Please check the examination details below before entering your candidate information

| Candidate surname | Other names |
|---|---|

Centre Number | Candidate Number

# Pearson Edexcel International Advanced Level

## Monday 19 January 2026

Morning (Time: 1 hour 20 minutes)

Paper reference **WBI13/01**

# Biology

## International Advanced Subsidiary/Advanced Level
## UNIT 3: Practical Skills in Biology I

**You must have:**
Scientific calculator, ruler, HB pencil

Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

### Information

- The total mark for this paper is 50.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

*Turn over* ▶

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**Answer ALL questions.**

**Write your answers in the spaces provided.**

**1** (a) The blue lotus is a freshwater plant found in lakes and rivers in East Africa.

The photograph shows a fruit and seeds of this plant.



(Source: ©YesinK/Shutterstock)

This fruit has been used in traditional medicine.

The antibacterial properties of an extract of the seeds were investigated.

The extract was made using ethanol.

The flow chart shows the steps taken:

Bacteria were added to a Petri dish, containing nutrient agar, to make a lawn

↓

An extract of some seeds was made using ethanol

↓

Filter paper discs were soaked in different concentrations of the extract or a known antibiotic

↓

The discs were left for the ethanol to evaporate

↓

The discs were placed on the bacterial lawn

↓

The dishes were incubated at 37° C for 24 hours

↓

The diameters of the clear areas (zones of inhibition) that developed were recorded

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(i) Describe how to make a clear solution, of known concentration, using powdered seeds.

**(3)**

(ii) Describe how bacteria could have been added to the nutrient agar to produce a lawn.

**(3)**

(iii) Explain why an incubation temperature of 37 °C was used in this investigation.

**(2)**

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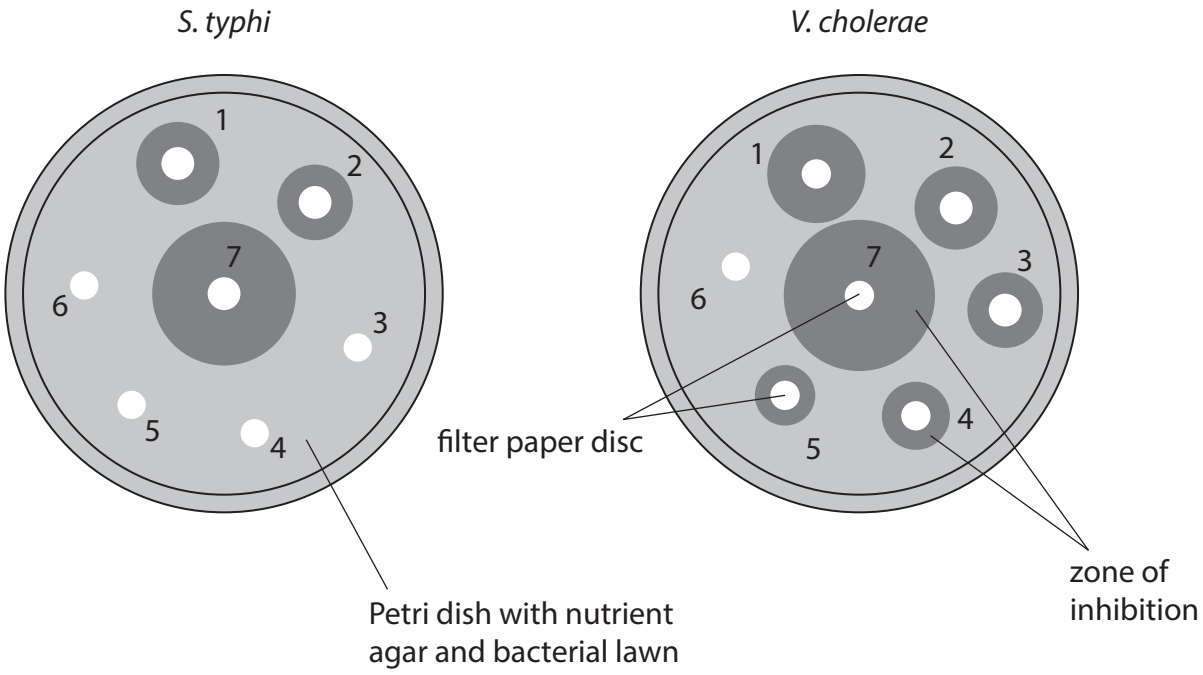
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(b) The diagram shows results for two types of pathogenic bacteria, *S. typhi*, which causes typhoid fever, and *V. cholerae*, which causes cholera.




