GradeMax

Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International Advanced Level

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.*
- **Show all your working out** in calculations and **include units** where appropriate.

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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Pearson

Answer ALL questions.

Write your answers in the spaces provided.

1 The photograph shows an Arencho plant (*Caylusea abyssinica*) that grows in East Africa.
Boiled leaves of Arencho are used as a traditional medicine. Extracts of this plant show antimicrobial properties.



(Source: © ChWeiss/Shutterstock)

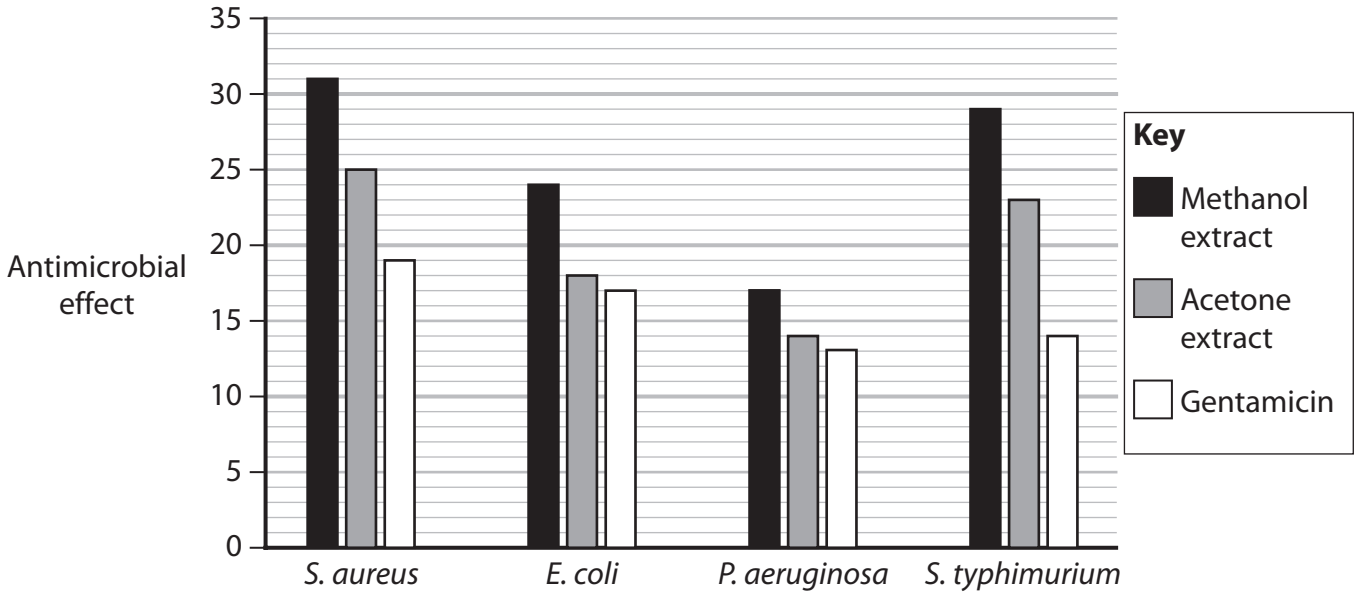
(a) In an investigation, roots of *Caylusea abyssinica* were dried and powdered.

Extracts were made using two solvents: methanol and acetone.

The powdered root was shaken with each solvent and then filtered to produce the extracts.

These extracts were used to measure the antimicrobial properties on four types of bacteria. The antimicrobial properties of the antibiotic gentamicin were also measured.

The graph shows data from this investigation.



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(i) State a suitable dependent variable with units for this investigation.

(2)

Dependent variable

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Units

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(ii) Describe a safe method, that uses your dependent variable, to obtain the results shown in the graph.

(5)

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(iii) Calculate the percentage difference in the effects of the methanol extract and gentamicin on *S. typhimurium*.

Give your answer to **two** significant figures.

(2)

Answer ..... %

(iv) Comment on the antimicrobial effect of extracts of the Arencho plant.

