

# Advanced Higher Biology Still Freshwater Study



<b>Level/age group:</b> Advanced Higher	<b>Duration:</b> 2 hours
<p><b>Learning objectives. By the end of the session:</b></p> <ul style="list-style-type: none"> <li>• All students will be able to explain how and when to use three pieces of field equipment and the strengths and limitations of these.</li> <li>• Most students will relate the adaptations of three invertebrate species from the study site to life in that environment.</li> <li>• Some students will critically evaluate the study and suggest an improvement to address its limitations.</li> </ul>	
<p><b>Introduction:</b> Kit demo  <i>What equipment can be used to sample biotic and abiotic factors? What are the limitations of the equipment?</i></p> <p>At the Aigas loch the students will work in pairs to familiarise themselves with the equipment they will use to collect their data. Each pair will be given a D net, pH meter, TDS meter and a meter ruler. The students will be given two minutes per piece of equipment, within this time they must figure out how the equipment works and what the strengths and limitations of it might be.</p> <p>Once the pair work is complete, the whole group will gather at the edge of the loch and the Naturedays staff member will talk through how each device works, taking suggestions from the group. The staff member will also demonstrate how the hydro-prop and impellor works.</p>	<p><b>Equipment/handouts:</b></p> <ul style="list-style-type: none"> <li>• D net</li> <li>• pH meter</li> <li>• TDS meter</li> <li>• Meter ruler</li> <li>• Worksheets</li> <li>• Clipboards</li> </ul>
<p><b>Main activity:</b> Freshwater invertebrate study  <i>What is the diversity of invertebrates living in the Aigas loch? Can you identify your independent, dependant and control variables?</i></p> <p>The students will work in small groups for this activity. We will walk past the stream and point out where the students will be sampling in the afternoon. On the bank of the loch the students will work in pairs to compare the two habitats they will be sampling- the loch and the stream. We will discuss answers as a group, then the students will write down the independent, dependent and control variables and any potential sources of error for each sample location. We will go discuss these variables as a group, ensuring every relevant one has been explained, including water velocity, pH, depth, total dissolved solids and substrate. Each student must now write their own hypothesis about the comparison between the two freshwater sites.</p> <p>We will start the investigation at a dropped bank where it is easy to enter and exit the loch. Before any students enter the loch, we will ask the group what health and safety issues they need to be aware of in this area, discuss this as a whole group and get the students to write them down. The students will be reminded to keep in mind the variables they need to control. Split the class into groups of three or four students. Before sampling the loch for invertebrates, the students will collect the data for the abiotic factors discussed earlier.</p> <p>Once the abiotic data has been recorded, the students can collect the equipment required for sampling invertebrates. Each group will have a D net, white tray, paint tray, wooden spoon, pipette and freshwater invertebrate ID guide (a dichotomous key). Demonstrate the figure 8 D net method in front of the group. Set boundaries for depth and distance into the loch the students can go to. One Naturedays staff member will stand in the loch whilst students are collecting their samples. Each group must assign one person (they must be wearing wellies) to stand in the loch and collect</p>	<p><b>Equipment/handouts:</b></p> <ul style="list-style-type: none"> <li>• D net</li> <li>• pH meter</li> <li>• TDS meter</li> <li>• Meter ruler</li> <li>• Worksheets</li> <li>• Clipboards</li> <li>• Throwline</li> <li>• White trays</li> <li>• Paint trays</li> <li>• Wooden spoons</li> <li>• Pipettes</li> </ul>

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<p>invertebrates. Once the sample has been collected, it must be emptied into the white tray and the group will work together to identify the invertebrates down to family level. The students will record their findings on their field data sheet. Encourage the students to use the dichotomous key to aid them through identifying the invertebrates, but we are on hand to help if they are unsure.</p>	
<p><b>Plenary:</b> Record of species found <i>How are these species adapted to living in the loch?</i></p> <p>Before leaving the loch, check that all groups have recorded the invertebrates they collected on their field data sheets. Encourage the students to look at the morphology of the invertebrates and point out any adaptations they have for living in the loch. Get them thinking about how the invertebrates found in the river may differ.</p>	<p><b>Equipment/handouts:</b></p> <ul style="list-style-type: none"> <li>•</li> </ul>
<p><b>Assessment is for Learning techniques:</b></p>	<p><b>Differentiation opportunities:</b></p> <ul style="list-style-type: none"> <li>• Younger kids:</li> <li>• Older kids:</li> <li>• G&amp;T:</li> <li>• SEN:</li> <li>• EAL:</li> </ul>
<p><b>Extension activities:</b></p>	
<p><b>Poor weather alternatives:</b></p>	
<p><b>Suggestions for preparation:</b></p>	<p><b>Suggestions for follow up:</b></p>
<p><b>Additional reading:</b></p>	