NATIONAL SENIOR CERTIFICATE EXAMINATION
SUPPLEMENTARY EXAMINATION – MARCH 2019

LIFE SCIENCES: PAPER III

MARKING GUIDELINES

Time: 1½ hours | 50 marks

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.

IEB Copyright © 2019

PART 1 INVESTIGATION

PART A

Following instructions: Five beakers labelled A–E and five tubes are labelled 1–5.

Procedural skills: Level of solutions in test tubes 1–5 the same (10 ml).

Manipulative skills: Small syringe used with 2 ml measured correctly.

1.21 Table showing the colour changes of different breast milk dilutions (concentrations) in the presence of alcohol detection solution (ADS).

Test tube	Concentration of breast milk (alcohol units)	Colour change of Alcohol Detection Solution
1	1	Red to blue
2	0,1	Red to blue
3	0,01	Red to green
4	0,001	Red to yellow
5	0,0001	Red to yellow

1.22 Concentration of breast milk/concentration of alcohol in breast milk (do NOT accept test tube).

1.23 Any two:
- Volume of solutions in test tube or beakers – controlled by placing 10 ml or 20 ml total volume respectively in each using a syringe.
- Amount of alcohol detection solution – each tube received 5 drops of alcohol detection solution using a dropper.
- Amount of water in each beaker for dilution each beaker contained 18 ml water using a syringe.

Do not accept – environmental conditions, not relevant to this study; size of test tubes/beakers is also irrelevant to the validity of this experiment.

1.24 The indicator was able to detect higher concentrations of alcohol in breast milk to a concentration of 0,1 alcohol units, as it changed colour from red to blue. It was also sensitive/able to detect 0,01 alcohol units, as it changed colour from red to green **OR** it was not sensitive in detecting lower concentrations of alcohol, e.g. 0,01 to 0,0001 alcohol units as it changed from red to yellow.

1.25 Any two of the following:
- Repeat the experiment again to see if the same result (colour change) is achieved.
- Replicates of the breast milk samples could be tested to see if the same result (colour change) is achieved.
- More dilutions/different range of dilutions can be made and tested.
- Comparison with pure ethanol dilutions could be made.

IEB Copyright © 2019

1.26 Ethics:

- Breastfeeding mother should not drink alcohol – irresponsible; can lead to impaired development of child. OR
- Breastfeeding mothers are allowed to drink responsibly – test allows for responsible drinking /knowing when alcohol cleared from breast milk.

1.27 (a) The more/less a breastfeeding mother weighs, the less/more time it takes to metabolise alcohol consumed.

(b) For a 63,5 kg woman drinking 2 beers starting at 8 p.m.: it would take 4 hours, 38 minutes for there to be no alcohol in her breast milk; 8 p.m. + 4 hours, 38 minutes = 00:38 (12:38 p.m)

(c) Time (hours and minutes) /time to clear alcohol from breast milk /time taken for alcohol clearance.

1.28 (a) A = 47 mm (4,7 cm) B = 59 mm (5,9 cm)
(Acceptable range: A: 45–50 mm; B: 58–62 mm)

(b) $\frac{59}{47}$ = 1,26 → 1,3 times bigger
(Acceptable range 1,23–1,3 times bigger)

(c) Longitudinal

(d) FAS brain corpus callosum smaller/narrower/absent than normal brain.
(**Must** be a description **comparing** the FAS and normal brains to receive full marks.)

PART B

2.1 No alcohol will be detected (indicator turns yellow) using ADS in breast milk 6 hours after consuming wine /Breast milk will be alcohol free 4/6/8 hours after consuming wine. (statement)

2.2 To determine how long it takes for alcohol to no longer be detected in breast milk (from a mother who had wine) using ADS /To find out at which time there is no more alcohol in the breast milk.

2.3 Time /time interval

2.4 Sample method:

- Label 5 test tubes 1 to 5 using a marker.
- Using a syringe, place 10/20 ml of breast milk provided at 19:00 in test tube 1.
- Rinse syringe.
- Using a syringe, place 10/20 ml of breast milk provided at 21:00 in test tube 2.
- Rinse syringe.
- Using a syringe, place 10/20 ml of breast milk provided at 23:00 in test tube 3.
- Rinse syringe.
- Using a syringe, place 10/20 ml of breast milk provided at 01:00 in test tube 4.
- Rinse syringe.
- Using a syringe, place 10/20 ml of breast milk provided at 03:00 in test tube 5.
- Using a dropper, add 5/10 drops of Alcohol Detection Solution into each test tube.
- Stir each test tube using a kebab stick/glass rod, rinsing the glass rod in between each test tube.
- Observe and record colour changes at different times in a table for each test tube.
- Samples that are blue still contain alcohol; samples that are yellow contain no detectable alcohol. (no marks awarded for this)
- Repeat the experiment to verify results.

Layout (L): neat, numbered

Aim (A): must have five milk samples from the different time intervals
must use Alcohol Detection Solution

Method (M):

- Original – look for milk samples from different time intervals; if mention serial dilution then no marks awarded.
- Equipment – looking for a syringe and dropper used correctly.
- Measuring – equal amounts of Alcohol Detection Solution and equal quantities of breast milk added to each test tube.
- Valid – Alcohol Detection Solution added to breast milk; order allows for achievable result.
- Measurable results – recording of colour change.

METHOD RUBRIC

Method Rubric Criteria	5	4	3	2	1	0
L Layout – appearance of method					Layout meets criteria below: neat and tidy and bulleted/numbered.	Layout is untidy and hard to read. **OR** Method is not formatted correctly with bullet points or numbers.
A Aim – Method relates to prescribed experiment.				Method clearly tests an aim that relates to the prescribed experiment and achieves the required result.	Method relates to the prescribed aim given, but is a little confusing and does not achieve the required result.	Method does not relate to the prescribed aim or achieve the desired result. Method given is the same as the given experiment.
M Method – This needs to be appropriate and relevant to the aim, clearly logical and sequential. If apparatus is given in the examination paper, the method should resemble the one given in the marking guidelines.	All 5 criteria given below are met: 1. An original experiment provided. 2. Equipment is appropriate and used correctly. 3. Measuring of solutions, reagents and marking of equipment are explained and this assists in the control of variables. 4. Instructions are scientifically valid and ordered. 5. Instructions are complete to produce measurable results that are recorded.	An original experiment provided. Plus 3 of 5 criteria are met.	An original experiment provided. Plus 2 of 5 criteria are met.	An original experiment provided. Plus 1 of 5 criteria is met.	An original experiment provided.	None of the 5 criteria are met. **OR** Method a copy of the original, given experiment.

Total: 50 marks

IEB Copyright © 2019