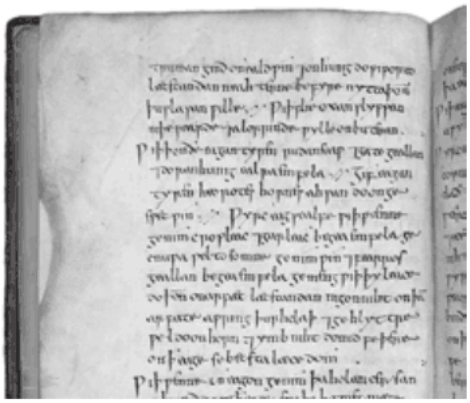
Antimicrobial Properties of Plants (Core Practical 9): Edexcel SNAB A Level Biology Exam Questions

14 questions · 40 marks · about 48 minutes. Answer in the spaces, then check the mark schemes at the end.

Question 1 · AS Paper 2 · June 2016 · Q4(a) · 2 marks

4 Bald's Leechbook was written in the 9th Century. This book contains details of medical treatments used over 1000 years ago.

The recipe for a 'salve', used to treat infections, is shown in the photograph.



Scientists followed the recipe to make this salve and tested it in the laboratory.

They found that the salve was very effective against *Staphylococcus aureus*. This bacterium commonly causes infections in humans.

(a) Describe **two** aseptic techniques that should be used when working safely with bacteria.

(2)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 2 · AS Paper 2 · June 2019 · Q7(a) · 3 marks

7 Sterile nutrient agar is a medium used for growing microbes.

(a) Describe how aseptic techniques are used when handling bacterial cultures.

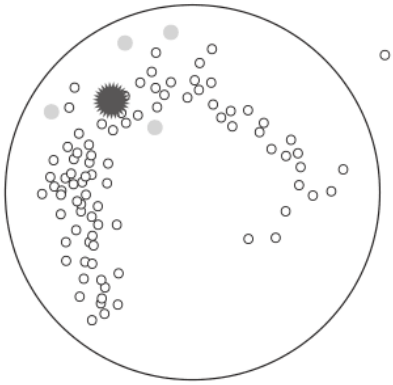
(3)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 3 · AS Paper 2 · June 2019 · Q7(b)(i) · 2 marks

(b) The diagram shows an agar plate after inoculation with a single bacterial culture. This plate was incubated at 25 °C.

The aseptic technique was not successful.



○ = colony from original bacterial culture

(i) Explain how the appearance of the plate shows that the aseptic technique was not successful.

(2)

Question 4 · AS Paper 2 · June 2019 · Q7(b)(ii) · 2 marks

(ii) Explain why the agar plate was incubated at 25 °C.

(2)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 5 · A level Paper 3 · June 2024 · Q2(b) · 3 marks

(b) The bacteria used in this investigation are pathogenic.

Describe how filter paper discs containing licochalcone A can be safely placed on the bacterial lawn.

(3)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 6 · A level Paper 1 · June 2019 · Q7(b) · 4 marks

(b) The effects of these plant extracts were tested on pathogenic bacteria. It was found that each extract had an effect on its own, but the effect was greater when used together.

Devise a procedure that scientists may have used to measure the effects of these extracts on pathogenic bacteria.

(4)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

6 Plants have been used as sources of medicine for thousands of years.

(a) The antimicrobial properties of a range of plant extracts were studied.

Extracts were produced by grinding plant material in water or ethanol.

The effectiveness of these extracts was tested against the bacteria *Staphylococcus aureus* grown in agar jelly in Petri dishes.

The table shows the results of this investigation.

Plant extract	Diameter of zone of inhibition / mm	
	Extract made with water	Extract made with ethanol
Cardamom	8.0	12.0
Cinnamon	6.0	10.0
Cloves	6.0	14.0
Cumin	6.0	11.5
Lemongrass	8.0	12.5

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 7 · AS Paper 2 · June 2023 · Q6(a)(ii) · 4 marks

(ii) Describe how valid results could have been obtained for this investigation.

(4)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

4 The photograph shows a plant called lantana (*Lantana camara*).



(Source: © Peter Vrabel/Alamy Stock Photo)

The leaves of lantana contain chemicals known to have antimicrobial properties.

The antimicrobial activity of lantana leaf extracts prepared using three different solvents, A, B and C, was compared.

Fresh lantana leaves were dried and powdered. The dried leaf material was mixed with the solvent and then the extract was purified and dried.

The mass of extract obtained from 5 g of powdered leaf, using each solvent, was measured.

