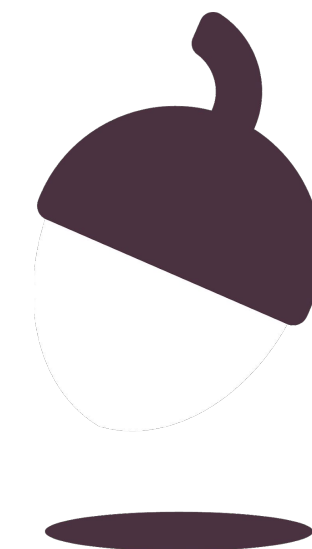


Combined Science - Biology - KS4
Cell Biology

Effectiveness of disinfectants

Miss Wong

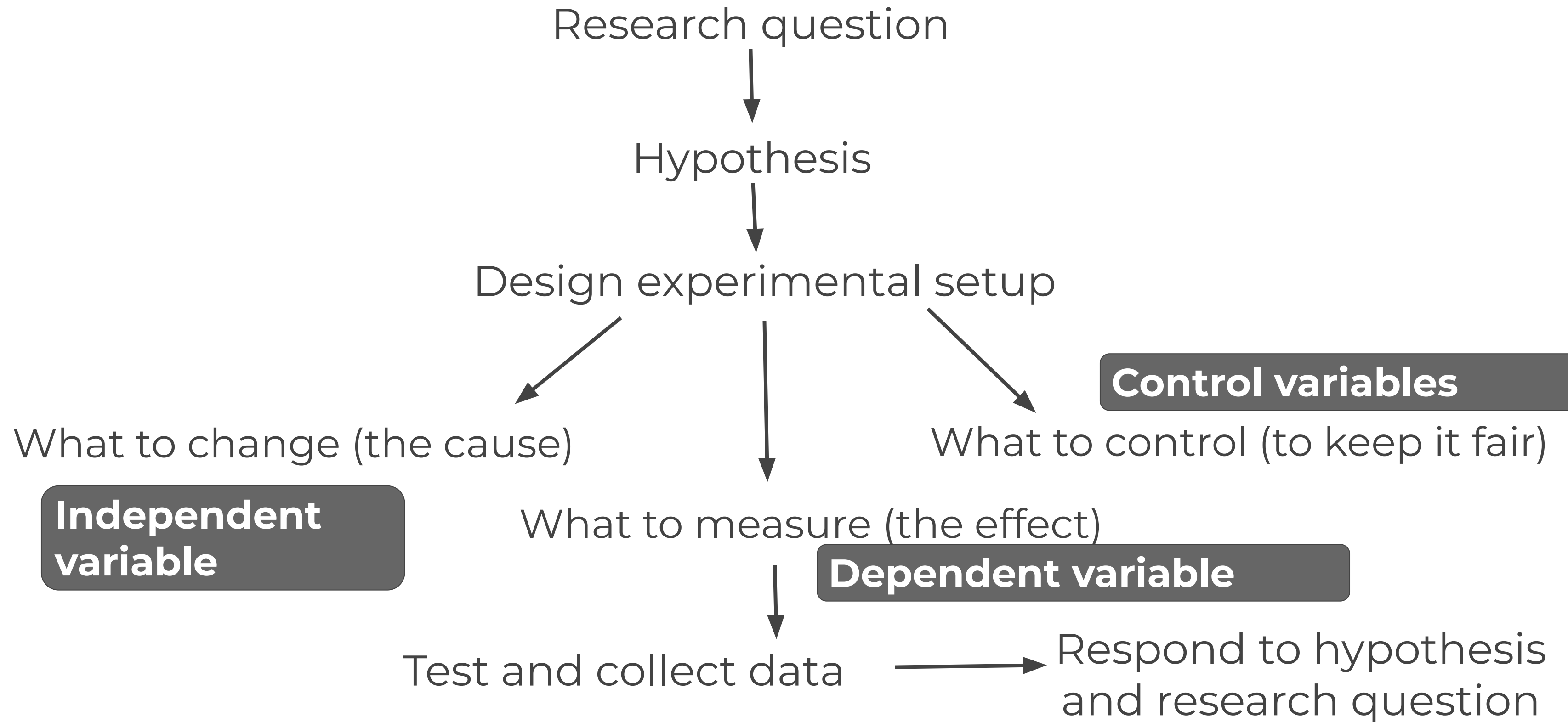


OAK
NATIONAL
ACADEMY

Working scientifically



Working scientifically as a process



Pause the video to complete your task

Arrange the following sentences in the right order.

