Bacterial growth

Biology calculations | AQA GCSE Biology 8461 only (not Combined Science) | 12 questions, 35 marks

GCSE science calculations

Scan for the solutions

Equations for this topic (cover this box to practise recalling them)

- number of bacteria = number at the start × $2^{\text{number of divisions}}$ learn this one
- area = πr^2 learn this one
- number of divisions = $\frac{\text{time}}{\text{mean division time}}$ learn this one

Name: _____ **Date:** _____ **Score:** _____ **/ 35**

1 A single bacterium is placed in some nutrient broth. It divides 5 times, and every cell divides each time.

Calculate the number of bacteria at the end. (1 mark)

Answer _____

2 A sample of milk contains 40 bacteria. The bacteria divide 6 times.

Calculate the number of bacteria after 6 divisions. (2 marks)

Answer _____

3 Jasmine places a paper disc soaked in antiseptic on an agar plate covered in bacteria. After incubation there is a circular clear zone around the disc with a radius of 6 mm.

Calculate the area of the clear zone in mm^2. (2 marks)

Answer _____

4 A bacterium in a warm kitchen has a mean division time of 20 minutes.

Calculate the number of bacteria produced from this one bacterium after 3 hours. (3 marks)

Answer _____

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5 Daniel tests an antibiotic disc on a plate of bacteria. The clear zone around the disc has a diameter of 18 mm.

Calculate the area of the clear zone in mm^2.

(3 marks)

Answer _____

6 A hospital lab tests a new antibiotic. The clear zone around the antibiotic disc has a diameter of 2.4 cm.

Calculate the area of the clear zone in mm^2.

(3 marks)

Answer _____

7 A culture starts with 25 bacteria. After some time there are 6400 bacteria.

Calculate how many times the bacteria have divided.

(3 marks)

Answer _____

8 Bacteria in a sample of chicken left out of the fridge divide 12 times in 4 hours.

Calculate the mean division time in minutes.

(3 marks)

Answer _____

9 **Higher tier**

Mei measures the area of a clear zone around a disc of garlic extract. The area is 201 mm^2.

Calculate the radius of the clear zone. Give your answer to 2 significant figures.

(3 marks)

Answer _____

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10 A sample of water from a garden pond contains 500 bacteria. The bacteria have a mean division time of 25 minutes.

Calculate the number of bacteria after 5 hours. Give your answer in standard form to 2 significant figures. Show your working.

(4 marks)

Answer _____

11 Adebayo tests three antibiotics on the same type of bacteria. The table shows the diameter of the clear zone around each disc.

Antibiotic	Diameter of clear zone in mm
P	12
Q	20
R	16

a. Calculate the area of the clear zone for antibiotic Q in mm^2.

b. Calculate how many times larger the area of the clear zone for Q is than the area for P. Give your answer to 2 significant figures.

Show your working.

(4 marks)

Answer _____

12 Ellie grows bacteria in 10 cm^3 of nutrient broth incubated at 25 °C.

- At the start there are 2.0×10^3 bacteria.
- The mean division time is 45 minutes.

Calculate the number of bacteria after 6 hours. Give your answer in standard form. Show your working.

(4 marks)

Answer _____

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End of questions | Total 35 marks

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