MARINE AND MARITIME STUDIES
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
- construct questions for investigation; propose hypotheses; and predict possible outcomes
- conduct investigations, including using ecosystem surveying techniques and line transects safely, competently and methodically for the collection of reliable data

Science Understanding
Oceanography
- construction and use of simple apparatus that can be used to measure abiotic factors of a marine ecosystem
- methods of measuring biotic factors, such as transects and quadrats

Safety equipment
- mandatory safety equipment – bilge pump, fire extinguisher, anchor, life jacket, flares, emergency positioning indicator radio beacon (EPIRB), parachute flares, marine radio (VHF, 27 MHz)
- distress signals – radio (mayday, pan-pan, securite), emergency positioning indicator radio beacon (EPIRB), flares and phone

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.

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Marine and Maritime Studies

Externally set task

Working time for the task: 60 minutes
Total marks: 59 marks
Weighting: 15% of the school mark

1. In the picture below, three marine biologists are conducting a survey of a sub-tidal rocky reef habitat. Examine the picture below carefully and then answer the questions that follow. (26 marks)

(a) What type of surveying method is being used by the marine biologists numbered 1 and 2? (1 mark)

...
(b) The apparatuses below are used to measure factors in the marine environment. In the table below, name each piece of apparatus, state what it is used to measure, and indicate whether it is used to measure biotic or abiotic factors. 

<table>
<thead>
<tr>
<th>Apparatus</th>
<th>Name</th>
<th>Used to Measure</th>
<th>Biotic/Abiotic</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ii)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(iii)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(c) Explain how to use the apparatus (i) and state what a low measurement reading would indicate. 

(d) Researchers in Western Australia investigating abalone, a marine invertebrate shellfish, could also use the research method being used by the marine biologists, numbered 1 and 2 in the diagram. Describe briefly the main information gathered when using this method of research and how this could be used to investigate the effect of recreational fishing on abalone.
Researchers collected data of fish caught from boat-based recreational fishers. These samples were used to determine the age composition for stocks in each area of the West Coast Bioregion (Wise et al., 2007).

The table below is an adaptation of the pink snapper age samples collected from recreational fishers in the metropolitan zone between 2003 and 2006.

<table>
<thead>
<tr>
<th>Ages (years)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency (catch)</td>
<td>0</td>
<td>5</td>
<td>20</td>
<td>125</td>
<td>225</td>
<td>140</td>
<td>50</td>
<td>15</td>
<td>20</td>
<td>5</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

(e) Graph this data on the grid below. (5 marks)
(f) Describe the age composition of pink snapper stocks in the metropolitan zone between 2003 and 2006. (3 marks)

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(g) Give two (2) possible causes to explain the pattern in the data of the age composition of pink snapper between 2003 and 2006. (2 marks)

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2. The data table below is the result of marine research into changes in water quality characteristics off the coast of south-western Australia over a period of 6 months. The measurements were taken at a depth of 0.5 m at the same location each time. (18 marks)

<table>
<thead>
<tr>
<th>Month</th>
<th>Light intensity at 0.5 m depth (lux)</th>
<th>% Concentration of O₂</th>
<th>Temperature (°C)</th>
<th>Amount of chlorophyll-α (algae) present (µg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>September</td>
<td>4500</td>
<td>83</td>
<td>16</td>
<td>7.6</td>
</tr>
<tr>
<td>October</td>
<td>4300</td>
<td>81</td>
<td>16.5</td>
<td>8.2</td>
</tr>
<tr>
<td>November</td>
<td>3900</td>
<td>76</td>
<td>17.6</td>
<td>8.9</td>
</tr>
<tr>
<td>December</td>
<td>1750</td>
<td>82</td>
<td>19</td>
<td>57.2</td>
</tr>
<tr>
<td>January</td>
<td>980</td>
<td>65</td>
<td>21</td>
<td>68.1</td>
</tr>
<tr>
<td>February</td>
<td>600</td>
<td>21</td>
<td>22</td>
<td>27.2</td>
</tr>
</tbody>
</table>

(a) What technology could the researchers have used to ensure that they sampled water in the same location each time? (1 mark)
(b) Summarise and explain the changes in light intensity over the 6 months. (8 marks)

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(c) If chlorophyll-α is a measure of how much microscopic algae (phytoplankton) is in the water, describe the changes in the amount of chlorophyll-α over the time period. (3 marks)

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(d) Provide three (3) reasons as to why these changes have occurred, using other evidence from the data table to support your answer. (6 marks)

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3. Safety at sea is a huge responsibility for the skipper of a recreational boat. Suppose you are the skipper of a recreational power boat that has become inoperable and is beginning to sink slowly. You are more than two nautical miles off shore. (15 marks)

(a) List, in order of importance, five (5) actions you would take, using the correct nautical terms and give a brief description of your actions. (10 marks)

Action 1: ____________________________________________________________

Action 2: ____________________________________________________________

Action 3: ____________________________________________________________

Action 4: ____________________________________________________________

Action 5: ____________________________________________________________

(b) List five (5) pieces of equipment you would need to carry with you on a recreational power boat. (5 marks)

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Additional working space: