IB Biology

Individual Investigation

Adapted from Chris Paine - Bioknowledgy
IA - Internal Assessment - worth 20% of the final assessment

II - Individual Investigation - ONE scientific investigation

- **10 hours** in length
- Write-up - **6 to 12 pages long**. Investigations exceeding this length will be penalized in the communication criterion as lacking in conciseness.
- It should require a purposeful research question and the scientific rationale for it.
- Student work is internally assessed by the teacher and externally moderated by the IB.
- The performance in internal assessment at both SL and HL is marked against common assessment criteria, with a total mark out of 24.
Possible Tasks

Some of the possible tasks include:

- a hands-on laboratory investigation
- using a spreadsheet for analysis and modelling
- extracting data from a database and analysing it graphically
- producing a hybrid of spreadsheet/database work with a traditional hands-on investigation
- using a simulation provided it is interactive and open-ended.

n.b. Some tasks may consist of relevant and appropriate qualitative work combined with quantitative work.
IA Criteria

Individual Investigation is assessed against five criteria.

- Personal engagement
- Exploration
- Analysis
- Evaluation
- Communication

An explanation of each criteria along with the relative weighting of each is included in the marking rubric (posted)
Deciding on a research question

The biggest obstacle to doing well in the individual investigation for most students is not putting enough thought and effort into coming up with a good question. A good, testable question is key!

Key considerations when thinking up a research question should be:

- The question interests you (This is VERY important for the personal engagement criteria)
- The question may be based on a well used method/protocol, but it is unique or changed in someway that makes it very much your own work
- The question can be used to form hypotheses and can answered by gathering and analysing data
- In coming up with your question you researched the theory surrounding it and so can talk about it like an expert

There may be NO duplicate questions! It will be first come, first served.
Limitations

- You must make sure your topic and method adheres to the IB Animal Experimentation Policy - it is your responsibility to be familiar with this policy.
- Studies involving human subjects must have consent forms for participation.
- No use of drugs or alcohol is allowed.
- Studies involving any animal must not put that animal in undue stress or in situations beyond normal tolerance limits.
- Experiments involving body fluids must not be performed due to the risk of the transmission of blood-borne pathogens.
What makes a good experiment?

- Easy to carry out protocol
- Basic equipment. If you are not sure ask us!
- Variation in IV (trials) = 5 different situations
- Number of repeats = 3 minimum. 5 is better
  - This is called 5x3
  - In order to draw a graph you need a minimum of 5 points!
  - In order to carry out statistics (e.g., standard deviation, t-test), you need a minimum of 5 samples
Stuck for ideas? Need help with a method?

What area of biology interests you? What question do you wonder about?

All good investigations will be based on theory and prior investigations, but they will develop what has been done previously, not simply repeat it. Things you must bear in mind when using theory or methods developed by others should be:

1. If you use a webpage or document you **must** cite it.
2. It is highly recommended that if your investigation is based on a published one that you put sufficient effort into developing making it your own and differentiating it from the source. If you don't, the marks you can gain with under the exploration criteria will be limited.
3. You may use the Vernier manuals for ideas and a basic protocol, but you must sufficiently adapt the method to make it your own.
Useful websites for idea generation

The below websites are known to contain information ideas for research questions about methods that produce good results:

- **Science And Plants for Schools** has lots of botanical investigations and ideas
- **Practical Biology** brings together lots of different biology practicals for all ages of student
- **Mr Rothery** publishes a list of practicals commonly done to support his A-level teaching
- **Senior Biology** has a list of investigation ideas for extended essays that are also suitable for individual investigations
- **Vernier dataloggers** can be used in individual investigations and vernier publishes ideas and details of how they can be used
Vernier Probes

We have the following probes:

<table>
<thead>
<tr>
<th>pH Meter</th>
<th>Conductivity Probe</th>
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<tbody>
<tr>
<td>Surface temperature Probe</td>
<td>Colorimeter</td>
</tr>
<tr>
<td>Heart Rate monitor</td>
<td>gas pressure probe</td>
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<tr>
<td>Hand Dynamometer (grip strength)</td>
<td>CO2 sensor</td>
</tr>
<tr>
<td>EKG sensor</td>
<td>Spirometer</td>
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Due Dates?

Research Question/Topic - Friday September 23rd

Lab design/Method - Friday October 14

*The sooner you come up with a RQ/Topic, the sooner you can start working on your method*

Gather Data - IA Lab week - TBA - End Oct/Beginning Nov

Draft copy - Mid November

Final - Before Christmas - Date TBA