Solvent used	Mean mass of extract ± SD / μg
A	501.3 ± 3.5
B	721.3 ± 1.5
C	245.6 ± 4.0

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

(b) The antimicrobial properties of the extracts produced using these solvents are shown in the table.

Solvent used to prepare extract	Dry mass of extract / μg	Bacteria tested	
		Klebsiella pneumoniae (Gram negative)	*Micrococcus luteus* (Gram positive)
		Mean diameter of the zone of inhibition / mm	
A	5.0	8.3	7.1
	10.0	10.5	7.0
B	5.0	14.5	12.2
	10.0	18.1	18.0

Question 8 · A level Paper 3 · June 2022 · Q4(b)(ii) · 4 marks

(ii) Devise a method that could be used to collect the data in the table.

(4)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

(b) The antimicrobial properties of the extracts produced using these solvents are shown in the table.

Solvent used to prepare extract	Dry mass of extract / μg	Bacteria tested	
		Klebsiella pneumoniae (Gram negative)	*Micrococcus luteus* (Gram positive)
		Mean diameter of the zone of inhibition / mm	
A	5.0	8.3	7.1
	10.0	10.5	7.0
B	5.0	14.5	12.2
	10.0	18.1	18.0

(i) Deduce the effect of using different solvents on the effectiveness of the extracts against these two bacteria.

(2)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 10 · AS Paper 2 · June 2018 · Q7(a)(i) · 2 marks

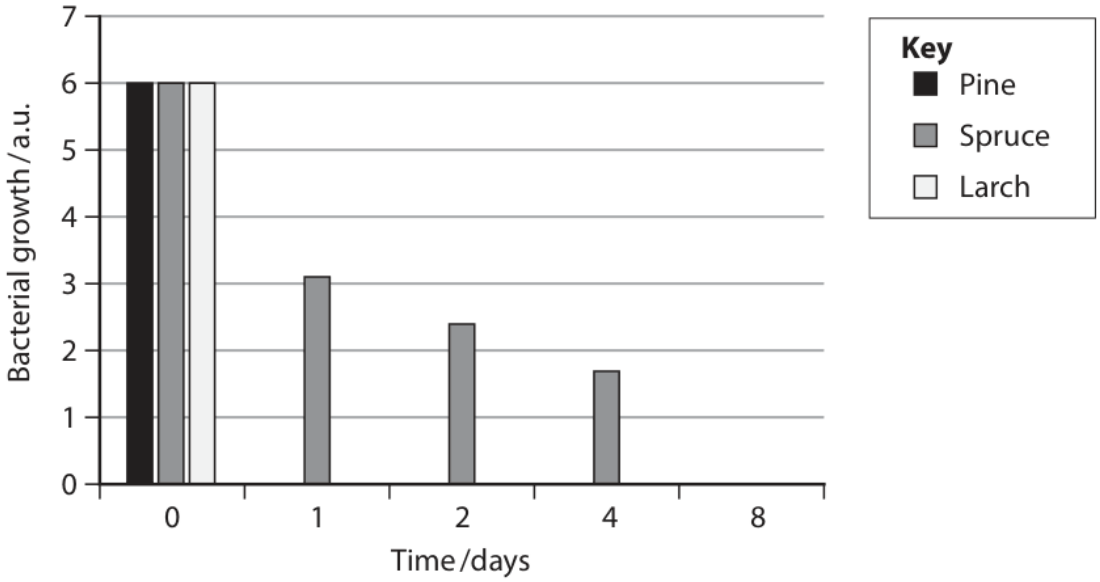
7 Many plants produce chemicals that have antimicrobial properties.

The suitability of using wood from three types of tree to make kitchen chopping boards was investigated.

In this investigation, 50 cm^3 of a bacterial culture was added to 100 g of wood chippings from each of three types of tree.

The growth of bacteria was measured at the start (Day 0), and then after 1, 2, 4 and 8 days.

The results are shown in the graph.



(a) (i) Describe the antimicrobial properties of these three types of wood.

(2)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 11 · information from earlier in the question

(c) Extracts from four different plants were added on separate small paper discs to agar plates containing *E. coli* bacteria.

After 48 hours, the zone of inhibition around each extract was measured.

Extract	Mean diameter of zone of inhibition / mm	Range
P	18.5	± 1.07
Q	23.5	± 0.97
R	22.2	± 0.58
S	22.9	± 1.28

Question 11 · AS Paper 2 · June 2019 · Q7(c)(ii) · 3 marks

(ii) Comment on the antimicrobial properties of these four plant extracts.