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(i) Complete the table to show the results for **disc 1** and **disc 2**.

**(1)**

| Disc | Concentration of extract / $\mu g\,cm^{-3}$ | Diameter of zone of inhibition / mm | |
|---|---|---|---|
| | | *S. typhi* | *V. cholerae* |
| 1 | 1000 | ..... | 13 |
| 2 | 500 | ..... | 11 |
| 3 | 250 | 0 | 10 |
| 4 | 125 | 0 | 9 |
| 5 | 63 | 0 | 8 |
| 6 | 0 | 0 | 0 |
| 7 | known antibiotic | 19 | 20 |

(ii) Suggest how disc 6 was prepared for use in this investigation.

**(1)**

.....

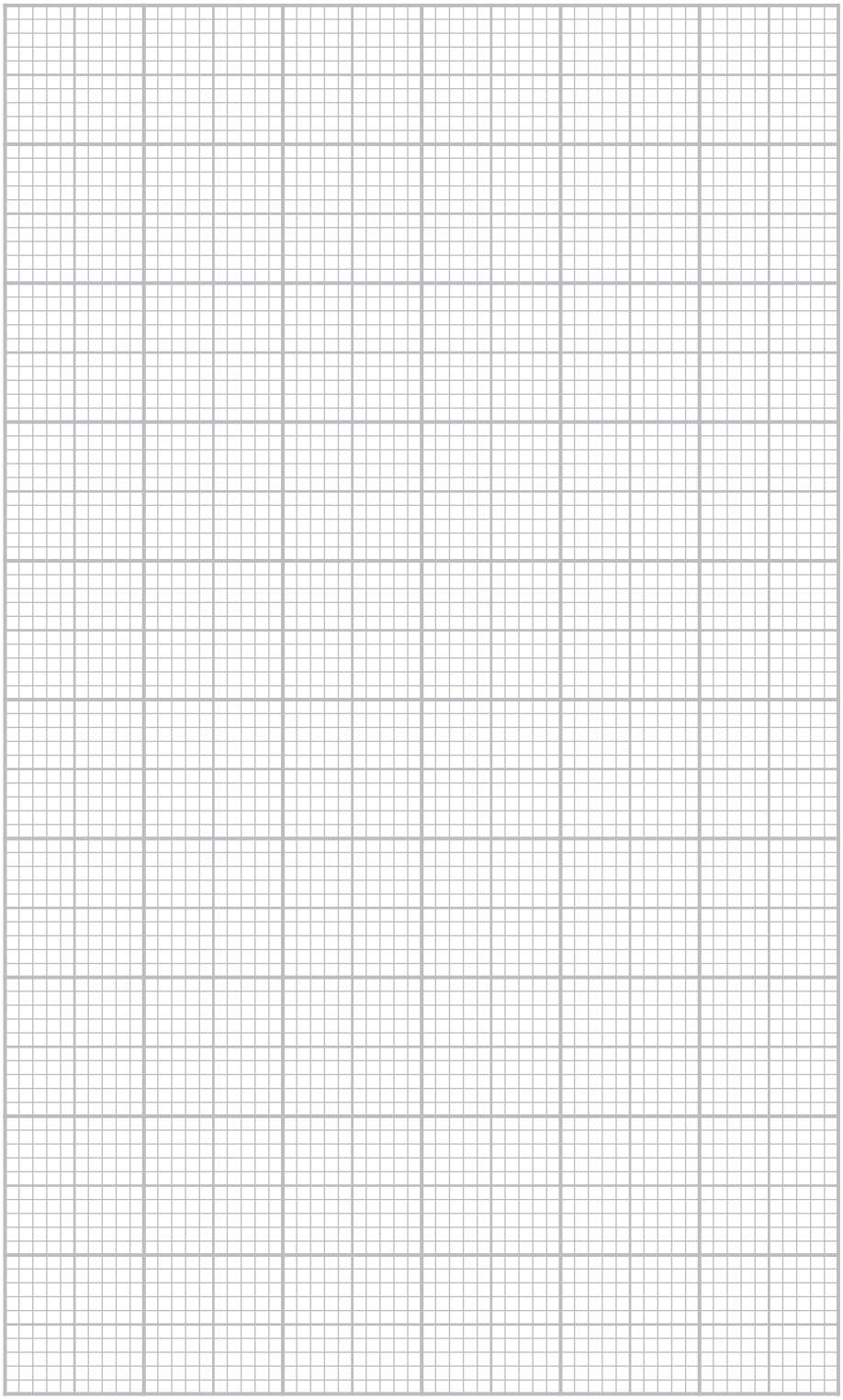
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(iii) Plot a suitable graph of the data for discs 1 to 6 for *V. cholerae*.

