HUMAN BIOLOGY
GENERAL COURSE

Externally set task
Sample 2016
Note: This Externally set task sample is based on the following content from Unit 3 of the General Year 12 syllabus.

**Science Inquiry Skills**

- identify, research and construct questions for investigation; propose hypotheses; and predict possible outcomes
- plan, select and use appropriate investigation methods, including pre-testing, to collect reliable data; assess risk and address ethical issues associated with these methods
- represent data in meaningful and useful ways; organise and analyse data to identify trends, patterns and relationships; qualitatively describe sources of measurement error and use evidence to make and justify conclusions

**Science Understanding**

- receptors detect stimuli which include light, sound, changes in position, chemicals, touch, pressure, pain and temperature
- reflex actions are automatic and rapid, which involve sensory neurons, interneurons and motor neurons
- the structures of the brain facilitate coordination of responses, including the central nervous system (brain, cerebellum, cerebrum, brainstem and spinal cord) and the peripheral nervous system

In future years, this information will be provided late in Term 3 of the year prior to the conduct of the Externally set task. This will enable teachers to tailor their teaching and learning program to ensure that the content is delivered prior to the students undertaking the task in Term 2 of Year 12.
Human Biology

Externally set task

Working time for the task: 60 minutes
Total marks: 35 marks
Weighting: 15% of the school mark

1. Lucy and Phillip wanted to investigate the effect of distractions on a person’s reaction time. They selected some students in their class to use as their test subjects and conducted the ruler drop test. (29 marks)

Ruler drop test

They converted the measurements to time using the following formula.

\[ t = \frac{\sqrt{2d}}{a} \]

They recorded their results in the table on the following page.
<table>
<thead>
<tr>
<th>Student</th>
<th>Reaction time without distraction (sec)</th>
<th>Reaction time with distraction (sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trial 1</td>
<td>Trial 2</td>
</tr>
<tr>
<td>Darren</td>
<td>0.16</td>
<td>0.14</td>
</tr>
<tr>
<td>Stephanie</td>
<td>0.20</td>
<td>0.21</td>
</tr>
<tr>
<td>Pieter</td>
<td>0.18</td>
<td>0.22</td>
</tr>
<tr>
<td>Braxton</td>
<td>0.20</td>
<td>0.15</td>
</tr>
<tr>
<td>Rohan</td>
<td>0.22</td>
<td>0.18</td>
</tr>
<tr>
<td>Suzie</td>
<td>0.25</td>
<td>0.25</td>
</tr>
</tbody>
</table>

(a) Write an hypothesis for this experiment. (1 mark)

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(b) i What is the independent variable? (1 mark)

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ii What is the dependent variable? (1 mark)

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iii List three (3) variables that Lucy and Phillip kept the same. (3 marks)

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(c) Write a step-by-step method describing how this experiment could be conducted, including equipment required.  (10 marks)

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(d) Complete the data table on the previous page by calculating the missing averages for Rohan and Braxton.  (2 marks)
(e) Draw a graph showing the average results from the table. Put the students on the x-axis and the reaction time on the y-axis. (6 marks)
(f) How could this experiment be improved to increase the validity of the results? (2 marks)

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(g) What could Lucy and Phillip do to investigate the difference between a visual distraction and a noise distraction? (2 marks)

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2. Describe how the nervous system assists reactions. (5 marks)

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3. Explain the difference between a reaction and a reflex action. (2 marks)

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4. Describe the nervous pathway of a reflex arc. (5 marks)

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End of questions
Additional working space:
Additional grid: Use the grid below to answer Question 5 if you have cancelled your first attempt.