(4)

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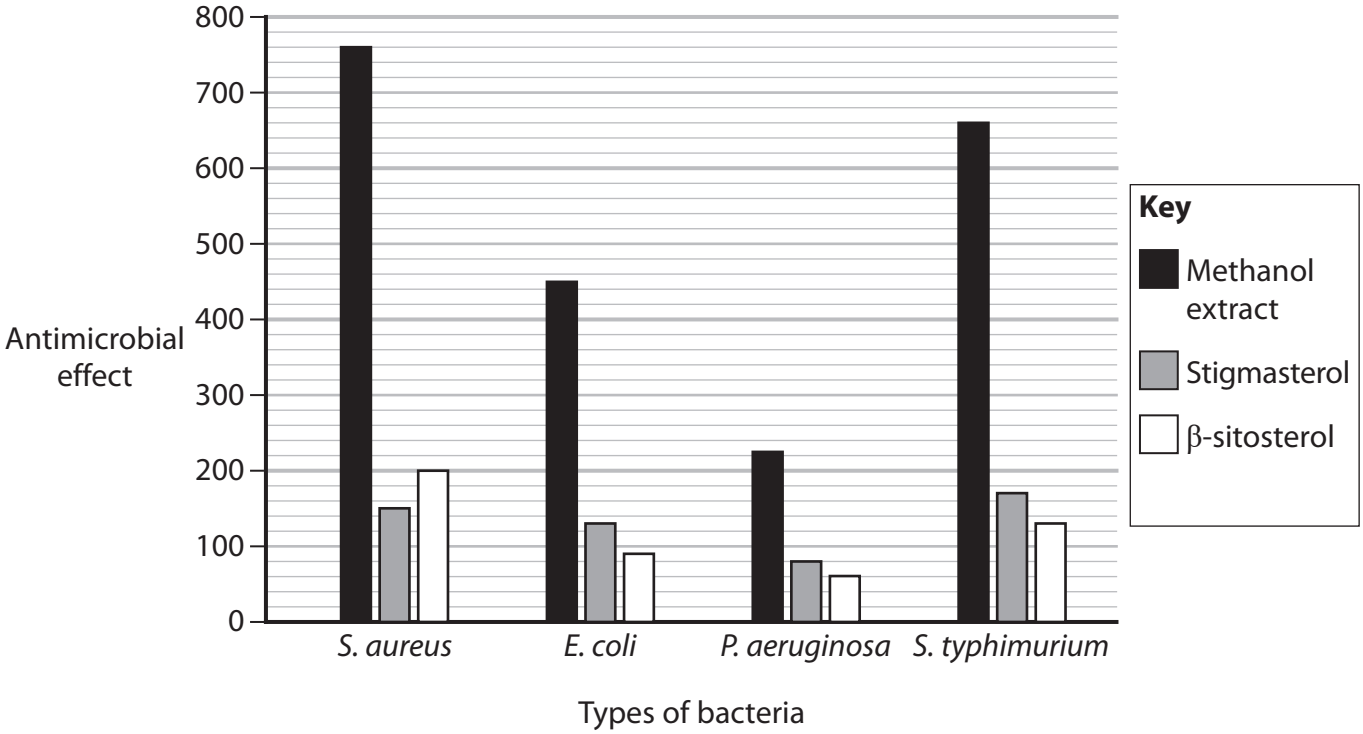
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(b) In a further study, the chemicals β-sitosterol and stigmasterol were purified from the methanol extract. The antimicrobial properties of these chemicals were measured using a different method.

The graph shows the results of this study.



Discuss the effects of these two chemicals compared with the methanol extract.

(4)

(c) Plant extracts can be used to make new drugs for the treatment of infections. In trials to test these drugs, placebos and double-blind trials are used.

Explain the purpose of each of these.

(3)

placebos

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double-blind trials

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(Total for Question 1 = 20 marks)