Join the points with straight lines.

**(4)**



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(iv) Describe **three** conclusions about the effectiveness of this extract.

Use the results in the table to support your answer.

**(3)**

1 .....

.....

.....

2 .....

.....

.....

3 .....

.....

.....

**(Total for Question 1 = 17 marks)**

**2** A study found that many adults consumed an unhealthy takeaway meal every day.

The photograph shows a typical takeaway meal consisting of a burger with cheese in a bread bun, fries and a sugar-free soft drink.



(Source: © Markus Mainka/Shutterstock)

(a) A student decided to investigate the carbohydrate, protein and fat composition of a takeaway meal.

The meal was liquidised in a blender. The mixture produced was filtered and the filtrate was tested for the presence of carbohydrates, proteins and fats.

(i) Complete the table to show a suitable semi-quantitative test for each food type.

**(3)**

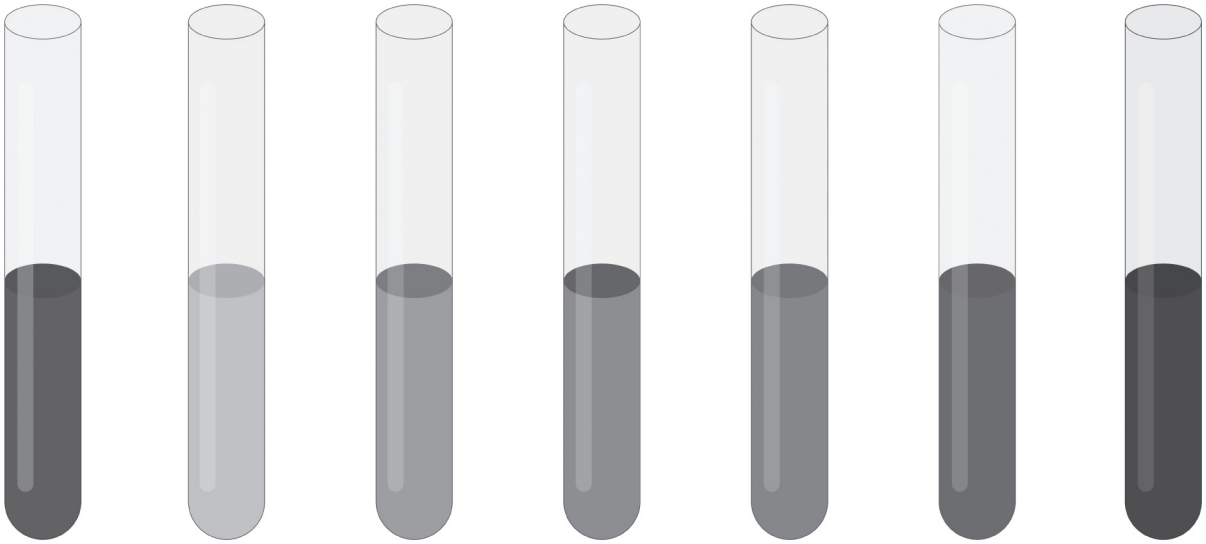
| Food type | Food test |
|---|---|
| Fats | Emulsion test |
| Reducing sugars | ..... |
| Starch | ..... |
| Protein | ..... |

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(ii) A protein test was performed on a sample of the filtrate and the result compared with colour standards.

