OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced GCE

BIOLOGY 2806/03/TEST

Practical Examination 2 (Part B – Practical Test)

Tuesday **27 JANUARY 2004** Morning 1 hour 30 minutes

Candidates answer on the question paper
Additional materials:
Electronic calculator
Ruler (cm/mm)
Candidate's Plan (Part A of the Practical Examination)

Candidate Name	Centre Number	Candidate Number

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Write your name in the space above.
- Write your Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers in the spaces provided on the question paper.
- Read each question carefully before starting your answer.

INFORMATION FOR CANDIDATES

- In this Practical Test, you will be assessed on the Experimental and Investigative Skills:
  Skill I: Implementing
  Skill A: Analysing evidence and drawing conclusions
  Skill E: Evaluating
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
Planning	**16**	
1	**30**	
2	**14**	
TOTAL	**60**	

This question paper consists of 9 printed pages, 2 blank pages, a Report Form and an insert.

SP (SC) S60341/7

Registered Charity Number: 1066969
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Answer **all** the questions.

Question 1 [65 minutes]

The purpose of this investigation is to determine the glucose concentration of a fluid.

Glucose can decolourise a pink solution of potassium manganate(VII). Using known concentrations of glucose, you are to time how long it takes for the pink colour of potassium manganate(VII) to disappear and use the results to draw a calibration curve.

The glucose concentration of a fluid resembling urine is then to be determined using the calibration curve.

Proceed as follows:

1. You are provided with five-test tubes labelled **A** to **E**. Using the distilled water, the 10% glucose solution and the 10cm^3 syringes provided, make up the five different glucose concentrations as shown in the table below.

tubes	volume of distilled water / cm^3	volume of 10% glucose solution / cm^3	concentration of glucose / %
A	8	2	2
B	6	4	4
C	4	6	6
D	2	8	8
E	0	10	10

2. Using another 10 cm^3 syringe, add 5 cm^3 of 1 M sulphuric acid to tube **A**.

   1 M sulphuric acid is an IRRITANT. Goggles must be worn and care exercised when handling it. Wash off any splashes immediately with cold water.

3. Using a clean syringe, add 2 cm^3 of the potassium manganate(VII) solution to tube **A**. Mix the solutions using a glass rod and start the stopwatch.

4. Record the time taken for the potassium manganate(VII) solution to become decolourised.

   Ignore any pink layer that may remain at the surface.

5. Repeat steps 2 to 4 with each of the remaining tubes **B** to **E**.

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(a) Record your results in a suitable form in the space below.

(b) Plot a graph of your results on the page opposite.

(c) Describe the pattern of results shown by your graph **and** suggest a reason for the trend.