(3)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 12 · AS Paper 2 · June 2025 · Q8(b) · 3 marks

(b) Coffee beans are the seeds of the coffee plant.

The photograph shows seeds, leaves and fruits of the coffee plant.



(Source: © Subbotina Anna/Shutterstock)

In an investigation, extracts from different parts of the coffee plant were tested for antimicrobial properties.

Vibrio cholerae, a species of bacteria that causes the disease cholera, was used in this investigation.

The results of the investigation are shown in the table.

Extract from	Mean diameter of inhibition zone / mm ± SD
Seed	12.33 ± 0.58
Fruit	11.33 ± 4.04
Leaf	16.67 ± 1.15

Comment on the antimicrobial properties of the parts of the coffee plant tested.

(3)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

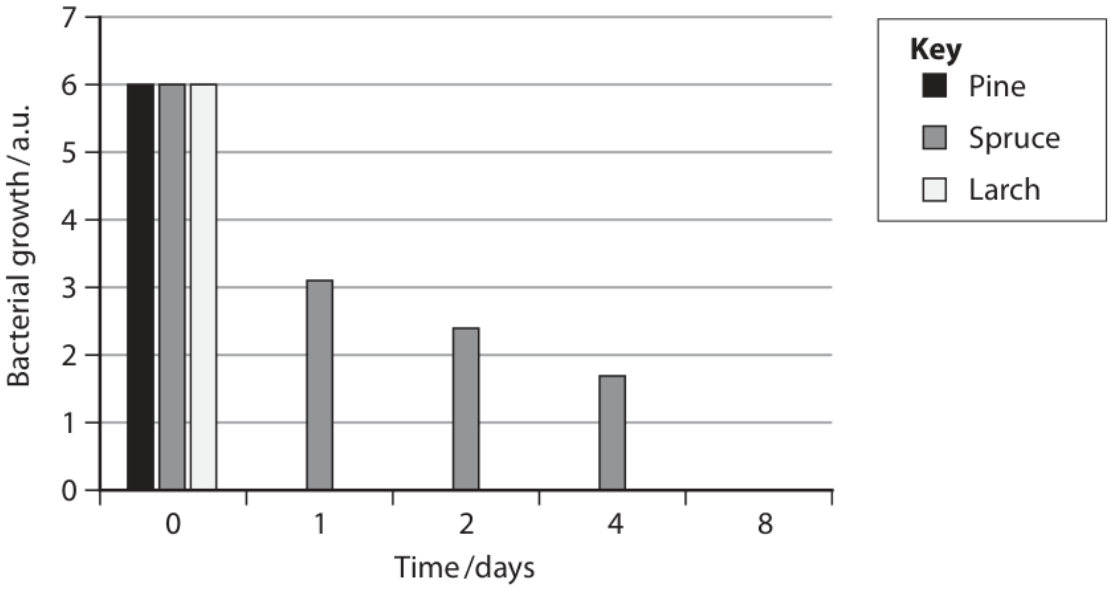
7 Many plants produce chemicals that have antimicrobial properties.

The suitability of using wood from three types of tree to make kitchen chopping boards was investigated.

In this investigation, 50 cm^3 of a bacterial culture was added to 100 g of wood chippings from each of three types of tree.

The growth of bacteria was measured at the start (Day 0), and then after 1, 2, 4 and 8 days.

The results are shown in the graph.



Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 13 · AS Paper 2 · June 2018 · Q7(a)(iii) · 4 marks

(iii) Explain how this investigation could be improved to provide additional data to determine whether pine or larch have greater antimicrobial properties.