The diagram shows the results for the filtrate and standard solutions of proteins.




(Source: © A StepBioMed/Shutterstock)

Estimate the concentration of protein in the filtrate.

**(1)**

.....

(iii) The total volume of the filtrate was 350 cm$^3$.

Calculate the mass of protein in the filtrate.

Give your answer in grams.

**(2)**

Answer ..... g

(iv) Describe the difference between a quantitative and a semi-quantitative test.

**(2)**

(b) The concentration of reducing sugar in the filtrate, in g $dm^{-3}$, was found.

The table shows the appearance of standard solutions of reducing sugar when tested.

| Appearance | Concentration of reducing sugar / g $dm^{-3}$ |
|---|---|
| Blue | 0.0 |
| Green with no visible precipitate | 1.5 |
| Green with precipitate | 5.0 |
| Yellow with precipitate | 12.0 |
| Orange with precipitate | 16.0 |
| Red with precipitate | 23.0 |

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The mass of reducing sugar in the 350 $cm^3$ of filtrate was 5.6 g.

(i) State the appearance of this filtrate when tested for reducing sugar.

Use the information in the table.

**(1)**

.....

(ii) The filtrate was found to contain 36 g of carbohydrate; 5.6 g of this was reducing sugar.

Give **one** reason why the mass of the reducing sugar is different from the mass of carbohydrate.

**(1)**

.....

.....

.....

(iii) Resistant starch is a form of starch that is difficult to break down.

Resistant starch is found in potatoes.

In an investigation, the effect of:

- the variety of potato
- the cooking method used (baked or fried)
- the temperature after cooking (hot or cold)

on the mass of resistant starch present was determined.

The table on the next page shows the results of this investigation.

| Variety of potato | Mass of resistant starch in 100 g of potato after cooking / g | | | |
|---|---|---|---|---|
| | Baked | | Fried | |
| | Hot | Cold | Hot | Cold |
| Red Norland | 3.8 ± 0.6 | 4.8 ± 0.7 | 2.5 ± 0.6 | 3.1 ± 0.2 |
| Russet Burbank | 3.5 ± 0.2 | 4.7 ± 0.5 | 2.6 ± 0.4 | 3.8 ± 0.2 |
| Yukon Gold | 3.5 ± 0.4 | 5.4 ± 0.5 | 2.3 ± 0.8 | 3.9 ± 0.3 |

Justify **two** conclusions that can be made from the results shown in this table.

**(4)**

Conclusion 1

Justification

Conclusion 2

Justification

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(c) Fats contain triglyceride molecules, made up of several component molecules.

(i) Describe how a triglyceride molecule is made from its component molecules.

**(3)**

(ii) Give **one** difference between a saturated and an unsaturated fat.

**(1)**

**(Total for Question 2 = 18 marks)**

**3** Savinase is an enzyme used in biological washing powders.

This enzyme digests protein-based stains on clothing.

An extract from an information sheet about savinase said:

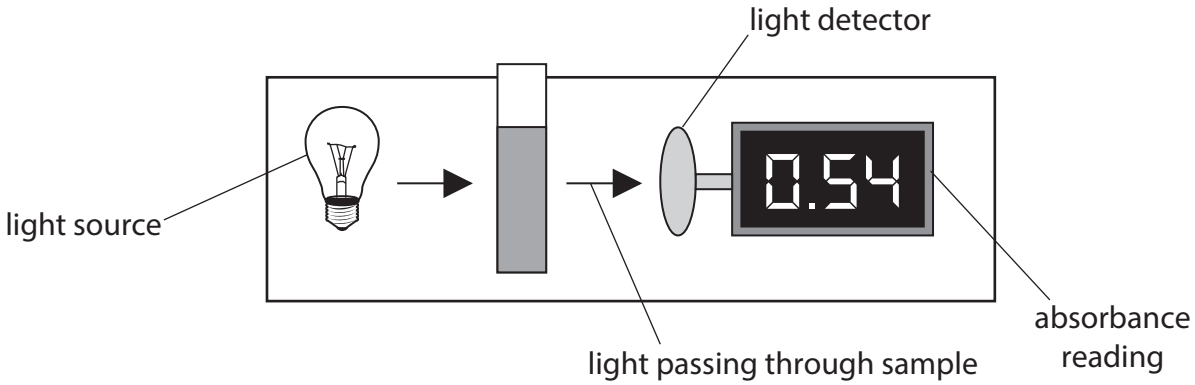
> *Savinase is effective under most alkaline conditions and is very effective at medium temperatures, its optimal activity is at 55 °C.*
>
> *Savinase can produce blisters on the skin.*

The progress of protein digestion can be followed using a colorimeter to measure the cloudiness of a protein solution.