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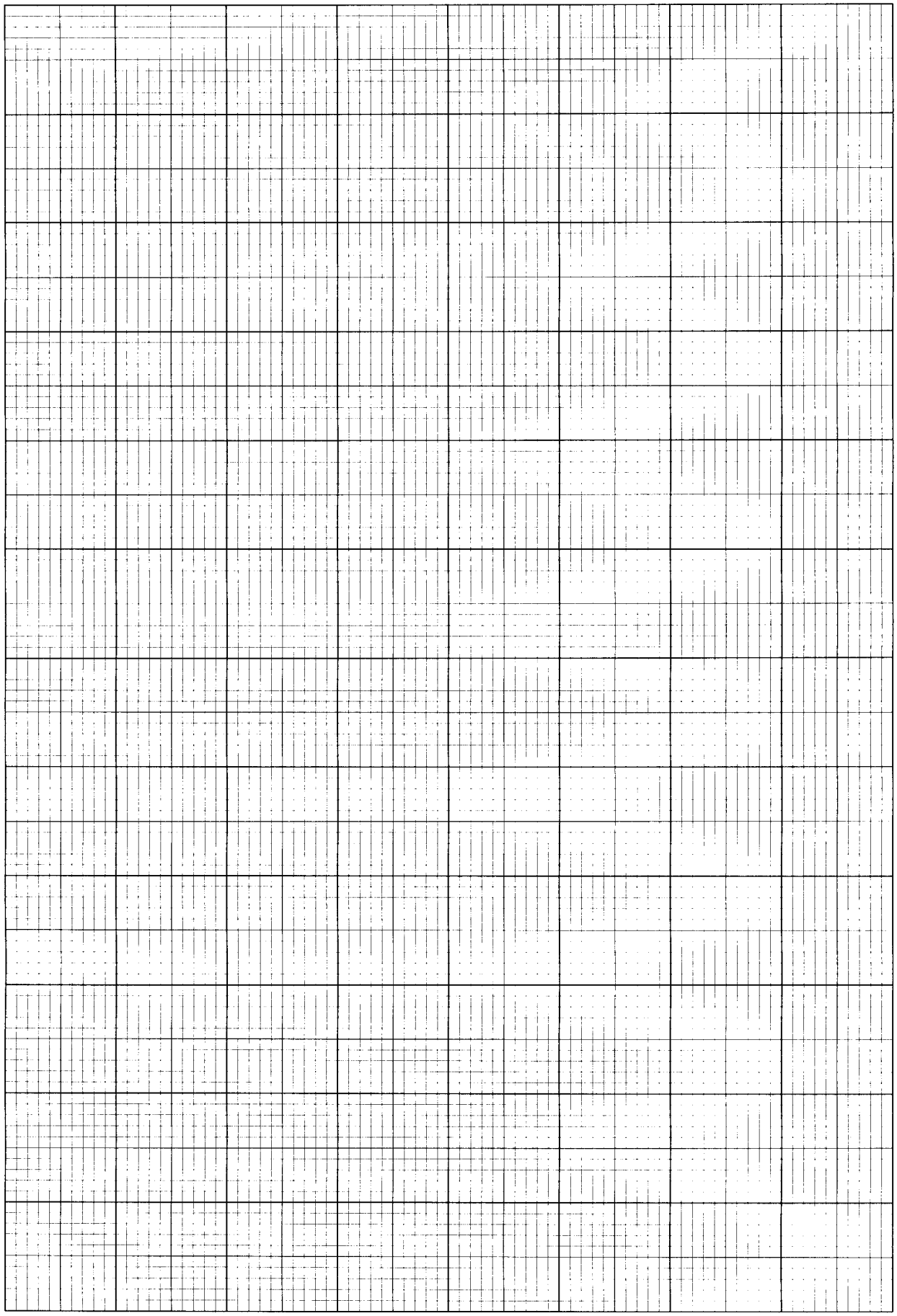

(d) Using the above technique and the calibration curve you have drawn, determine the glucose concentration of the 'urine' sample labelled **U**.

Record your result below and use it to find out the glucose concentration of the sample.

Glucose concentration .....%

(e) Urine which consistently contains glucose might have come from an individual with diabetes.

Explain why glucose is present in the urine of people with diabetes.

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A student determined the glucose concentrations of a range of solutions using an alternative method. The method and results are shown below.

- Excess Benedict's reagent was added to 10 cm^3 of glucose solution of known concentration.
- The mixture was placed in a boiling water bath for exactly ten minutes and then cooled.
- The precipitate formed on boiling the Benedict's and glucose solutions was collected by filtering the mixture through filter paper of known mass.
- The filter paper and residue was placed in a drying oven for 5 minutes, removed and weighed.

glucose conc/%	mass of filter paper/g	mass of filter paper plus residue/g	difference in mass/g
0	0.84	1.16	0.32
2	0.80	1.15	0.35
4	0.85	1.22	0.37
6	0.85	1.25	0.40
8	0.81	1.20	0.39
10	0.85	1.29	0.44

Evaluation exercise.

(f) Identify any anomalies in the student's results **and** suggest reasons for them.

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For Examiner's Use

(g) Discuss the **advantages** and **disadvantages** of both the method used by the student and the procedure that you have just carried out.

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[Total: 30]

Question 2 [25 minutes]

The glucose concentration of the blood is monitored and maintained by the opposing effects of protein hormones produced by the α cells and β cells of the islets of Langerhans.

(a) A limitation of the light microscope is that it has a relatively poor resolution. A good light microscope has a resolution of 250 nm.

Name **two** organelles associated with protein synthesis that you might observe in the cytoplasm of α and β cells using an **electron microscope** with a resolution of 2 nm.