Write a hypothesis.

Collect data, complete repeats and analyse data using graphs.

Ask a research question.

Identify the experimental variables

Respond to the research question

Resume once you're finished



Pause the video to complete your task

Answers

Ask a research question.

Write a hypothesis.

Identify the experimental variables

Collect data, complete repeats and analyse data using graphs.

Respond to the research question

Resume once you're finished



Pause the video to complete your task

Quick concept check

- 1. Independent variable is the one you _____.**
- 2. Dependent variable is the one you _____.**
- 3. Control variable is the one you _____.**

Resume once you're finished



Pause the video to complete your task

Quick concept check

1. Independent variable is the one you change.
2. Dependent variable is the one you measure.
3. Control variable is the one you keep the same.

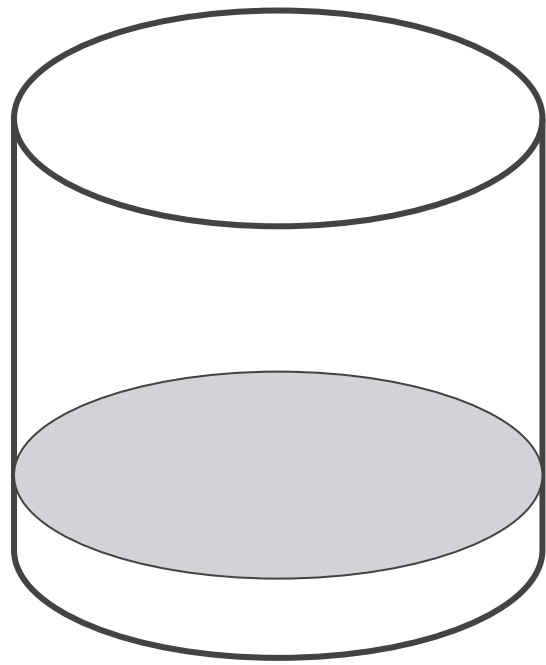
Resume once you're finished



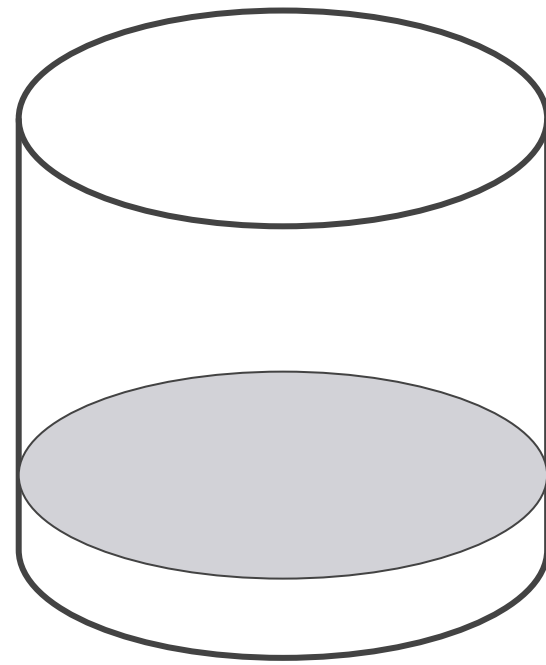
Testing the effectiveness of disinfectants



Testing the effectiveness of disinfectants.

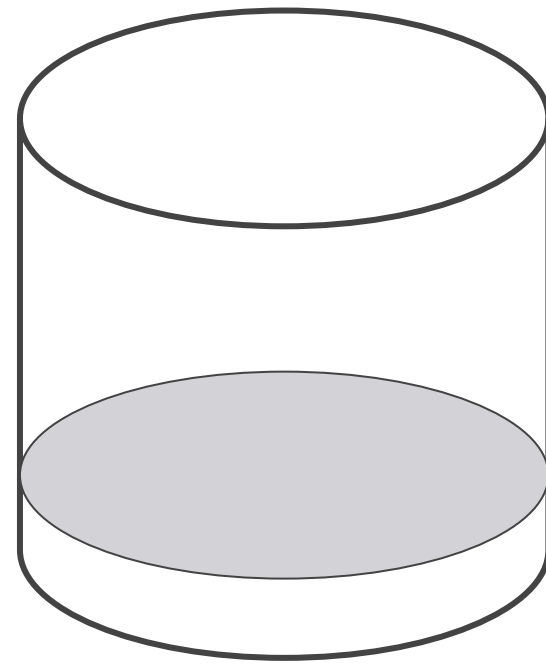


A

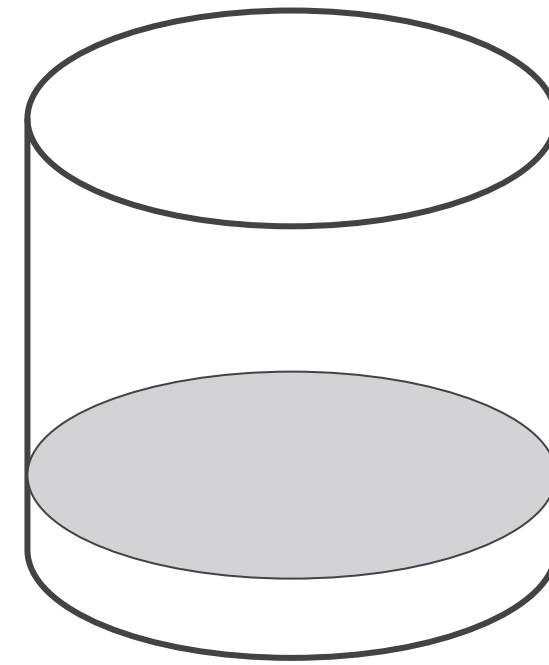


B

Image created by Miss C. Wong



C



D

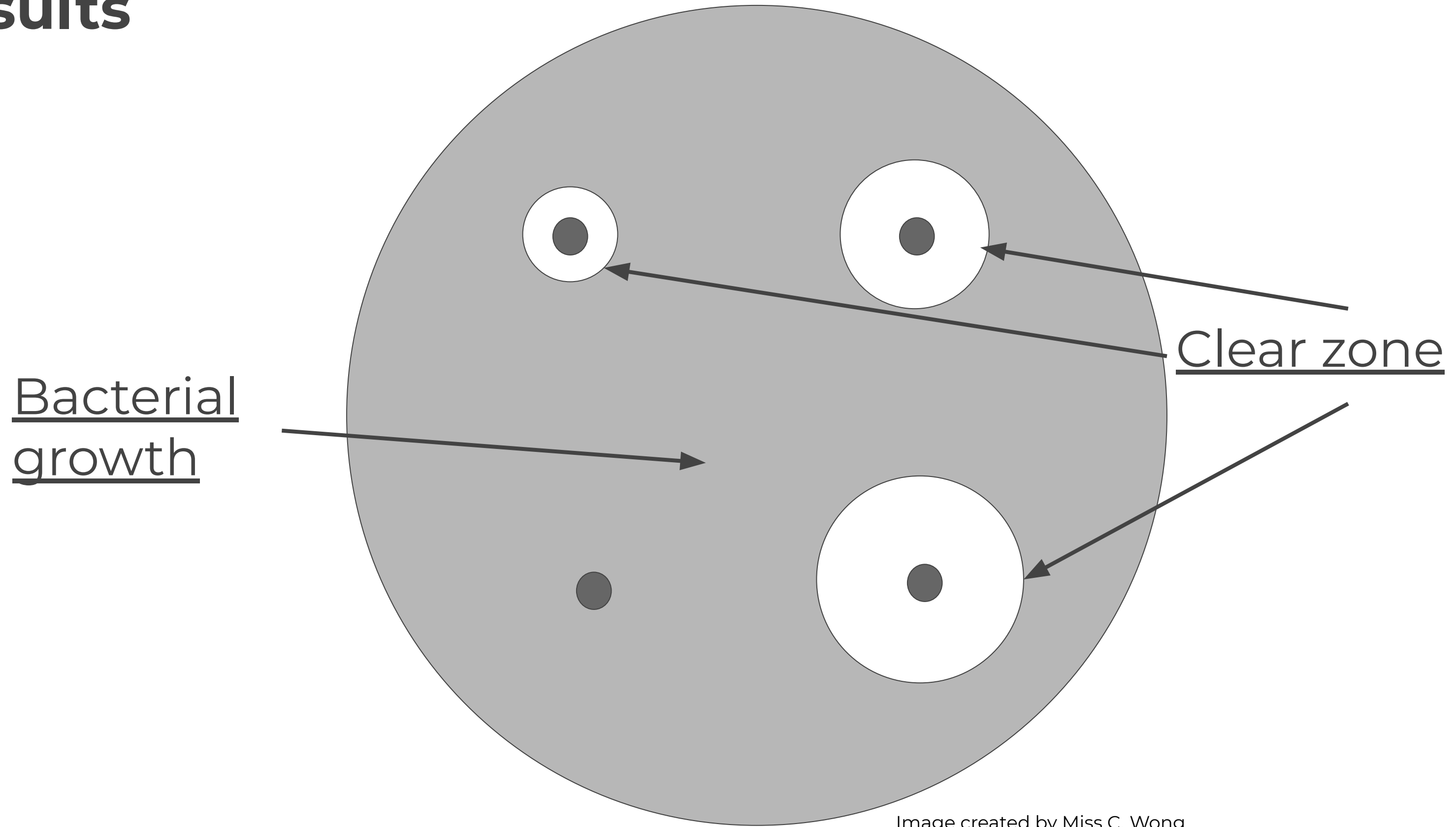


Agar plate

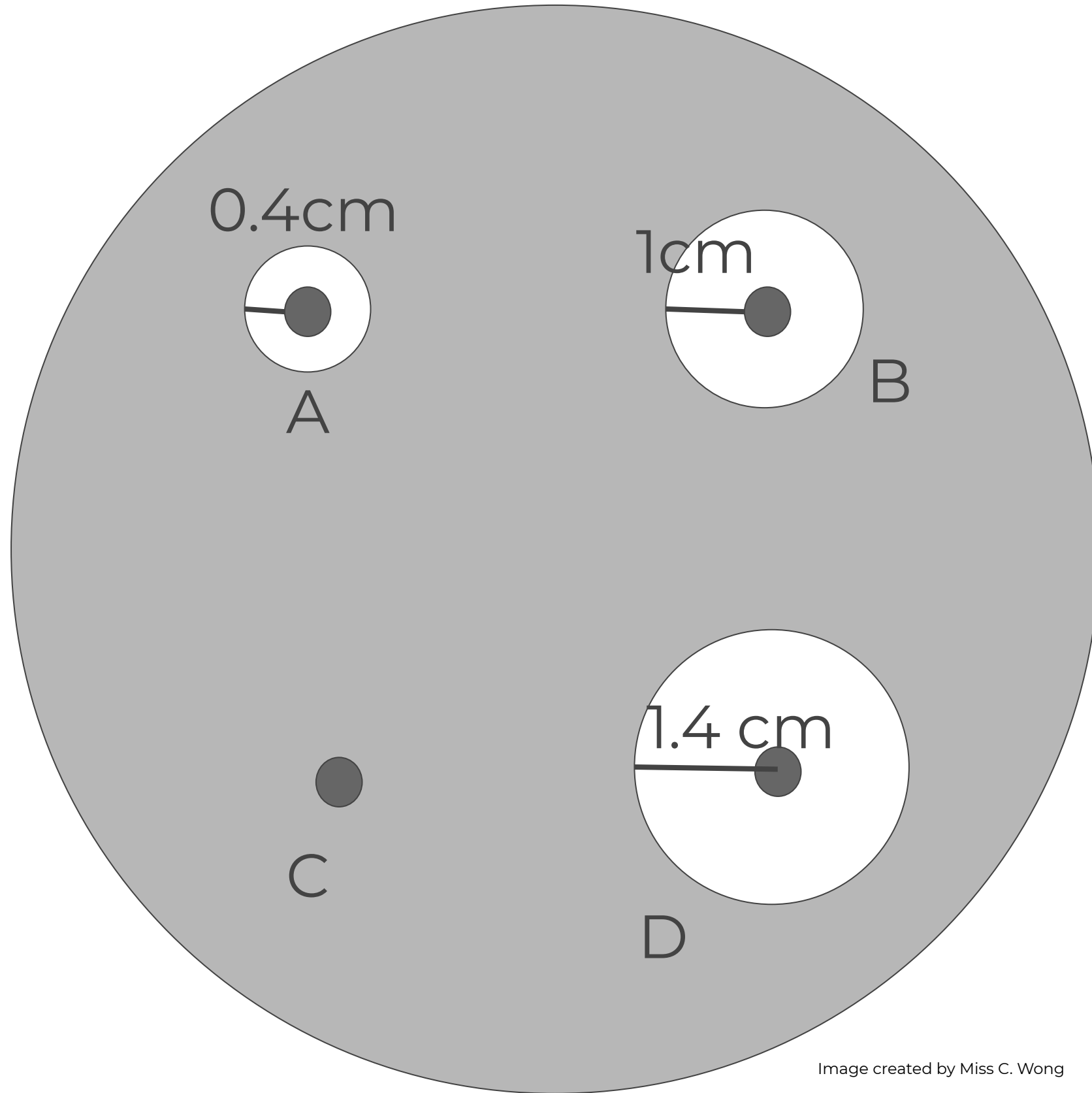
Image created by Miss C. Wong



Results



Finding the area of clear zones



Area of a circle $= \pi r^2$

You can use a ruler to measure the radius of the clear zone.

Area of clear zone of A $= \pi r^2$

$$= \pi (0.4)^2$$

$$= 0.50 \text{ cm}^2$$

Area of clear zone of C $= \pi r^2$

$$= \pi (1.4)^2$$

$$= 4.40 \text{ cm}^2$$



Pause the video to complete your task

Quick concept check

- 1. What might be the research question?**
- 2. What was the independent variable?**
- 3. What was the dependent variable?**
- 4. What was the control variable?**

Resume once you're finished



Pause the video to complete your task

Answer

1. What might be the research question?

Which disinfectant was the most effective?

2. What was the independent variable?

The type of disinfectant

3. What was the dependent variable?

The sizes of the clear zones.

4. What was the control variable?

The size of the paper discs

Resume once you're finished



Bacteria and antibiotic resistance



Independent task

There can be mutations in the plasmid that provides the bacteria with antibiotic resistance.

