Practice Question Set For A-Level
Subject : Biology
Paper-1 Topic: 2 Cells

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Name of the Student:_____
Max. Marks : 19 Marks **Time : 19 Minutes**

Q1.

(a) Describe binary fission in bacteria.

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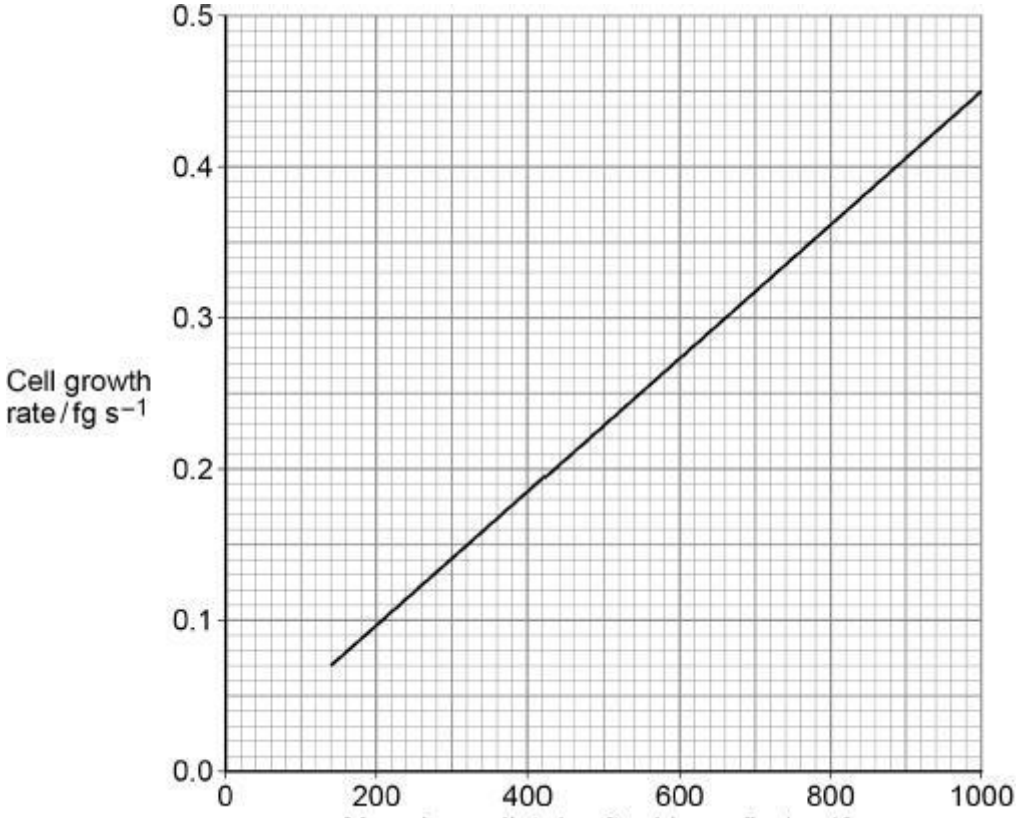
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(3)

The cell growth rate of the bacterium *Bacillus subtilis* is proportional to its mass immediately after binary fission.

The graph below shows this relationship.

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(b) The mass of the bacterial cells was measured in femtograms (fg).

1 fg (femtogram) = 1×10^{-15} g

Place a tick (✓) in the box next to the number that is equal to 680 fg

0.000 000 000 006 8 g	☐
6.8×10^{-13} g	☐
6.8×10^{-15} g	☐
6.8×10^{-17} g	☐

(1)

A scientist determined the growth rate of a *B. subtilis* cell by measuring its mass for 5 minutes.

In those 5 minutes, the cell's mass increased by 90 fg

(c) Use this information and the graph above to determine the mass of this cell immediately after binary fission.

Show your working.

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Answer _____ fg

(2)

(d) Suggest and explain how **two** environmental variables could be changed to increase the growth rate of these cells.

Suggestion 1 _____

_____

_____

Explanation _____

_____

_____

Suggestion 2 _____

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Explanation _____

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(4)

(Total 10 marks)

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Q2.