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(b) Fig. 2.1 is provided for you on an insert. It is a photograph taken with a light microscope of a section of a **diseased** islet of Langerhans.

Calculate the actual maximum diameter of the islet. Show your working in the space below and give your answer in micrometres (μm).

Actual size .....μm

(c) Slide **S** is a section of a **healthy** pancreas showing islets of Langerhans.

Observe the islets using the low power and the high power of your microscope.

Describe the appearance of the islets on slide **S**.

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(d) In some people, a viral infection triggers a disease in which T lymphocytes attack the cells of the islets of Langerhans. As a result, they stop secreting insulin. Fig 2.1, provided as an insert, shows T lymphocytes invading the islets of Langerhans.

(i) Describe how the appearance of the islet in Fig 2.1 differs from that of the islets on slide **S**.

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(ii) Describe how T lymphocytes, as shown in Fig 2.1, attack cells infected by viruses.

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(iii) State precisely which cells are being destroyed. Explain your answer.

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[Total: 14]

END OF QUESTION PAPER

REPORT FORM

The teacher responsible for the supervision of the Practical Test is asked to report on the following:

(a) Any particular difficulties encountered in making preparations for the Practical Test.

(b) Whether it was necessary to make any substitutions for the materials listed in the Instructions. Submit a copy of the results obtained by a teacher or technician, using the substituted materials, on top of the candidates' scripts.

(c) Any difficulties experienced by the candidate due to deficient materials or faulty apparatus. If so, give brief details, **including the candidate's name and number**.

(d) Any assistance given to the candidate with respect to colour blindness or other physical handicap. If so, give brief details, **including the candidate's name and number**.

Other cases of hardship, for example illness or temporary disability, should be reported directly to OCR by the Examinations Officer, as a normal Application for Special Consideration.

Signed .....

Information that applies to **all** candidates need be given on the first candidate's answer book **only**.

OCR

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INSERT

Tuesday **27 JANUARY 2004** Morning 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

This insert contains Fig. 2.1.

This question paper consists of 2 printed pages.

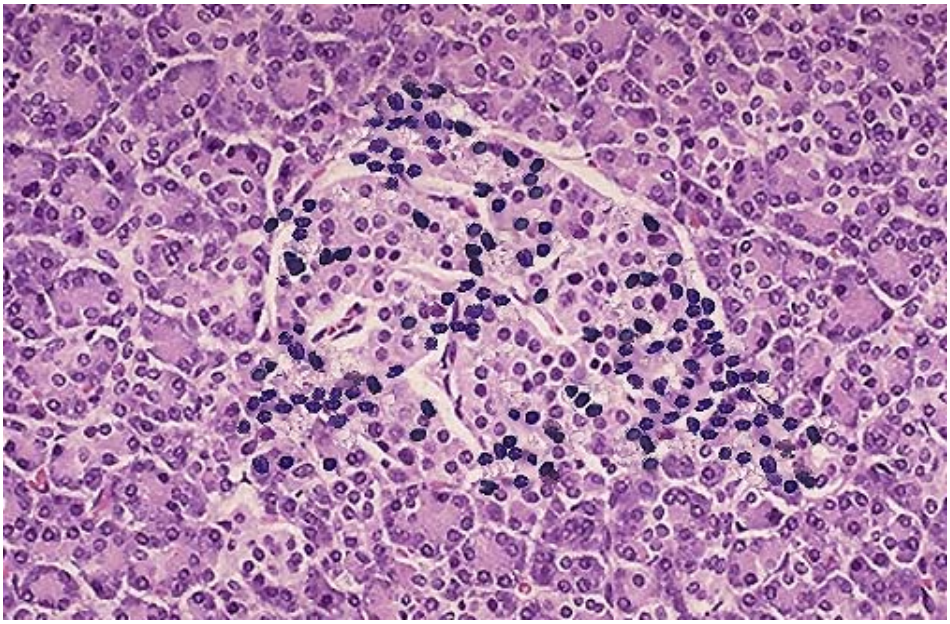

Fig. 2.1

An islet of Langerhans from a patient with insulitis. x400