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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 Level Examination  
June 2014

# Biology

# BI06T/P14/test

## Unit 6T A2 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 calculations</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 37.</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 of reaction times.

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

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

- 6** You asked the first person to place an arm on the work surface with only the wrist and hand over the edge (step 1). Suggest **one** reason for this.

[1 mark]

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- 7** Before dropping the measuring stick, you held it in a vertical position (step 3). Why was it important to hold it in a vertical position before dropping it?

[1 mark]

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- 8** You were told to read out instructions (step 4). Why was it important to read out the same instructions each time?

[1 mark]

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**9** It was important to vary the release time (steps 5 and 7). Explain why. **[2 marks]**

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**10** You were told to keep the temperature of the ice-water bath at about 5 °C (step 8). Give **two** other variables that you did control. **[2 marks]**

1 .....

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2 .....

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**11** Other than standardising the method, suggest why you were told to use only the results from **Trial 3** (Question 1). **[1 mark]**

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**Turn over ►**

**12** In your investigation, you were not told to match people for any factor. **Table 3** shows some factors that could be used to match people in this investigation. Complete **Table 3** by giving an explanation of why people should be matched for each factor.

**[4 marks]**

**Table 3**

Factor	Explanation of why people should be matched for this factor
People are the same age	..... ..... .....
People belong to the same ethnic group	..... ..... .....
People have the same body size	..... ..... .....
People have the same intake of caffeine	..... ..... .....

**13** The people caught the measuring stick as quickly as they could after you let go of it. This was **not** a simple reflex action. Explain why.

**[2 marks]**

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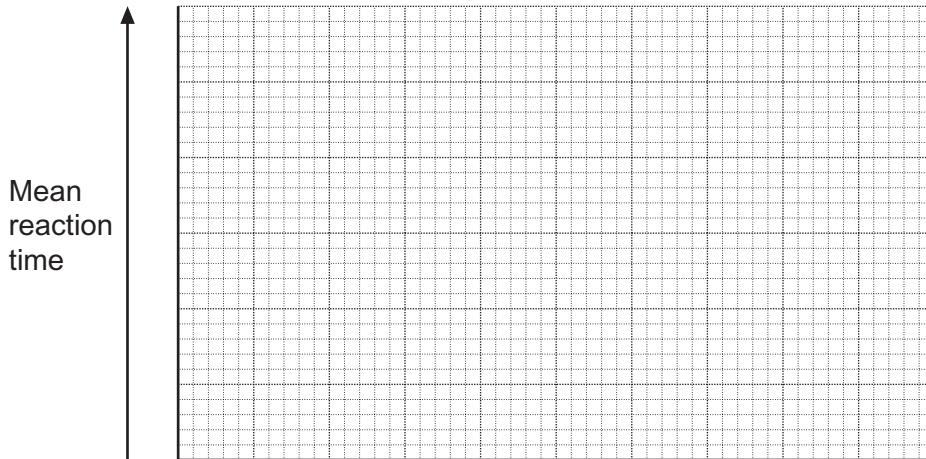
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**14** Another student used the same method as you to investigate the effect of age on reaction times. He tested the reaction times of six groups of people aged 20, 30, 40, 50, 65 and 75 years of age. For each age group, he determined the mean reaction time. He found that mean reaction times slowly increased up to 50 years of age and then quickly increased.

**14 (a)** Complete the graph to show how his data would appear.

**[4 marks]**



**14 (b)** The student also calculated the standard deviations of the mean reaction times. He found these standard deviations increased with the age of the group. What did this show about reaction time?

**[1 mark]**

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**Resource Sheet****Resource A**

The body loses heat quickly in cold water. A researcher investigated the effect of length of time in a bath of ice-cold water on the reaction times of 20 healthy people aged between 21 and 23 years of age.

She measured each person's reaction time after being left in ice-cold water for 15, 30 or 45 seconds. She also recorded each person's reaction time before being placed in the ice-cold water (0 seconds).