A student investigated the effect of ethanol, hydrochloric acid and temperature on the loss of red pigment from beetroot cells.

During the procedure, the student:

- added 10 cm^3 water into one test tube
- added 10 cm^3 ethanol into a second test tube
- added 10 cm^3 hydrochloric acid into a third test tube
- put the three tubes into a 25 °C water bath
- cut four cylinders of tissue from a beetroot
- put a cylinder into each tube and fitted bungs
- added 10 cm^3 water into a fourth test tube and put this tube into a 70 °C water bath
- placed the fourth cylinder into this tube and fitted a bung
- later removed the cylinders from the tubes
- estimated the intensity of red pigment in each solution by eyesight.

(a) Give **one** way in which the student could ensure the first three beetroot cylinders were kept at 25 °C throughout her experiment.

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(1)

(b) Give **two** variables that the student did **not** control in her procedure.

1 _____

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2 _____

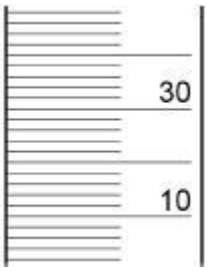
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(2)

(c) The student used a measuring cylinder to obtain 10 cm^3 of each solution.

Figure 1 shows some of the scale graduations on the side of this measuring cylinder.

Figure 1



What is the uncertainty of taking a reading of 10 cm^3 with this measuring cylinder?

Suggest how you could reduce the uncertainty calculated.

Uncertainty ± _____ cm^3

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Reducing uncertainty _____

_____

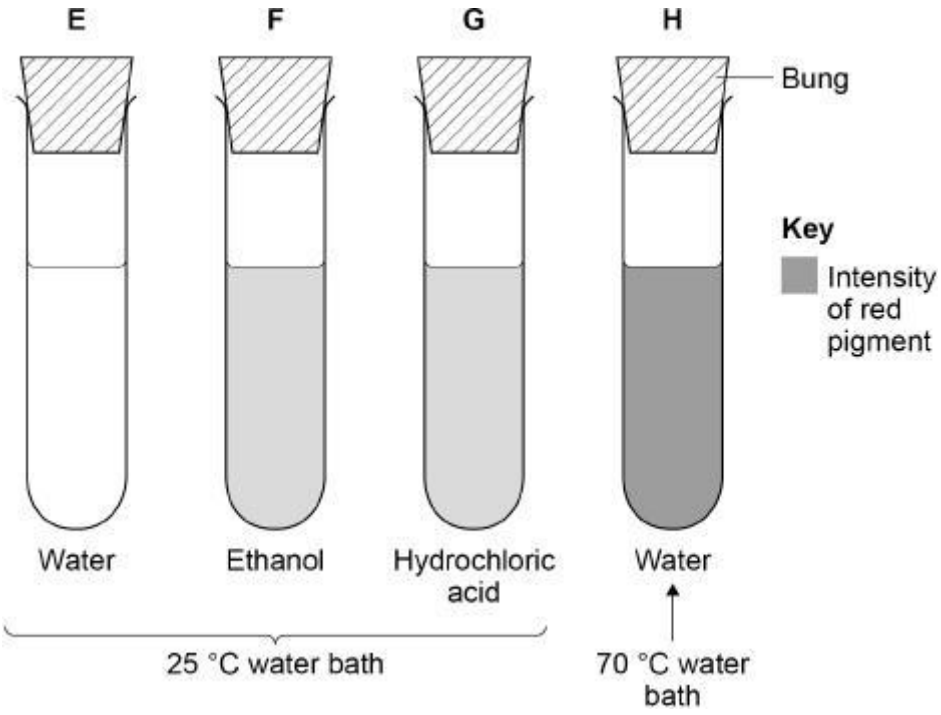
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(2)

A different student used the same procedure and she controlled **all** variables appropriately. Her results are shown in **Figure 2**.

Figure 2



(d) Using **Figure 2**, what can you conclude about the damage caused to beetroot cells by water, ethanol, hydrochloric acid and different temperatures?

Provide explanations for your conclusions.

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(4)
(Total 9 marks)

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