OCR GCSE 21ST CENTURY BIOLOGY B · J257

BIOLOGY



EXAM QUESTION PACK

B2.6 HOW CAN WE TREAT DISEASE? (FOUNDATION)

SCORE	PERCENTAGE
/53	%

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1. Scientists have developed a drug that could be used to treat Ebola.

(i) Which of the statements can be used to complete the sentence about testing a new drug?

Put ticks (✓) in the boxes next to the **two** correct statements.

The first stages of testing a new drug include tests on …

animals	☐
healthy human volunteers	☐
human cells grown in a laboratory	☐
humans with the disease	☐

[1]

(ii) The scientists plan to test the new drug in humans.

The table shows groups that they could include in their plan.

Group	People in group	Treatment the people receive
A	healthy volunteers	the drug
B	people with Ebola	the drug
C	people with Ebola	a placebo

Explain the benefits of including each group and the ethical issues raised by including Group **C**.

The quality of written communication will be assessed in your answer.

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[6]

2(a). Tony has pneumonia.
His doctor prescribes antibiotics.

Suggest why it is important that Tony starts his course of treatment as soon as possible.

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[1]

(b). The doctor tells Tony to complete the course of treatment.
Explain why this is important.

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[2]

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(c). Tony recovers.

Several years later, Tony's friend, Gordon, also catches pneumonia.

This time the antibiotic does not work.

The doctor decides to give Gordon two other antibiotics at the same time.

Gordon recovers.

Suggest why:

- the original antibiotic did not work
- using two other antibiotics was effective.

---[3]

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3(a). Antidepressants are drugs prescribed by doctors to treat depression.

The table gives information about drugs **A**, **B**, **C** and **D** that are used to treat depression.

Drug	Information
A	Some people respond to this drug better than other drugs. Do not take if you have high blood pressure.
B	Causes fewer side effects than other drugs. Overdose not likely to be fatal. Do not take if yo
C	Unpleasant side effects. Do not take if you have liver disease or heart disease.
D	Need to avoid red wine. Can lead to high blood pressure.
Fiona has depression and high blood pressure.	
Her doctor prescribes drug **B**.	

Suggest why her doctor makes this choice.

[3]

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(b). Antidepressant drugs usually have side effects.

Which **two** statements explain why Fiona is willing to risk side effects?

Put ticks (✓) in the boxes next to the **two** best explanations.

The drugs are very expensive.	☐
The benefits of taking the antidepressants outweigh the risks.	☐
The risk of serious side effects is low.	☐
All of the side effects are serious.	☐
Overdoses are always fatal.	☐

[2]

[Total: 5]

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4(a). Helen is investigating the effect of antibiotics on the growth of bacteria.

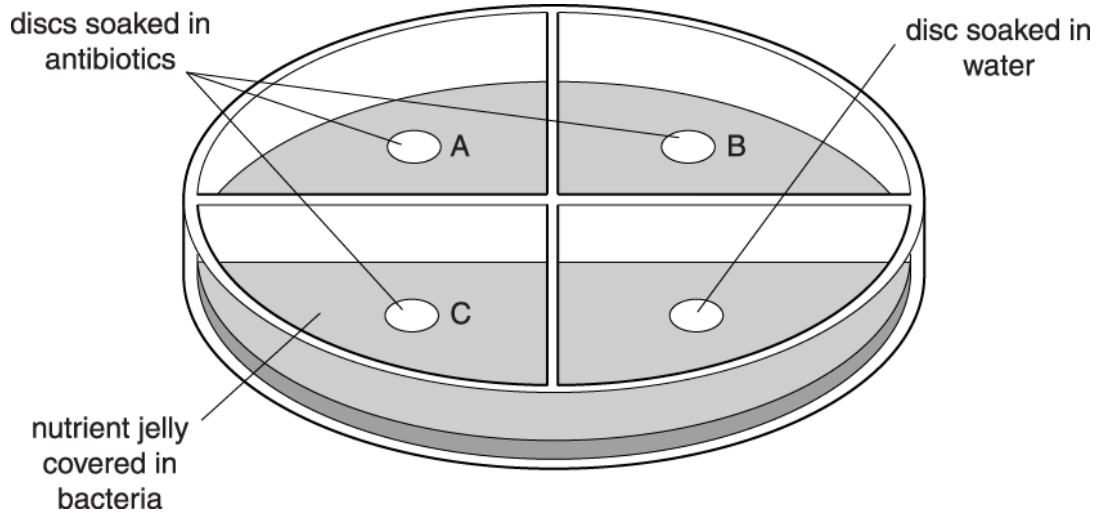
Bacteria are grown on nutrient jelly. This makes the jelly look cloudy.

Helen puts a small paper disc into each of three different antibiotic solutions, **A**, **B** and **C**.

She puts another paper disc into water.

