodium chloride solution directly into a vein. The concentration of sodium chloride solution used is 0.9%, rather than 0.5%, regardless of the species of mammal.

Explain the advantage to the vet of using this concentration.

**[2 marks]**

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**[Extra space]** .....  
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**END OF QUESTIONS**

**20**