As the insoluble protein is digested, the cloudiness measured as absorbance decreases.

Absorbance is zero when all the protein has been digested.

The diagram shows a colorimeter.




(a) Explain why the digestion of protein by savinase produces a clear solution in the colorimeter.

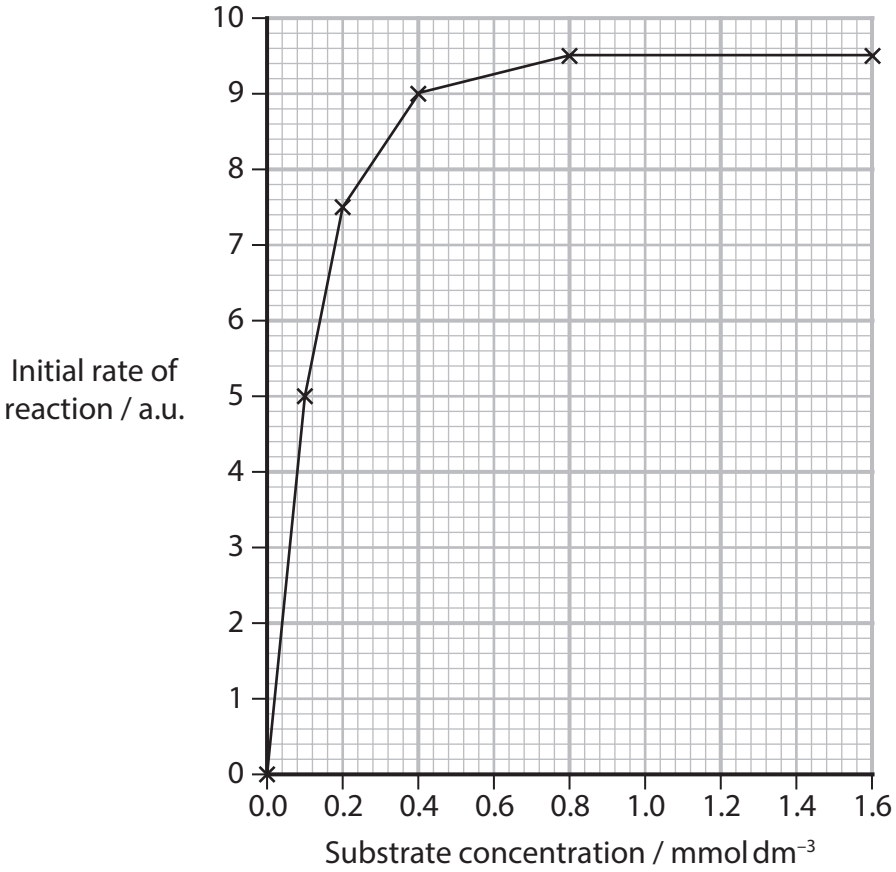
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(b) The graph shows the effect of substrate concentration on the initial rate of reaction with savinase.

The concentration of savinase used in the investigation was 0.1 mmol $dm^{-3}$.




(i) Draw a table to show these results.

**(3)**

(ii) Explain why the initial rate of reaction was measured in this investigation.

**(2)**

(iii) Explain the relationship shown in this graph.

**(3)**

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(c) Devise a procedure to show that the optimum temperature for savinase is 55 °C.

You are provided with:

- 1.0 mmol $dm^{-3}$ savinase solution
- 1.0 mmol $dm^{-3}$ of protein solution
- a colorimeter
- standard laboratory equipment and chemicals.

**(5)**

**(Total for Question 3 = 15 marks)**

**TOTAL FOR PAPER = 50 MARKS**

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