(4)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

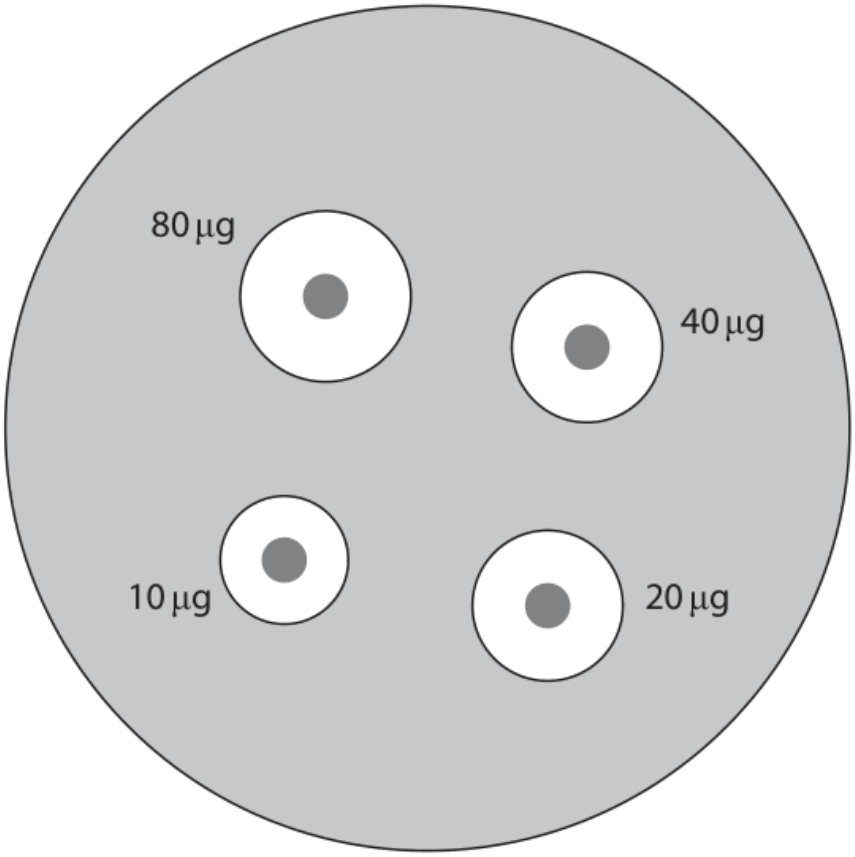
2 Pathogenic bacteria can become resistant to antibiotics.

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a bacterial pathogen that is resistant to many antibiotics.

Licochalcone A is a chemical isolated from the liquorice plant.

The antibacterial properties of licochalcone A have been investigated.

The diagram shows the effect of licochalcone A on a bacterial lawn prepared using MRSA.



Magnification ×1

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 14 · A level Paper 3 · June 2024 · Q2(c) · 2 marks

(c) Explain how an anomalous result could be identified for this investigation.

(2)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Mark schemes

Question 1 · AS Paper 2 · June 2016 · Q4(a) · 2 marks

Question Number	Answer
4(a)	A description that makes reference to the following: • one aseptic technique (1) • another aseptic technique (1)

Additional Guidance	Mark
e.g. boiling the culture medium before use { 'flaming' / disinfecting } of the instruments keeping lids off for the minimum time working in { updraught of a flame / a flow hood } disinfecting the bench (before or after working) autoclaving used plates IGNORE: 'sterilising' without a technique handwashing, gloves, etc reference to incubation temperature cross taping of plates	(2)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 2 · AS Paper 2 · June 2019 · Q7(a) · 3 marks

Question Number	Answer
7(a)	A description that makes reference to three of the following: • working near a Bunsen burner (to provide a convection current) (1) • sterilising work surfaces (1) • sterilising equipment with heat (1) • limiting time containers are open (1)

Additional Guidance	Mark
ALLOW using a laminar flow cabinet IGNORE Bunsen flame killing bacteria e.g. flaming of {forceps / bottle necks / inoculating loops} e.g. only partially lifting lids from Petri dishes	**(3)**

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 3 · AS Paper 2 · June 2019 · Q7(b)(i) · 2 marks

Question Number	Answer
7(b)(i)	An explanation that makes reference to the following: • colonies present with a different {shape / size / colour} (1) • therefore {belonging to different species / contaminants} (1)

Additional Guidance	Mark
e.g. presence of 'darker spots' ALLOW other {microorganisms /bacteria} present or annotation of diagram to indicate other colonies	(2)

Question 4 · AS Paper 2 · June 2019 · Q7(b)(ii) · 2 marks

Question Number	Answer
7(b)(ii)	An explanation that makes reference to the following: • to allow bacteria to multiply (1) • without encouraging pathogenic organisms (1)

Additional Guidance	Mark
ALLOW growth of bacteria	(2)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 5 · A level Paper 3 · June 2024 · Q2(b) · 3 marks

Question number	Answer
2(b)	A description that makes reference to three of the following: • wear gloves (that can be disposed of) (1) • after transfer of disk sterilise tweezers (1) • keep exposure of bacteria in Petri dish to environment to a minimum (1) • after transferring disks clean workspace (1)

Additional guidance	Mark
ALLOW wash hands after transferring the disk ALLOW description of method e.g. flaming of forceps e.g. only lift lid slightly / keep time lid is removed (from Petri dish) to a minimum ALLOW work in a containment cabinet	Choose an item. (3)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 6 · A level Paper 1 · June 2019 · Q7(b) · 4 marks

