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.

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9.   Table to show the colour of a variety of solutions/liquids when indicators (A and B) or Biuret are added.

Test tube	Colour (when indicators are added)
A	Light blue
B	Purple to lilac
C	Slight tinge of purple/lilac in a very 'milky' mixture
D	Light blue

Layout of table (neat and in columns and rows) with both correct column headings (Descriptions of colour blue for A and D) (and **more** purple/lilac in B than in C).   (6)

10.   Sediment/solid/ precipitate in test tube D with blue layer on the top.
      A, B and C – unchanged. (check what is written in the table)   (3)

11.   A and D do not contain protein.
      B and C do contain protein (refer back to table).   (2)

12.   (Contents of the test tube/various liquids or different solutions) added to the test tubes.   (2)

13.   Presence or absence of protein/colour change (only 1 mark)   (2)

14.

Test tube	Protein in the test tube (%)
A	0
B	5 (30/6)
C	30
D	0

      NOTE: Both A and D recorded 0
                No units (%) in the body of the table   (3)

15.   15.1   More protein in C as it is pure milk. We have shown in A that there is no protein in water and B is diluted milk so less protein than in C. (C most and B less). This question asks where you **expect** to have more protein present.   (2)

      15.2   No. The colour in B is more purple/lilac than in C as there is less milk (with particles in) to blur/obscure the indicator and colour change.   (2)

16.   The colour/shade of purple/lilac would be in between what was observed in test tubes B and C.
      OR
      In between B and C.
      Lighter than B but darker than C.   (2)

17.   Measured length or width of PB (… mm/length of scale bar in mm) × 15 µm
      = ... µm   method may differ to calculate (or (3 fits in × 15 = between 42–48 µm)   (4)

18.   Heading: (bar graph to show) the **protein** content in (gram/100 cal of) different **foods.**
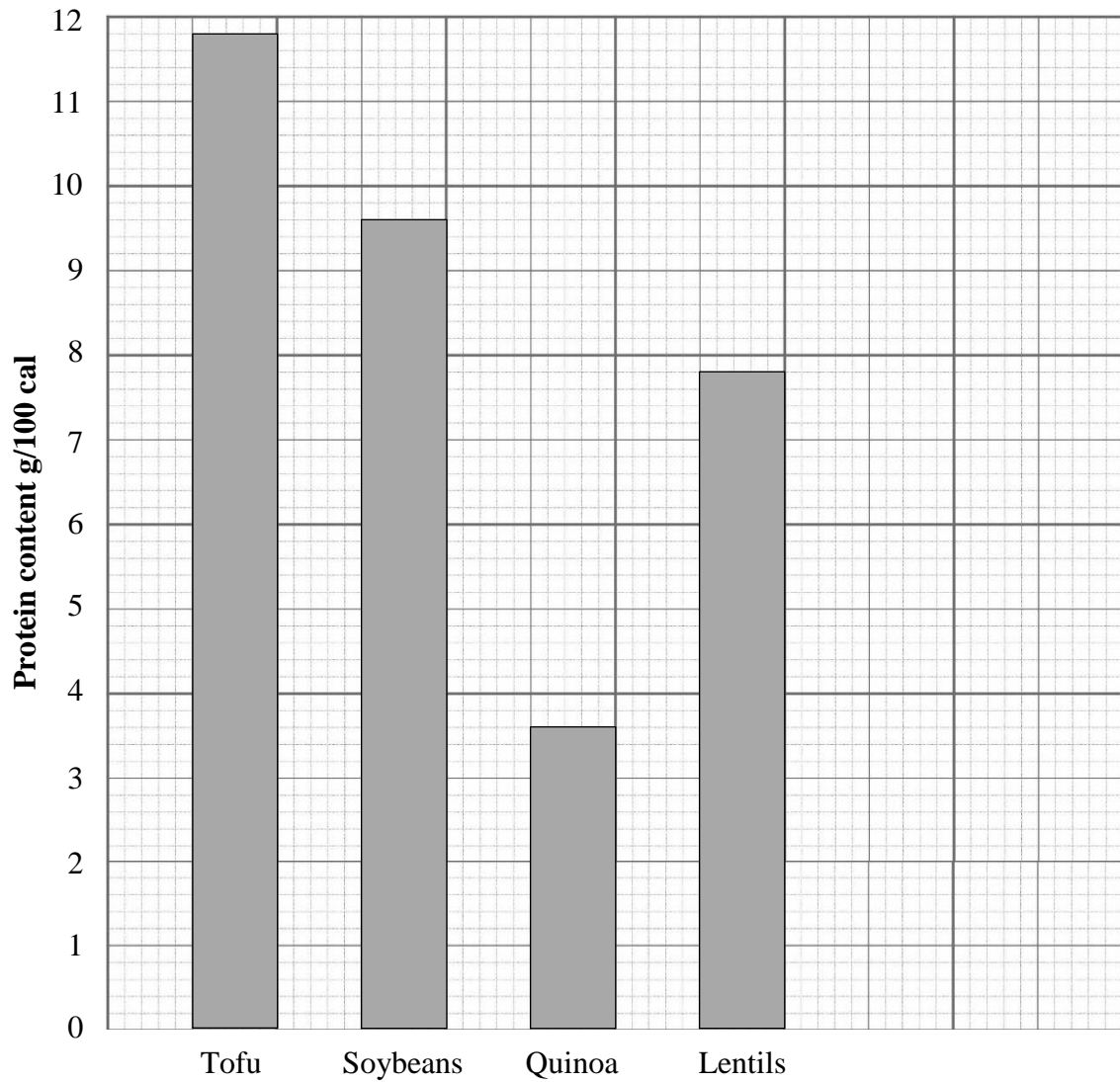
Complete heading
Bar graph
Spaces between bars equal
Label y-axis (protein content in gram/100 cal)
Scale on y-axis correct
Names of foods on x-axis/key

Accuracy (maximum 3 if do a line graph) Histogram only 4/6   (6)

PART 2   EXPERIMENTAL DESIGN

19.1   Rennet added to milk will cause the milk to coagulate. Statement   (3)
         THE DESIGN MUST SPEAK TO THE HYPOTHESIS

19.2   To investigate whether milk in the presence of Rennet will coagulate and form lumps.

         OR

         To determine if adding Rennet will cause the milk to coagulate and form lumps.   (2)

19.3   (1)   Take two identical test tubes.
         (2)   Mark one test tube A and the other B.
         (3)   Using a 10 ml syringe add 30 ml of milk to both A and B.
         (4)   Add 4 drops of lemon juice to both test tubes A and B.
         (5)   Into A add 4 drops of Rennet.
                 (One test tube has Rennet and the other test tube no Rennet.) THIS IS A CRUCIAL POINT THAT NEEDS TO BE IN THE DESIGN.
         (6)   Take a 250 ml beaker and to it add 200 ml water that is at a temperature of 70 ^{o}C (water bath).
         (7)   Place both test tubes in the water bath for 10 minutes/set time.
         (8)   Remove the test tubes from the water bath and tilt to the side to observe for small lumps/coagulation.
         (9)   Record your observations in a table.
         (10)   Repeat the investigation to verify your findings.

Use the attached rubric for assessment for Question 1.3.

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.

(8)

Total: 50 marks