

# 1.1 Cells: Theory

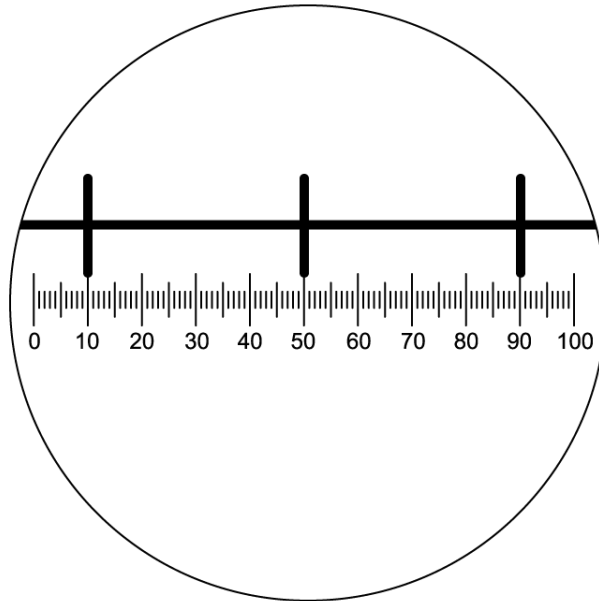
## Question Paper

|            |                   |
|------------|-------------------|
| Course     | DP IB Biology     |
| Section    | 1. Cell Biology   |
| Topic      | 1.1 Cells: Theory |
| Difficulty | Hard              |

**Time allowed:** 10  
**Score:** /5  
**Percentage:** /100

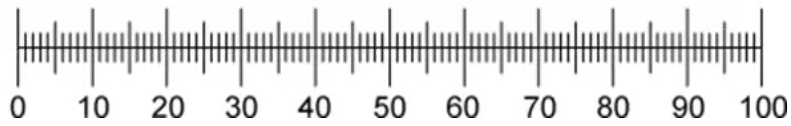
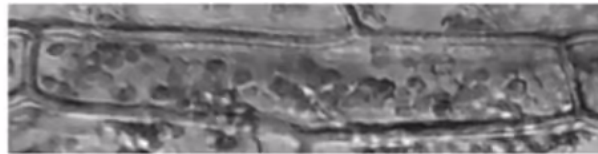
**Question 1**

A stage micrometer with small divisions of 0.1 mm was used to calibrate a graticule. This is shown in the diagram below.



A slide of a plant cell was placed on the stage in place of the stage micrometer.

What is the width of one of the chloroplasts below?



- A. 100  $\mu\text{m}$
- B. 50  $\mu\text{m}$
- C. 10  $\mu\text{m}$
- D. 0.5 mm

[1 mark]

## Question 2

Current research is making great advances in the therapeutic use of stem cells.

Embryonic stem cells are delivering promising results in treating diseases such as Stargardt's disease due to their unique characteristics.

Which of the following characteristics would **not** apply to embryonic stem cells?

- A. They have the potential to develop into any type of tissue if taken within the first few days after fertilisation
- B. There are methods that can be used to make the embryonic stem cells develop into specialised cells needed to treat specific diseases
- C. A small number of stem cells remain in many tissues of the body, such as bone marrow, skin and the liver to replace damaged or dead cells
- D. The stem cells can divide an unlimited number of times to produce a large number of cells that can become specialised

[1 mark]

## Question 3

There are many ethical objections to the use of stem cells in medical research.

Some of the objections are as follows:

- I. These cells have a higher risk of developing into tumours
- II. They need to be a close match in terms of blood type and other body antigens or there is a chance that the cells used will be rejected by the patient's immune system
- III. The cells are multipotent and therefore have a limited capacity to differentiate into different cell types
- IV. Difficult to obtain as there are a small number of them and so they can be painful to extract
- V. The destruction of these cells can be viewed as being equivalent to ending a life

Which of the objections only apply to stem cells taken from embryos?

- A. I. and V.
- B. I., II. and III.
- C. I. and IV.
- D. I., IV. and V.

[1 mark]

### Question 4

The cells of bacteria are on average 1–5  $\mu\text{m}$  long, whereas human cells are on average 100  $\mu\text{m}$  in diameter.

What is the main limiting factor preventing the bacterial cells from growing to the same size as the human cells?

- A. The rate of cell division would be too slow to take advantage of colonising new areas
- B. The structure of the cell wall of bacteria limits the size of the cell
- C. A larger size would prevent the cells from moving and being pushed by the flagella
- D. The rate of diffusion of substances being exchanged across the membrane slows as the cell gets larger

[1 mark]

### Question 5

The cell theory describes the idea that all living organisms are made of cells that have a particular set of features, such as being surrounded by a cell membrane.

The options below describe some atypical examples that don't possess all the features described by the cell theory.

Which of the examples below does conform to the cell theory?

- A. Striated muscle fibres possess multiple nuclei and can grow up to 300 mm in length.
- B. Skin cells replicate so quickly that our full body of skin cells die and are regenerated every 27 days
- C. Aseptate fungal hyphae do not possess septa (end walls between the cell) meaning that the cells are multinucleated with a shared cytoplasm.
- D. Giant algae (*Acetabularia*) are unicellular but can be up to 100 mm long with just one nucleus and a complex structure.

[1 mark]