



NATIONAL SENIOR CERTIFICATE EXAMINATION  
NOVEMBER 2012

**LIFE SCIENCES: PAPER III**

**MARKING GUIDELINES**

Time: 1½ hours

50 marks

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**These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.**

**The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.**

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Teachers are asked to please complete this grid after the examination.

<b>Criteria</b>		
Test tubes labelled correctly.	1	0
Equal amount of solutions in each test tube.	1	0
Evidence of ensuring contamination does not occur.	1	0
Use of thermometer to test temperature of the water.	1	0
Working independently.	1	0
<b>TOTAL</b>	<b>Max / 5</b>	

**EXPERIMENT (21 marks)**

8. Observe and describe the reactions in the four test tubes in the table below. Remember to give your table suitable headings.

<i>Test Tube/Solutions</i>	<i>Colour change/Description of Results/ Reactions</i> (✓)
<i>A/Egg White</i>	<i>Pale purple/lilac</i> (✓)
<i>B/Milk</i>	<i>Lighter/paler purple/lilac</i> (✓)
<i>C/Enzyme Solution</i>	<i>Deep purple/lilac</i> (✓)
<i>D/Glucose solution</i>	<i>Unchanged or any colour other than purple or lilac</i> (✓)

(Accept any reasonable colour change) Note: No other colour is acceptable for test tube D.

(6)

*Table to show the amount of protein present in a variety of substances/solutions. (Any reasonable heading relating to the aim and complete)*

9. Write a conclusion for this experiment.

Answer must refer to the results in the candidate's table above.

An example could be:

*As enzyme solution changed to the darkest purple/lilac colour and glucose remained unchanged we can conclude that enzyme solution has the most protein and glucose has no protein.*

**OR**

*Enzyme solution has the most amount of protein and glucose has no protein.*

**OR**

*Enzyme solution, milk and enzyme solution have a range of protein and glucose has no protein.*

**OR**

*Any reasonable answer linked to Aim.*

(2)

10. Describe TWO ways in which you worked carefully in order to get results that are as accurate as possible.

- *Ensured warm water was 37 °C – used thermometer*
- *Measured exactly 4 ml of solutions – used syringe*
- *Timed each test tube for 15 minutes – used timing device*
- *Avoided contamination – rinsed out syringe before measuring solutions*
- *Measure equal amounts of potassium/sodium hydroxide solution and copper sulphate solution – used dropper pipette/dropper* (4)

11. How could the design of the investigation given above be improved? Explain TWO improvements to **this** design.

- *Accurate measurement/2 ml potassium/sodium hydroxide with same amount of copper sulphate in each test tube – use dropper pipette/syringe to measure accurately*
- *Stir solutions more thoroughly – using a spatula/spoon/stirring stick*
- *Repeat several times – for accuracy*
- *Accurate measurement of the enzyme powder – use a teaspoon/measure 2 ml* (4)

**DATA RESPONSE QUESTION REQUIRING GRAPHING SKILLS (8 marks)**

The table below shows the number of American children between the ages of 2 months and 2 years of age who have died as a result of being left in a hot car for a minimum of 10 minutes. The data was collected over a period of two years.

Carefully study the tabulated data given below and then display the data given as line graphs on the graph grid supplied below.

<b>Temperature °C</b>	<b>2010</b>	<b>2011</b>
38	3	4
42	17	8
46	24	15
50	4	3
52	1	0

A table to show the number of deaths due to hyperthermia in children in the USA between the age of 2 months and 2 years of age over a 2 year period