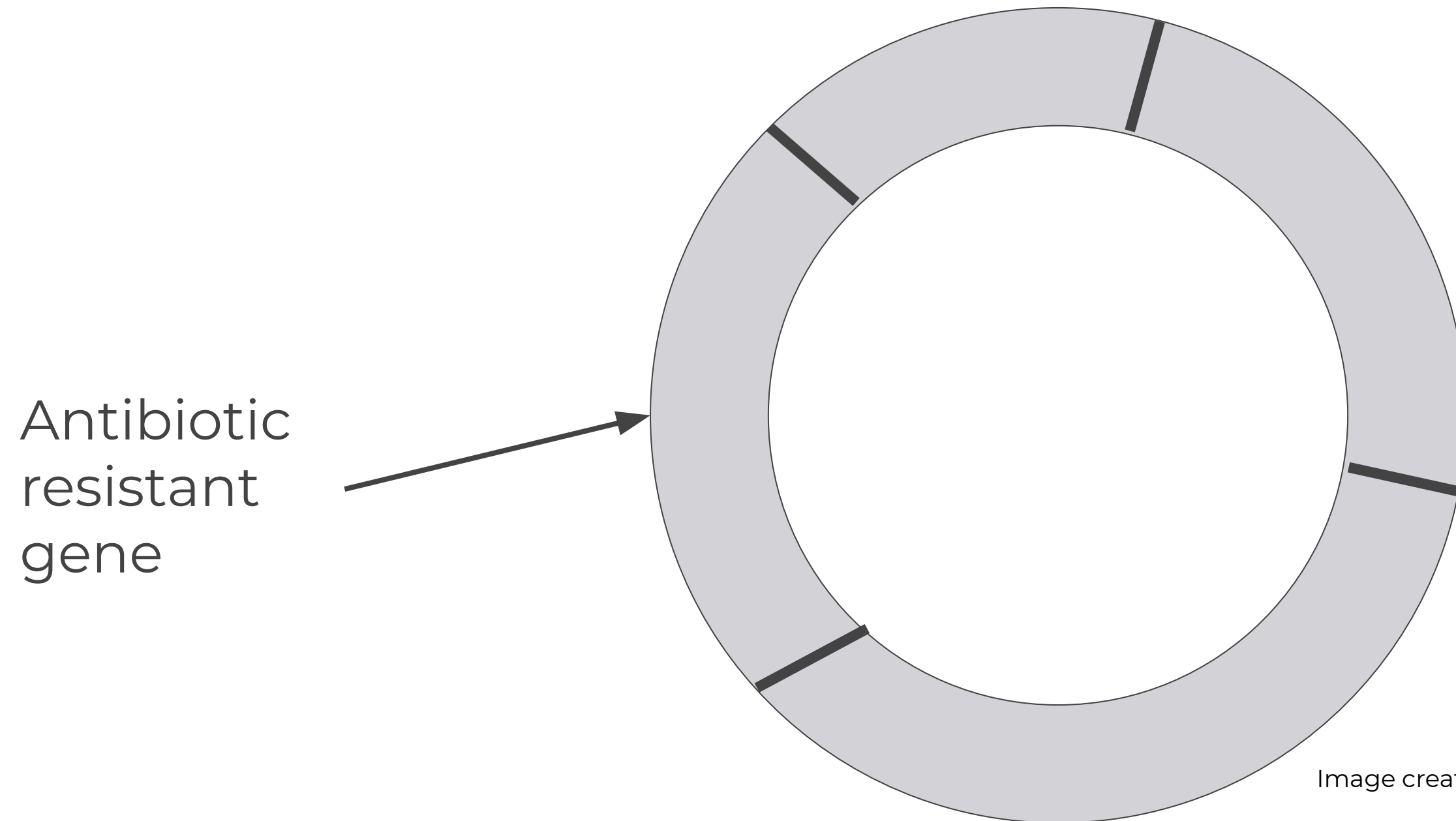


Image created by Miss C. Wong



**Which antibiotic is
not effective at all?**

**Which antibiotic is
the most effective?**

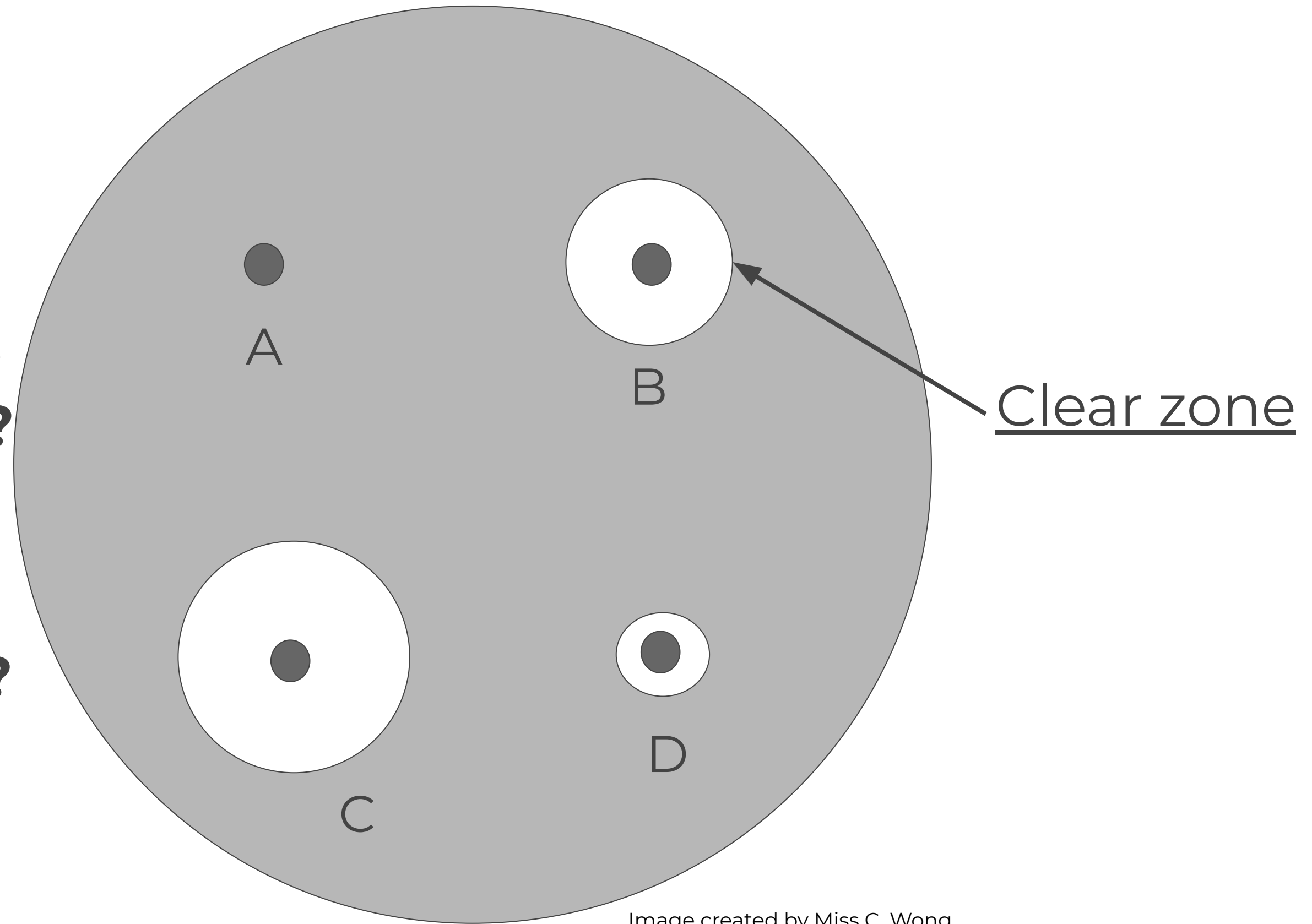


Image created by Miss C. Wong



Exam questions



Exam question

OCR, Specimen J247/02

Probash is ill and is having tests in hospital. Probash's doctors want to check that the bacteria causing his illness are not resistant to the antibiotic erythromycin.

They set up an experiment to test this.

This is the method they use:

- a petri dish is made that has the bacteria growing evenly over the surface
- a disc of filter paper is soaked in erythromycin
- the disc is placed on the agar in the centre of the petri dish
- the lid of the dish is fixed on with a piece of tape
- the dish is then incubated.

1. What is an antibiotic?
2. What equipment should be used to spread the bacteria across the agar plate?
3. Suggest suitable temperatures for incubation of the agar plate. Explain your choice.