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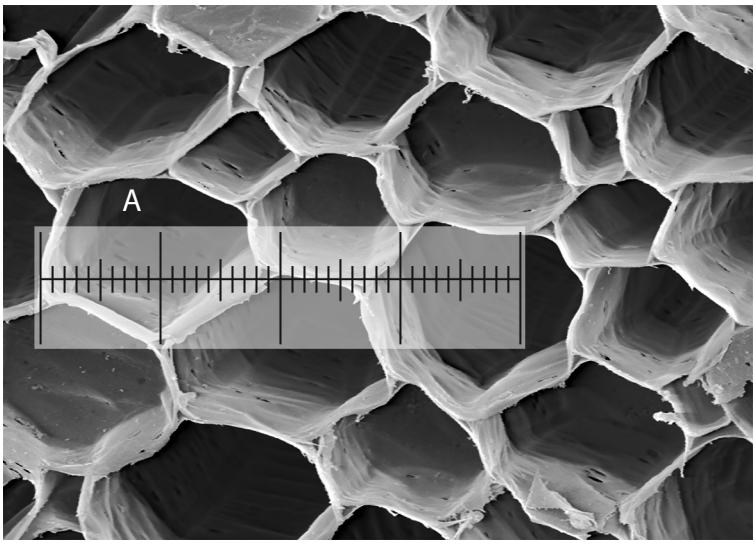
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2 Fibres from the stems of hemp plants are widely used in industry for their great tensile strength.

The relationship between tensile strength and fibre diameter was investigated.

The photograph shows a cross section of a part of a hemp fibre and an eyepiece graticule. The fibre bundle is made up of pith cells, some of which are shown here.



(Source: © Ted Kinsman/SCIENCE PHOTO LIBRARY)

(a) (i) Each of the smallest units on the graticule is 3×10^{-6} m.

Calculate the width of the pith cell labeled A in micrometres (μm).

(2)

Answer ..... μm

(ii) Name the **two** types of tissue found in fibres from plant stems.

(2)

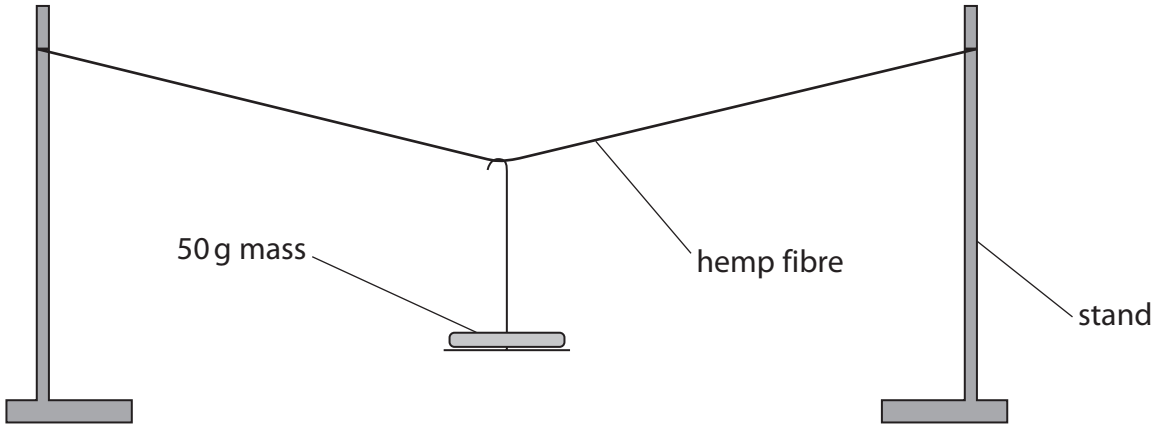
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(b) The diagram shows apparatus that was used in an investigation to find the tensile strength of hemp fibres.



(i) Describe how you could use this apparatus to make a valid comparison of the tensile strength of fibres with different diameters.

