READ THESE INSTRUCTIONS FIRST

These Confidential Instructions give details of the apparatus required by each candidate for each experiment in this paper. A summary of the questions that will be presented to the candidates is included, where appropriate, to allow the biology teacher to test the apparatus appropriately. Testing must be done out of sight of all candidates.

No access to the question paper is permitted in advance of the examination.

Centres are reminded that candidates are expected to follow the instructions on the question paper and record all their results. They will not be penalised if these results are not what they expect.

The Supervisor should make sure the Supervisor’s Report is fully completed and a copy is enclosed with each packet of scripts.

It is assumed that the ordinary apparatus of a science laboratory will be available, including a supply of purified water (distilled or deionised).

If arrangements are made for different sessions for different groups of candidates, care must be taken to ensure that the different groups of candidates are effectively isolated so that no information passes between them.

All specimens should carry only the code letters and numbers as indicated and their identity should not be revealed to the candidates.

Supervisors should ensure that all specimens have the correct identity attached to the specimen and that these are not removed during the examination.

If a candidate breaks any of the apparatus, or loses any of the material supplied, the matter should be rectified and a note made in the Supervisor’s Report.

Supervisors are advised to remind candidates that all substances in the examination should be treated with caution. Pipette fillers and eye protection should be used where necessary.

In accordance with COSHH (Control of Substances Hazardous to Health) Regulations, operative in the UK, a hazard appraisal of the examination has been carried out.

The following codes are used where relevant:

- C corrosive
- HH health hazard
- F flammable
- N hazardous to the aquatic environment
- MH moderate hazard
- T acutely toxic
- O oxidising

Centres are reminded that they are not permitted to open the question paper envelopes before the examination.

If there are any difficulties with any aspect of setting up this practical examination that the Centre is not able to resolve, it is essential for Centres to contact Cambridge as soon as possible by email to info@cie.org.uk, by fax to +44 1223 553558 or by phone to +44 1223 553554.
Question 1

Each candidate should be provided with:

(i) six test-tubes
(ii) one test-tube rack
(iii) one 250 cm$^3$ beaker labelled water-bath
(iv) a supply of warm water at 40°C. Candidates will raise their hands when they are ready for warm water to fill their water-bath.
(v) one glassware marker pen
(vi) one 5 cm$^3$ syringe without needle
(vii) one 1 cm$^3$ syringe without needle
(viii) stop-clock
(ix) 25 cm$^3$ of fresh whole milk in a container labelled milk
(x) 10 cm$^3$ of 0.4 mol dm$^{-3}$ hydrochloric acid in a container labelled acid
(xi) 40 cm$^3$ of distilled water in a container labelled distilled water

HH, MH, C (xii) 10 cm$^3$ of 0.1% rennin solution in a container labelled 0.1% rennin
MH (xiii) 10 cm$^3$ of 0.4 mol dm$^{-3}$ sodium hydroxide in a container labelled alkali
(xiv) three dropping pipettes, graduations are not required
(xv) paper towels
(xvi) disposable gloves
(xvii) eye protection

Preparation of solutions

HH, MH, C 0.1% rennin solution

This can be made up using dried rennin, rennet essence or vegerennin. It can be purchased from science providers, dairy industry providers and some food stores. The enzyme should be refrigerated but should not be frozen prior to use.

Dissolve 1 g of dried rennin in (or add 1 cm$^3$, if in liquid form, to) 500 cm$^3$ of distilled water. Add more distilled water to make up to a total volume of 1 dm$^3$. 
**Milk**

The milk should be fresh whole cow’s milk. Skimmed or semi-skimmed milk is unsuitable. Before the examination the Supervisor should trial the enzyme reaction of the milk and rennin solution. Warm separate samples of the milk and the 0.1% rennin solution to 40°C. Add two drops of 0.4 mol dm⁻³ hydrochloric acid to 5 cm³ of warmed fresh whole milk. Add 1 cm³ of warmed 0.1% rennin to the milk and acid mixture.

The milk should form visible clots (small lumps) within one minute and should be partially solid within three minutes. If these times are longer or shorter adjust the concentration of the rennin enzyme accordingly.

MH Add two drops of 0.4 mol dm⁻³ sodium hydroxide to 5 cm³ of fresh whole milk, which has been warmed to 40°C. Add 1 cm³ of warmed rennin solution to the milk and alkali mixture. There should be little or no clotting with this mixture within 5 minutes. Increase the strength of the alkali if the milk is clotting but note that sodium hydroxide is classified as C at concentrations equal to or greater than 0.5 mol dm⁻³.

**Question 2**

(i) ruler with a mm scale

The Supervisor (not the Invigilator) should carry out the practical aspects of Question 1 and record their results in the space provided in the Supervisor’s Report. This must be done during the examination, using the same apparatus and reagents as the candidates but out of sight of the candidates.
This form should be completed and sent to Cambridge with the scripts.

SUPERVISOR’S REPORT

The Supervisor or Teacher responsible for the subject should provide the following information.

1 Was any difficulty experienced in providing the necessary materials? If so, give brief details.
   ..........................................................................................................................................................
   ..........................................................................................................................................................
   ..........................................................................................................................................................

2 Give details of any difficulties experienced by particular candidates, giving names and candidate numbers. Reference should be made to:

   (a) difficulties with specimens or materials;
       ..........................................................................................................................................................

   (b) accidents to apparatus or materials;
       ..........................................................................................................................................................

   (c) assistance provided in the case of colour blindness;
       ..........................................................................................................................................................

   (d) any other information that is likely to assist the Examiner, especially if this cannot be discovered from the scripts.
       ..........................................................................................................................................................

Other cases of individual hardship, e.g. illness or disability, should be reported direct to Cambridge on the normal Special Consideration Form as detailed in the Handbook for Centres.

3 During the examination, the Supervisor should, out of sight of the candidates, carry out the practical aspects of Question 1 using the same apparatus and reagents as the candidates. Results should be recorded in the space on page 8 (not on a spare question paper). Attach extra sheets if necessary.

   The Invigilator should not carry out Question 1.
Question 1 results:

4 A plan of work benches, giving details of the candidate numbers of the places occupied by the candidates for each session, must be enclosed with the scripts.

Declaration (to be signed by the Supervisor)

The preparation of this practical has been carried out so as to maintain fully the security of the examination.

Signed ...................................................................................

Name (IN BLOCK CAPITALS) ...................................................................................

Centre number ........................................................................................................

Centre name ...........................................................................................................

If scripts are required to be dispatched in more than one packet, it is essential that a copy of the Supervisor’s Report and the appropriate seating plan(s) are inside each packet.