Question Number	Answer
7(b)	An answer that makes reference to four of the following: • description of production of agar plates with bacteria (1) • description of method used to add plant extract to plates (1) • extracts used separately and in combination (1) • incubate for at 37 °C for an appropriate period of time (1) • measure and compare the sizes of zones of inhibition (1)

Additional guidance	Mark
ALLOW plates { inoculated / seeded} with bacteria, production of bacterial lawn or streak plates e.g. on filter paper discs or in wells ALLOW time from 24 to 72h and a temperature from 35-38°C e.g. diameter or area ALLOW comparative statements such as the larger the area, the more effective the antimicrobial properties	**(4)**

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 7 · AS Paper 2 · June 2023 · Q6(a)(ii) · 4 marks

Question Number	Answer
6(a)(ii)	A description that makes reference to four of the following: • reference to aseptic technique (1) • bacterial culture controlled (1) • same size disc of paper / same size well in agar (1) • same mass of plant material / same volume of solvent used for each plant / same concentration of extract (1) • {same/stated} (incubation) temperature (1) • {same/stated} time allowed (to incubate) (1)

Additional guidance	Mark
ALLOW method described to prevent contamination of plate e.g. volume of culture added / method of inoculating plates / species of bacteria ALLOW same volume water / ethanol e.g. 25-40°C e.g. 24 – 48 hours , no more than 1 week	(4)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 8 · A level Paper 3 · June 2022 · Q4(b)(ii) · 4 marks

Question number	Answer
4(b)(ii)	An answer that makes reference to the following: • prepare an agar plate with a bacterial lawn (1) • description of how extract can be added to the (agar plate) (1) • incubate at a stated temperature between 20 °C and 37 °C (1) • measure the diameter of the zones of inhibition after a (suitable) stated time (1)

Additional guidance	Mark
ALLOW adding bacteria to agar / seeding agar plate with bacteria e.g. added to wells / on paper disks IGNORE at room temperature ALLOW time periods between 1 day and 1 week ALLOW calculate diameter	(4)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 9 · A level Paper 3 · June 2022 · Q4(b)(i) · 2 marks

Question number	Answer
4(b)(i)	An answer that makes reference to the following: • solvent B (extract) has greatest (antimicrobial) activity / solvent A (extract) has the least (antimicrobial) activity (1) • {Gram negative bacteria / *Klebsiella*} are more sensitive (to both the solvent extracts) (1)

Additional guidance	Mark
ALLOW solvent B {is more effective / increases the effectiveness} solvent A {is less effective / reduces the effectiveness} ALLOW both extracts more effective against {Gram negative bacteria / *Klebsiella*}	(2)

Question 10 · AS Paper 2 · June 2018 · Q7(a)(i) · 2 marks

Question Number	Answer
7(a)(i)	A description which makes reference to the following: • pine and larch **{** have greater antimicrobial properties / act faster **}** than spruce (1) • pine and larch equally effective (1)

Additional Guidance	Mark
ALLOW converse	**(2)**

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 11 · AS Paper 2 · June 2019 · Q7(c)(ii) · 3 marks

Question Number	Answer
7(c)(ii)	An answer that makes reference to the following: • extract P is the least effective (1) • all extracts { inhibit / prevent } growth of bacteria (1) • no significant differences between extracts Q, R and S due to overlap of ranges (1)

Additional Guidance	Mark
	(3)

Question 12 · AS Paper 2 · June 2025 · Q8(b) · 3 marks

Question number	Answer
8(b)	An answer that makes reference to the following: • leaves have most antimicrobial property (1) • as zone of inhibition is greatest / no overlap of range with either fruit or seed (1) • ranges overlap for seed and fruit (1)

Additional guidance	Mark
	(3)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 13 · AS Paper 2 · June 2018 · Q7(a)(iii) · 4 marks

Question Number	Answer	Additional Guidance	Mark
7(a)(iii)	An answer which makes reference to four of the following: • shorter time intervals / hourly measurements (1) • { between 0 and 1 day / within first 24 hours } (1) • because no bacterial growth in either after 1 day (1) • test with different bacterial cultures (1) • because antimicrobial properties may vary (1)		(4)

Question 14 · A level Paper 3 · June 2024 · Q2(c) · 2 marks

Question number	Answer
2(c)	An explanation that makes reference to the following: • plot a graph (1) • results {not close to the line of best fit / that do not fit the trend} (could be) anomalous (1) OR • repeat (the experiment) (1) • results outside standard deviation (could be) anomalous (1)

Additional guidance	Mark
	Choose an item. (2)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.