

Antibiotics and painkillers

Q1. (2022)

0 1 . 3 What is the name of the first antibiotic developed?

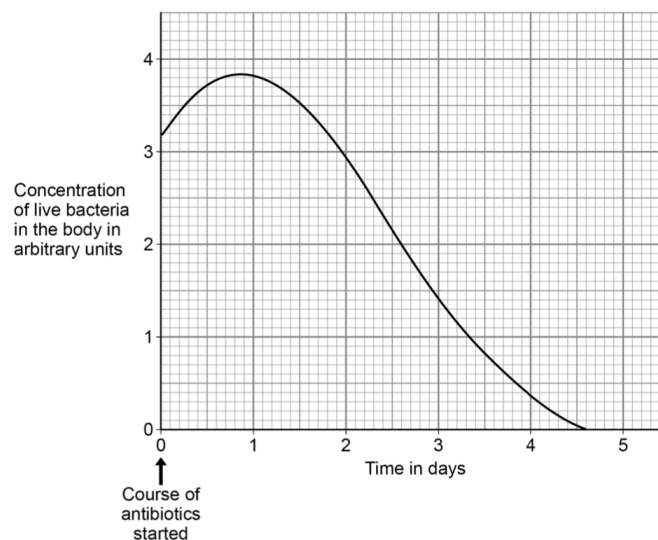
[1 mark]

Q2. (2022)

A child with a severe bacterial infection was given a course of antibiotics.

Figure 1 shows how the concentration of live bacteria in the child's body changed when taking the course of antibiotics.

Figure 1



A)

0 1 . 4 The concentration of live bacteria in the body continued to increase after starting the course of antibiotics.

Suggest **one** reason why.

[1 mark]

B)

0 1 . 5 After 3 days of taking the antibiotic:

- the child felt better
- there were still bacteria in the child's body.

Why did the child feel better?

[1 mark]

Tick (✓) **one** box.

Bacteria had become immune to the antibiotic.

☐

The child had become resistant to the bacteria.

☐

There were fewer toxins in the body than at day 0

☐

Q3. (2023)

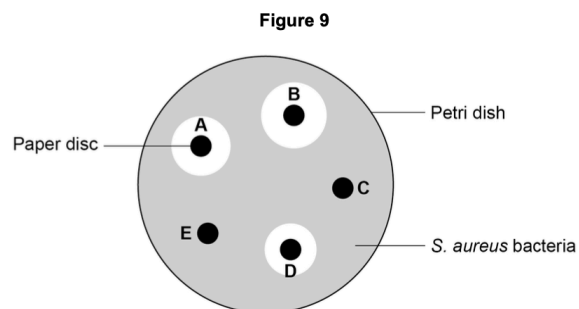
A scientist investigated which antibiotics (**A**, **B**, **C**, **D** and **E**) killed *Staphylococcus aureus* (*S. aureus*) bacteria.

This is the method used.

1. Grow *S. aureus* bacteria in a Petri dish.
2. Cut five small discs of paper.
3. Soak each paper disc in a different antibiotic solution.
4. Put the five paper discs into the Petri dish.
5. Keep the Petri dish at 37 °C for 24 hours.

Figure 9 shows the results.

A clear area around a disc shows where the bacteria have been killed.



A)

0 7 . 2 The scientist concluded:

'*S. aureus* is resistant to antibiotics **C** and **E**'.

Explain the evidence for this conclusion.

Use **Figure 9**.

[2 marks]

B)

0 7 . 3 The scientist later discovered that *S. aureus* is **not** resistant to antibiotic **E**.

Suggest how the method was developed and showed that *S. aureus* is **not** resistant to antibiotic **E**.

[2 marks]

Q4. (2023)

Broken bones are sometimes repaired using a metal implant.

The area around an implant can become infected with *S. aureus* bacteria. The infection is usually treated with a long-term course of antibiotics.

Long-term use of antibiotics has led to the development of antibiotic resistant bacteria. Research is being carried out into alternative treatments.

Stem cells from bone marrow and from fat tissue have antimicrobial properties.

A scientist investigated the effect of four treatments on the area of infection around metal implants. Each treatment was injected into the area around the implant.

The four treatments were:

- unreactive solution
- antibiotic solution
- stem cells from fat tissue
- stem cells from fat tissue containing antibiotic.

Each treatment was tested on 5 patients where an infection had developed around their metal implant.

After 7 days of treatment, the scientist calculated the ratio:

$$\text{area of infection} : \text{total tissue area}$$

A)

07.4

What was the independent variable in this investigation?

[1 mark]

Tick (✓) **one** box.

The ratio of area of infection : total tissue area

☐

The treatment injected around the implant

☐

The type of antibiotic used

☐

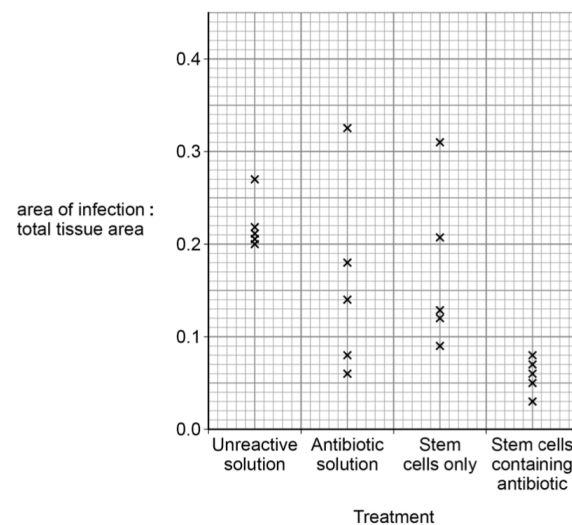
The type of bacterial infection

☐

B)

Figure 10 shows the results.

Figure 10



07.7

What is the range of results for the treatment with stem cells only?

[1 mark]

From _____ to _____

C)

0 7 . 8 A student looked at the results and concluded:

'Injections of stem cells containing antibiotic should be used
to treat **all** implant-related infections'.

Evaluate the student's conclusion.

Use **Figure 10**.

[4 marks]