**2008 HL**

**1.** Answer the following, which relate to the scientific method, by completing the blank spaces.

(a) As a result of her observations a scientist may formulate a ……………………………………… She will then progress her investigation by devising a series of ……………… and then carefully analysing the resulting ………………………

(b) Why is a control especially important in biological investigations? …………………………………………………………………………………………………..

(c) If a scientist wished to determine the effect of a certain herbicide on weed growth she would include a control in the investigation. Suggest a suitable control in this case.

………………………………...……………………………………………………………

(d) The use of replicates is an important aspect of scientific research. What, in this context, are replicates? …………………….…………………………………………………………………..

……………………………………………………………………………………………

(e) Suggest where a scientist may publish the results of her investigations

……………………………………………………………………………………………………

**2010HL**

**1.** (a) Answer the following in relation to the scientific method.

1. What is a hypothesis?

…………………………………………………………………………………….

………………………………………………………………………………………

(ii) Why is a control normally used when carrying out an experiment?

………………………………………………………………………………………

**2011 HL**

**2.** (a) In relation to the scientific method, explain each of the following.

(i) Experiment. ……………………………………………………

(ii) Theory. …………………………………………………………

(b) Scientists investigated the effect of a certain mineral on the growth of wheat.

Use your knowledge of biology and laboratory procedures to answer the following questions.

1. Suggest a reason why the seeds used were all taken from one parent plant.

……………………………………………………………………………….

(ii) The compost in which the wheat plants were grown was sterilised at the start of the

investigation.

1. Suggest a way in which the scientists may have sterilised the compost.

…………………………………………………………………………….

1. State **one** reason why it was important to sterilise the compost.

...........................................................................................................................

1. Why did the scientists divide the young wheat plants into two equal groups?

……………………………………………………………………………….

(iv) During the investigation the scientists kept the two groups of plants under identical conditions. Why was this? ………………………………………………..

(v) Name **two** conditions you think the scientists would have kept constant during the investigation.

1. …………………………………………………………………………..

2. …………………………………………………………………………

(vi) Why did the scientists repeat the investigation several times before publishing their results in a scientific journal?

…………………………………………………………………..

**2012 HL**

7.(a) In relation to the scientific method, explain each of the following:

(i) Data. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(ii) Replicates. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Answers**

**2008 HL Q3**

|  |  |  |  |
| --- | --- | --- | --- |
| 3. |  | **3(1) + 3(4) + 5** |  |
|  | (a) | Hypothesis |  |
|  |  | Experiments |  |
|  |  | data **or** information **or** findings **or** outcomes |  |
|  | (b) | for comparison **or** reference to (biological) variability |  |
|  | (c) | no herbicide **or** implied |  |
|  | (d) | repeat of experiment |  |
|  | (e) | (scientific) journal **or** named journal [*accept* Internet] |  |

**2010 HL Q8**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **8.** | (a) | (i) | Educated guess **or** (possible) explanation | **3** |
|  |  | (ii) | Comparison (with experiment) | **3** |
|  | (b) | (i) | As a stain **or** to see more clearly | **3** |
|  |  | (ii) | To see (or measure ) gas (or bubbles)  [*negative for terrestrial plants*] | **3** |
|  |  | (iii) | 1. (Detergent) breaks down membranes 2. To separate (or see) the DNA | **3**  **3** |
|  |  | (iv) | 1. To prevent contamination **or** described 2. Attach leaves (or leaf parts) | **3**  **3** |
|  |  | (v) | 1. Test for (soluble) protein 2. Test for fat (or lipid or oil) | **3**  **3** |

**2011 HL Q7**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **7.** | (a) | (i) | Test of hypothesis **or** test of prediction | **3** |
|  |  | (ii) | Hypothesis (or explained) supported (by experiment) | **3** |
|  | (b) | (i) | To minimise (genetic) variation | **3** |
|  |  | (ii) | 1. Heat (or method of heating) **or** named chemical **or** irradiation (or named) 2. To kill organisms **or** to prevent contamination **or** to eliminate competition **or** to eliminate disease **or** described | **3**  **3** |
|  |  | (iii) | As control (or described) | **3** |
|  |  | (iv) | To have only one variable (or explained) | **3** |
|  |  | (v) | Temperature / Light **/** pH / CO2 / humidity / other minerals / H2O  ***Any 2*** | **2(3)** |
|  |  | (vi) | To ensure (statistical) reliability | **3** |