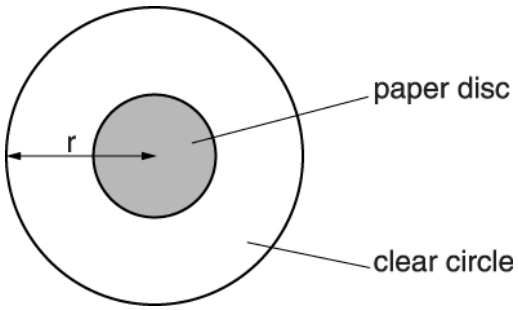
She then places all of the paper discs onto the nutrient jelly.

The diagram shows the apparatus she uses for her investigation.



After two days Helen sees clear circular areas around some of the paper discs.

Helen measures the radius (r) as shown in the diagram.



She then calculates the total area of the clear circle (including the paper disc) using the formula:

area = $?r^2$ (where ? = 3.14).

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Here are her results.

	Radius in mm	Total area of the clear circle (including the paper disc) in mm^2
A	8	
B	14	615.44
C	3	28.26
water	3	28.26

Complete the table by calculating the total area of the clear circle (including the paper disc) for **A**.

Show your working below.

[2]

(b). The clear areas on the nutrient jelly are where the bacteria have been killed by the antibiotic.

Helen makes the following conclusions from her results.

Which of these conclusions are correct?

Put ticks (?) in the boxes next to the **three** correct conclusions.

- The greater the clear area, the more bacteria have died. ☐
- The bacteria may be resistant to antibiotic C. ☐
- Antibiotic A is the least effective. ☐
- Water kills more bacteria than any antibiotic. ☐
- Antibiotic C must be water. ☐
- Antibiotic B is the most effective. ☐

[3]

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(c). Explain why it is important for all the paper discs to be the same size.

---[2]

(d). New antibiotics must be tested before they can be made available to the general public.

Write down **one** reason why.

---[1]

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5. Penicillin was the first antibiotic used by doctors.

Streptomycin is also an antibiotic. It was developed in 1947.

Describe how streptomycin should be used by doctors to treat their patients, including why it is important to regularly discover new antibiotics.

The quality of written communication will be assessed in your answer.

[6]

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6. A clinical trial investigated the effect of different combinations of chemotherapy drugs on survival rates of cancer patients.

Two groups of cancer patients were given different combinations of drugs.

- Patients in group **A** were given two drugs: 1 and 2.
- Patients in group **B** were given two drugs: 3 and 4.

(i) A placebo was not used in the trial.

Explain why.

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[2]

(ii) The results of the trial are shown in the table.

	Group A (Drugs 1 and 2)	Group B (Drugs 3 and 4)
Number of people in the trial	305	314
Number of people still alive two years after treatment	247	222

What conclusion could be made from these results?

Tick (✓) **one** box.

The drugs given to the patients in Group **A** cured their cancer. ☐

The combination of drugs given to Group **B** was not effective. ☐

The combination of drugs given to Group **A** was the most effective. ☐

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The patients in Group **B** were given a placebo.

[1]

(iii) New drugs are tested to see how safe they are to use and how well they work (their effectiveness).

Put a tick (✓) in **one** box in each row of the table to show what each stage of the drug development process tests for.

Clinical trial stage	Tests for both safety and effectiveness	Tests only for safety	Tests only for effectiveness
Preclinical trial using human cells and animals			
Clinical testing – using healthy human volunteers			
Clinical trials – using humans with the disease			

[3]

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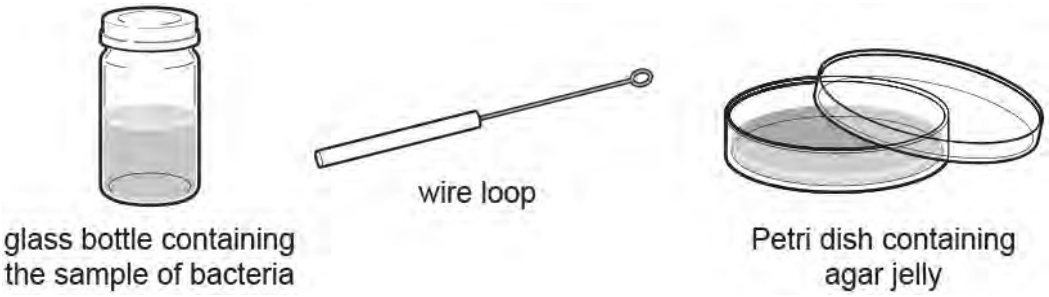
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7. Amir works in a laboratory. His job is to identify the pathogens that cause plant diseases.

Amir has a sample of bacteria from an infected plant.

He wants to test the effectiveness of different antibiotics against the bacteria.

Amir writes a method for transferring bacteria from the sample onto a Petri dish.



Method:

1. Pick up the wire loop from the bench.
2. Open the glass bottle containing the sample of bacteria.
3. Dip the loop in the sample of bacteria
4. Take the lid off the Petri dish.
5. Wipe the loop over the agar jelly in the Petri dish to spread bacteria.
6. Put the lid back on the Petri dish.