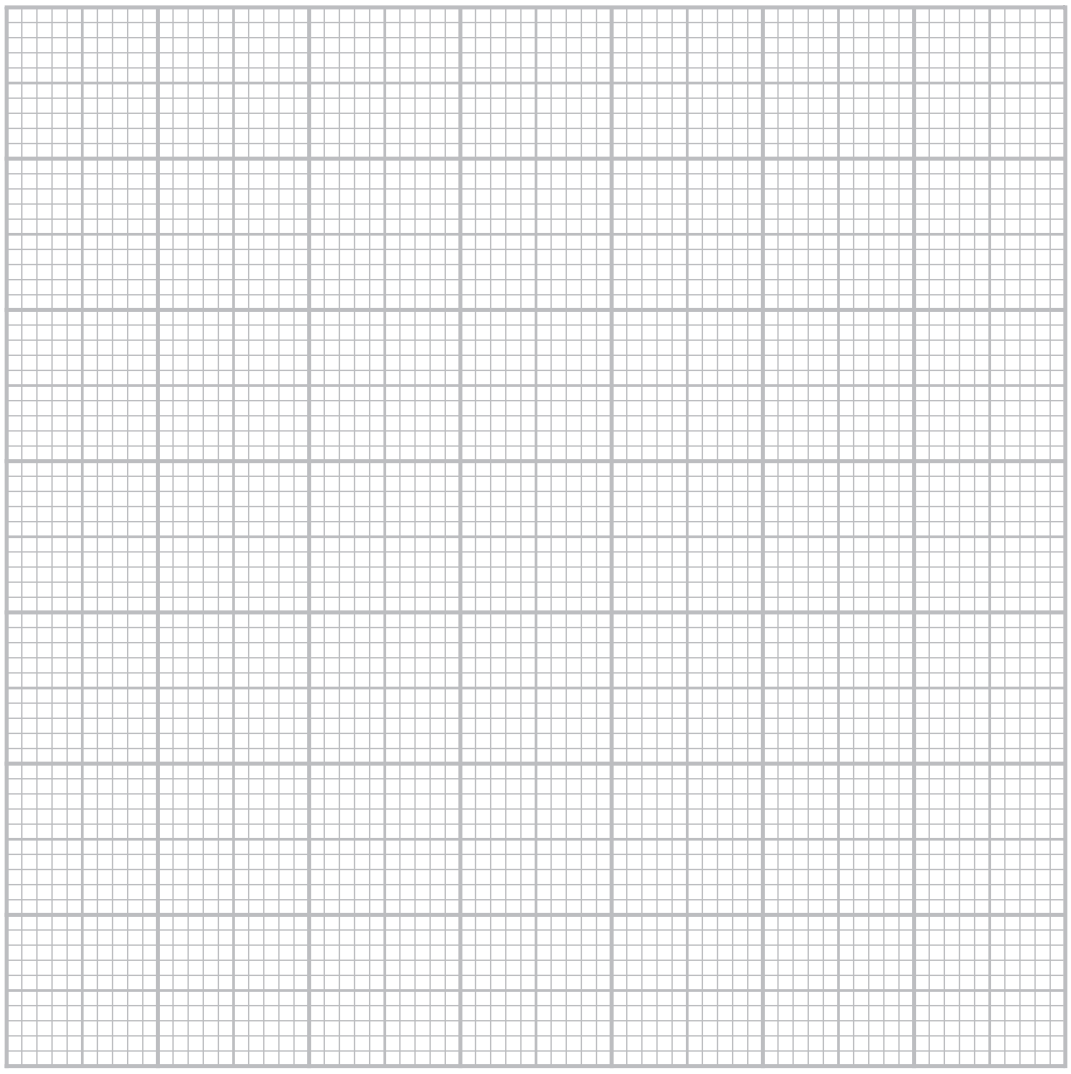
(4)

(ii) Some results from this investigation are shown in the table.

Diameter / μm	Tensile strength / MPa
21	1280
25	830
40	610
43	580
60	390
81	190
84	180

Plot a suitable graph of these results. Join the points with straight lines.

(4)



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(iii) Describe the relationship between the diameter and the tensile strength of these fibres.

(3)

(Total for Question 2 = 15 marks)

3 A student investigated the water potential of carrots.

Six cylinders were cut from a single carrot. One cylinder was placed in distilled water and the others were placed in solutions of different concentrations of sucrose.

The length of each cylinder was measured using a ruler every 5 minutes for the next 50 minutes.

(a) (i) Suggest how the method can be modified to increase validity.

(1)

(ii) Suggest how the method could be modified to reduce measurement errors.

(1)

(b) (i) Explain how a 0.4 mol dm^{-3} solution could be made from a 1.0 mol dm^{-3} sucrose solution.

(2)

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(ii) Suggest **two** properties of sucrose that make it suitable for use in this investigation.