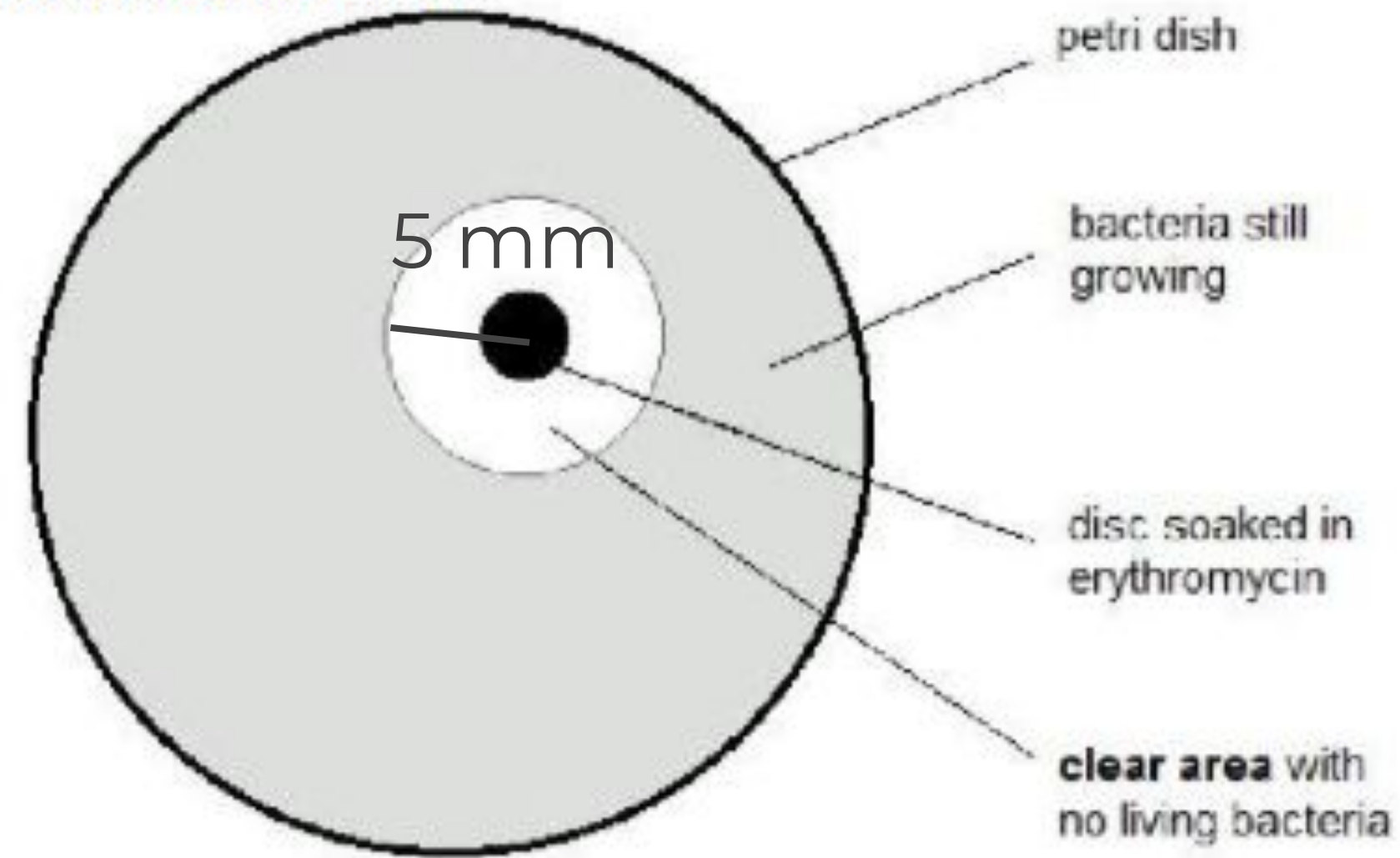


Answers

1. A chemical that attacks and destroy bacteria.
2. An inoculating loop.
3. 25- 30 degrees Celsius. If the temperature is too high, it will denature the enzymes but if the temperature is too low, the growth of the bacteria will be too slow.



ii. The diagram shows the doctor's results.



Use a ruler to measure the diameter of the clear area in mm.

Use this diameter to calculate the area of the circle where there are no living bacteria.

(the area of a circle = πr^2 and $\pi = 3.14$)

area = _____ mm²

OCR, Specimen
J247/02

[3]



Answers

$$\begin{aligned}\text{Area of clear zone of} &= \pi r^2 \\ &= 3.14 \times (5)^2 \\ &= 78.5 \text{ mm}^2\end{aligned}$$



iii. This table is used to analyse the results of the experiment.

OCR, Specimen
J247/02

Area clear of bacteria including the area of the disc (mm ²)	Level of resistance
less than 133	resistant
133 to 416	intermediate resistance
more than 416	not resistant

What is the extent of antibiotic resistance of the bacteria found in Probash? Explain your answer.



iii. This table is used to analyse the results of the experiment.

OCR, Specimen
J247/02

Area clear of bacteria including the area of the disc (mm ²)	Level of resistance
less than 133	resistant
133 to 416	intermediate resistance
more than 416	not resistant

What is the extent of antibiotic resistance of the bacteria found in Probash? Explain your answer.

Answer:

The area was 78.5 mm².

Therefore, it is antibiotic resistant.