(i) Suggest **three** improvements Amir could make to his method to reduce the risk of contaminating the Petri dish with unwanted bacteria.

1 ----------

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2 ----------

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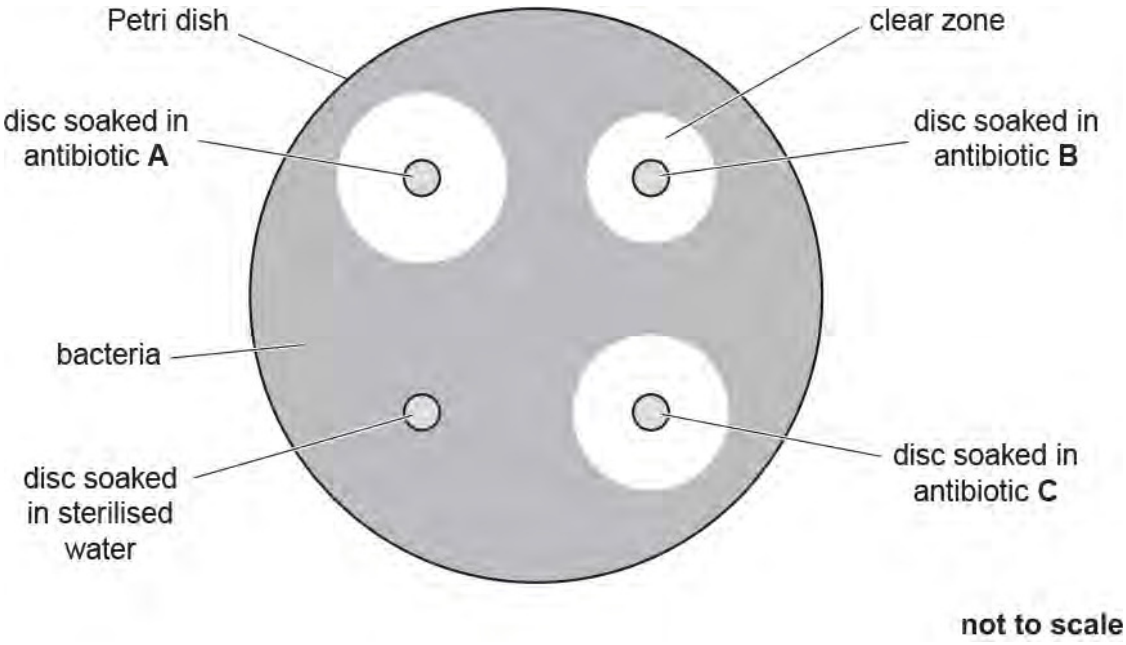
[3]

(ii) After transferring bacteria from the sample onto a Petri dish, Amir adds four different paper discs to the agar.

Three of the discs have been soaked in solutions of different antibiotics, **A**, **B** and **C**. One disc has been soaked in sterilised water.

Amir places the dish in an incubator overnight. The bacteria grow to cover the surface of the agar jelly.

The diagram shows what he sees after the dish has been incubated.



The radius (r) of the clear zone around the disc soaked in antibiotic **A** is 11 mm.

Calculate the area of this clear zone.

Use the equation: area of clear zone = $3.14 \times r^2$

Give your answer to **3** significant figures.

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Area of clear zone = ---------- mm^2 [3]

(iii) Amir sets up three more Petri dishes in the same way as the first.

The table shows his results for all four dishes.

Disc	Soaked in	Area of clear zone (mm^2)			
		Petri dish 1	Petri dish 2	Petri dish 3	Petri dish 4
1	Antibiotic **A**		363	346	346
2	Antibiotic **B**	227	363	227	214
3	Antibiotic **C**	314	283	298	314
4	Sterilised water	0	0	0	0

Amir thinks one of the discs was soaked in the wrong solution.

Suggest which disc may have been soaked in the wrong solution.

Give a reason for your answer.

Disc ---------- in Petri dish ----------

Reason ----------

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[2]

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8. Warfarin is a medicine that helps to prevent the formation of blood clots.

It is given to people who are at risk from a blood clot blocking one of their veins.

Warfarin helps to prevent the formation of blood clots when it is given to a patient in the correct amount.

The amount of medicine given to a patient is called the dose.

However, there is not one correct dose of warfarin that works for everybody. Different patients need a different dose.

(i) Doctors usually start by giving a low dose of warfarin to a patient. They then increase the dose if necessary.

Explain why it is better to start with a low dose of warfarin **and** suggest what could happen if the dose is too high.

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[3]

(ii) Doctors think that different people need a different dose of warfarin because of differences in their genomes.

Explain how differences in the genome could cause a person to need a different dose of warfarin.

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[2]

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(iii) Explain how gene technology could be used to help a doctor to give the correct dose of warfarin to a patient.

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[2]

END OF QUESTION PAPER

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