(2)

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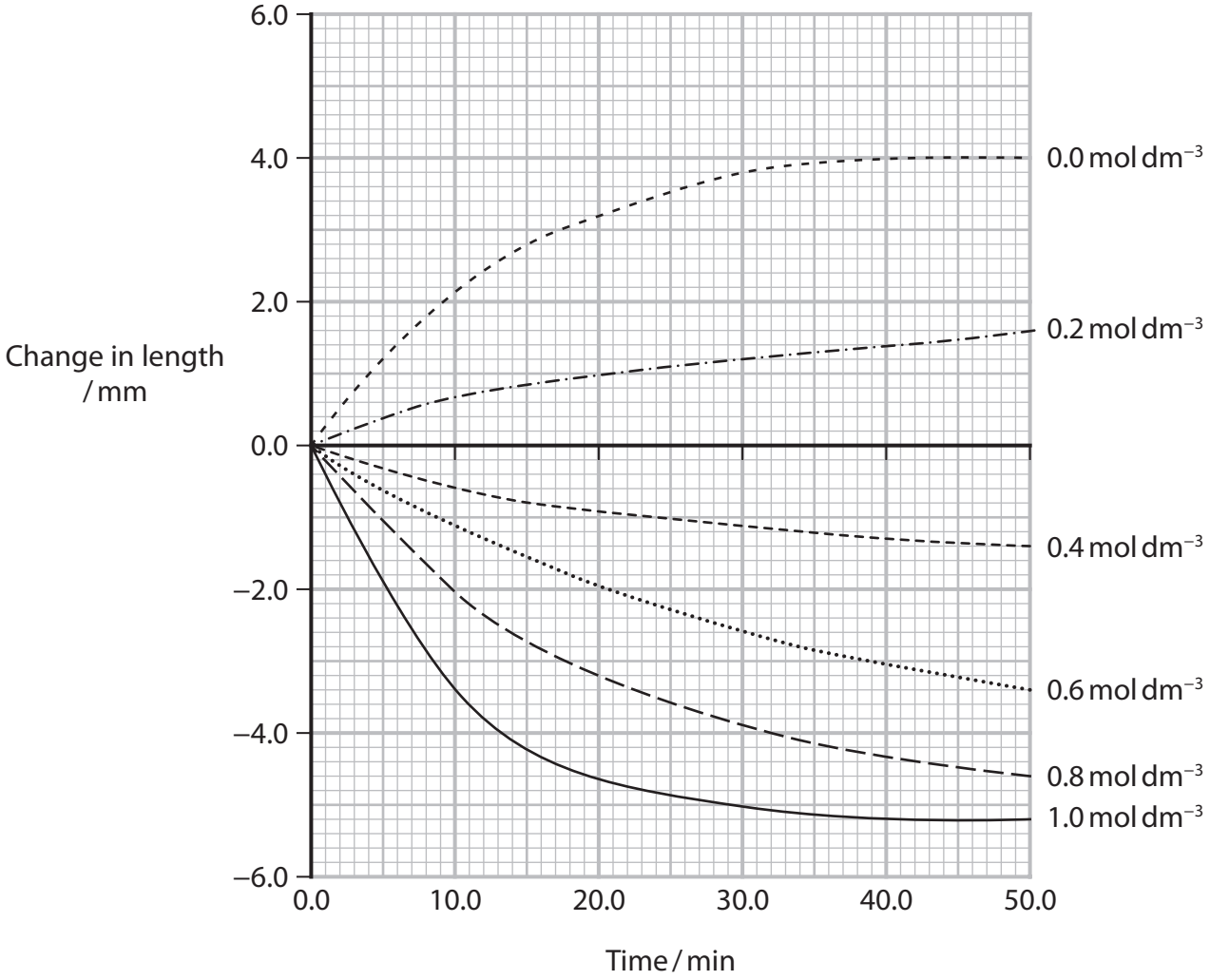
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(c) The graph shows the results of this investigation.



(i) Draw a table to show the results at 50 minutes for all six concentrations.

(3)

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(ii) Calculate the rate of change in length of the carrot cylinder in a 1.0 mol dm^{-3} solution at 15 minutes.

(2)

Answer ..... mm min^{-1}

(iii) Explain the results between 40 and 50 minutes for the 1.0 mol dm^{-3} solution.

(2)

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(iv) Explain the results between 40 and 50 minutes for the 0.0 mol dm^{-3} solution.

(2)

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(Total for Question 3 = 15 marks)

TOTAL FOR PAPER = 50 MARKS

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