Marking guidelines

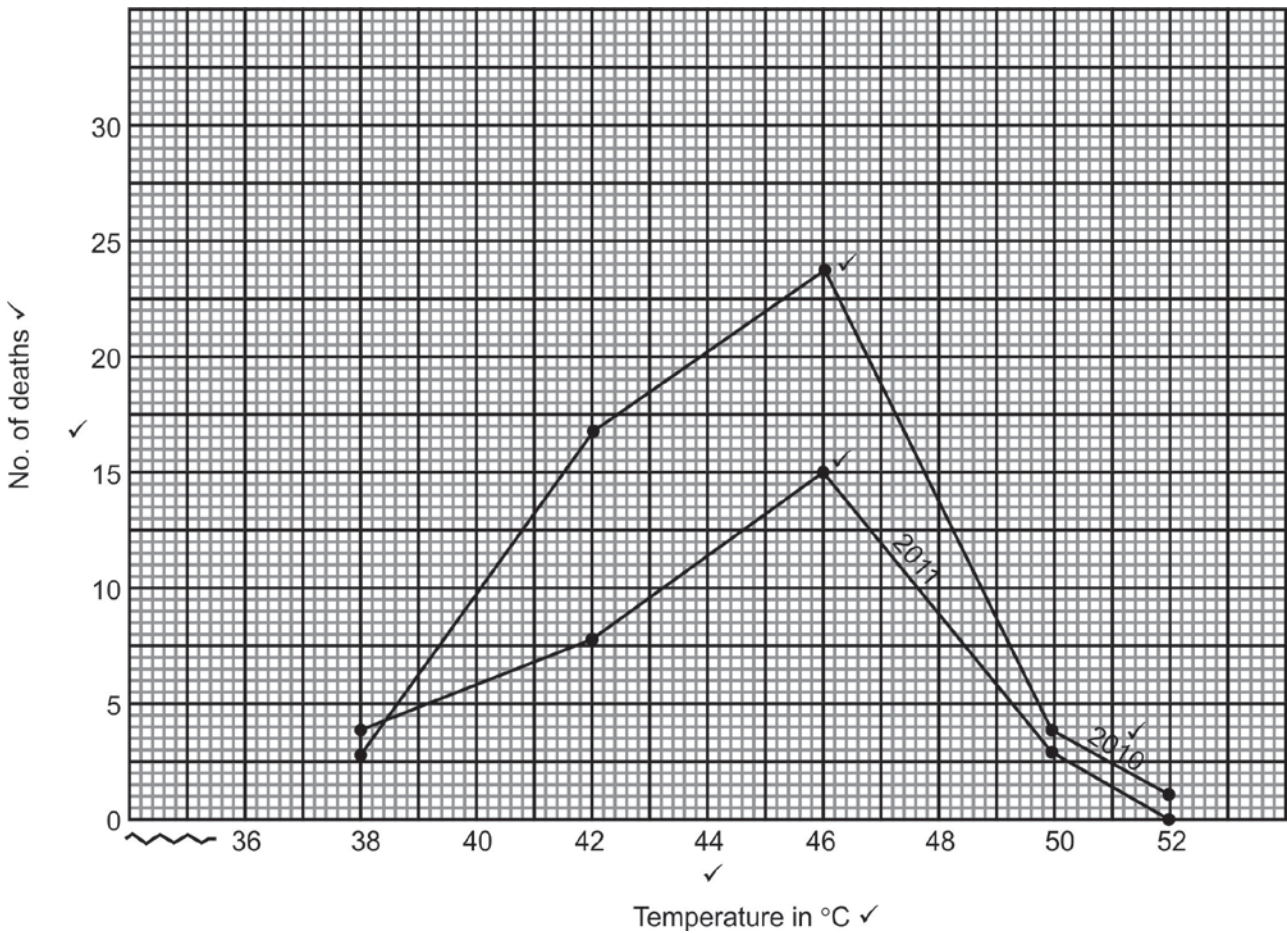
**Headings on axes**

*Suitable scale on axes*

*Overall heading*

*2 lines plotted*

*Key/labelled lines* (8)



Graph to show number of deaths due to hyperthermia in children between the age of 2 months and 2 years in USA.

**EXPERIMENTAL DESIGN (21 marks)**

Before you continue with the next task please refer back to the article: *Baby dies after being left in hot car* on the Information Sheet. Pay particular attention to the lines 16 to 22.

Design an experiment in which you determine if proteins are sensitive to temperature. You may use any apparatus that you would find in your school laboratory. Do not simply rewrite the experiment you have just completed.

1. State your hypothesis.

Statement – short and to the point

Wording – must include 2 variables

An example could be:

**Proteins are sensitive to temperature**

(3)

2. State your aim.

Relates to hypothesis

Shows it is an aim and not a statement.

An example could be:

***To prove/disprove proteins are sensitive to temperature*** (2)

3. Identify the dependent variable.

- ***Evidence of the amount of protein in solutions***
- ***Positive test for protein*** (2)

4. Identify the independent variable.

- ***Temperature of water baths/water in which the test tubes stand*** (2)

5. List any TWO controlled/fixed variables and state precisely **how** they will be controlled in your experiment to ensure fair testing.

- ***Equal amounts of substrates/actual volume listed – measured using a syringe/other accurate measuring device***
- ***Time substrate exposed to temperatures must be the same – actual time in minutes listed***
- ***Keep to the same type of protein throughout experiment – list protein to be used***
- ***Same amount/volume of reagents used in each test tube should be the same – use syringe to measure actual volume to be used/2 ml*** (4)

6. Outline your own **new** method using numbered points or bullet points

Suggested method:

- ***Using a marker pen mark 3 test tubes A, B and C***
- ***Use a syringe to measure 3 ml of a protein solution into each test tube***
- ***Place test tube A into luke-warm water***
- ***Place test tube B in boiling water***
- ***Place test tube C into ice water***
- ***Leave for 10 – 15 minutes***
- ***Add a few drops of potassium OR sodium hydroxide solution to each test tube***
- ***Add same amount of copper sulphate to each test tube***
- ***Swirl each test tube gently***
- ***Record observations in a table***

Please use the rubric below to assess this method.

<b>Criteria</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>0</b>
<b>L</b> Method laid out as a series of steps that are bulleted or numbered			Method laid out as a series of steps that are bulleted or numbered	Method <b>NOT</b> laid out as a series of steps that are bulleted or numbered
<b>A</b> Method relates to aim			Method actually tests the aim given by the candidate	Method is <b>NOT</b> related to the aim given by the candidate
<b>R</b> Method chosen is appropriate and relevant to the task	All 3 criteria are met 1. Method given is unique and an extension of the method given in the examination 2. Method is complete 3. Method achieves a definite result	Two criteria are met	One criterion met	No criterion met
<b>E</b> Equipment chosen is appropriate and used correctly			Equipment chosen by the candidate is both appropriate to the task and used correctly	Equipment chosen by the candidate is neither appropriate to the task nor used correctly
<b>I</b> Instructions given are logical, in sequence and are easy to follow		Instructions given are both logical and easy to follow	One criterion met	Instructions given are confusing and difficult to follow

(8)

**Total: 50 marks**