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| <b>Total marks</b>  | 12  |
| <b>Time allowed</b> | Approximately 25 minutes                                    |
| <b>Instructions</b> | Answer ALL questions. Write answers in the spaces provided. |

### Question 1

Three antibiotic discs (X, Y, Z) were placed on agar plates containing bacteria. After 48 hours at 25°C, the zones of inhibition were measured.

| Antibiotic | Zone diameter — plate 1 (mm) | Plate 2 (mm) | Plate 3 (mm) | Mean zone diameter (mm) |
|------------|------------------------------|--------------|--------------|-------------------------|
| X          | 24                           | 22           | 26           | 24.0                    |
| Y          | 8                            | 10           | 9            | 9.0                     |
| Z          | 0                            | 0            | 0            | 0.0                     |

A student grows bacteria on agar plates and places antibiotic discs to investigate which antibiotic is most effective. The table shows the results.

[0 marks]

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### Question 2

Using the results, state which antibiotic is most effective against the bacteria. Explain your reasoning.

[2 marks]

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### Question 3

Antibiotic Z produced no zone of inhibition. What conclusion can you draw about the bacteria and antibiotic Z?

[2 marks]

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### Question 4

The student incubated the plates at 25°C. Explain why 25°C is used rather than 37°C (body temperature) in school experiments.

[2 marks]

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### Question 5

Describe THREE techniques the student should use to prevent contamination of the agar plates during the experiment.

[3 marks]

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### Question 6

A student calculates the area of the zone of inhibition for antibiotic X using the formula  $A = \pi \times (d/2)^2$ . Calculate the area of the zone for antibiotic X. Give your answer to 3 significant figures.

[3 marks]

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**END OF QUESTIONS — Total: 12 marks**