**Table 4** shows her results.

**Table 4**

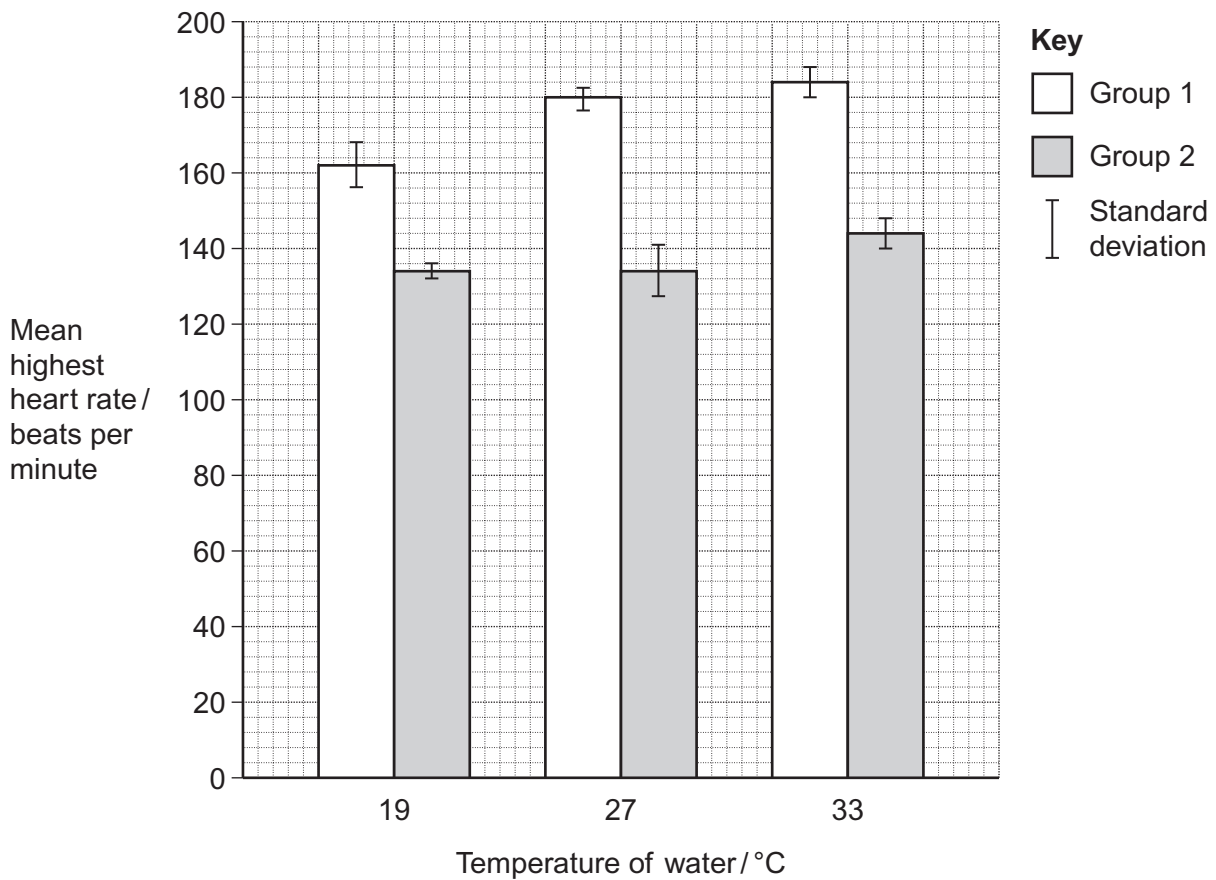
<b>Length of time in bath of ice-cold water / seconds</b>	<b>Mean reaction time / seconds</b>	<b>Standard error</b>
<b>0</b>	0.395	0.0124
<b>15</b>	0.301	0.0105
<b>30</b>	0.297	0.0212
<b>45</b>	0.326	0.0183

**Resource B**

Scientists investigated the effects of water temperature on the heart rate of swimmers. Two groups of volunteers were asked to repeat the same swim at three different temperatures.

- **Group 1** volunteers were asked to swim 100 m as quickly as they could.
- **Group 2** volunteers were asked to swim continuously for 30 minutes.

The scientists recorded the highest heart rate for each swimmer during each swim. Their mean results are shown in **Figure 2**.

**Figure 2****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 15 to 19**.

**15** The stimulus of putting the body in ice-cold water leads to responses in the body that reduce heat loss from the surface of the skin. Describe how. **[3 marks]**

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

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**16 (a)** One reason that reaction time is slower when body temperature falls is because nerve impulse conduction is slower. Explain how a lower temperature leads to slower nerve impulse conduction. **[2 marks]**

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**16 (b)** Other than temperature, give **two** factors that affect the speed of nerve impulse conduction. **[2 marks]**

1 .....

2 .....



**17** Suggest the conditions that the researcher used when obtaining her data for 0 seconds. **[1 mark]**

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**18** Explain how the researcher could use her **raw** data to find **[2 marks]**

**18 (a)** the mode .....

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**18 (b)** the range .....

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**19** A student reading the researcher's report concluded that the difference between the results for 30 seconds and 45 seconds was significant. Do you agree with his conclusion? Explain your answer. **[3 marks]**

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

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**Turn over for the next question**

**Turn over ►**

Use **Resource B** to answer **Questions 20** and **21**.

**20** Give **one** conclusion that can be made from the scientists' investigation. **[1 mark]**

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**21** After reading the scientists' report, a member of a swimming club stated that "the report shows that swimming flat out is better for you than swimming for a length of time." Evaluate this statement. **[4 marks]**

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

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**END OF QUESTIONS**