1.1 Cells: Theory

Question Paper

Course	DP IB Biology
Section	1. Cell Biology
Topic	1.1 Cells: Theory
Difficulty	Easy

Time allowed: 50

Score: /34

Percentage: /100

Question 1a

a)
In order to be considered living, organisms carry out the functions of life.

Define the following:

   i. Homeostasis
  ii. Excretion

[2 marks]

[2 marks]

Question 1b

b)
The unicellular group, dinoflagellates, can be found in fresh water, preying upon other protozoa.

Dinoflagellates contain eyespots and two flagella enabling them to find and move towards prey. Every day they undergo mitosis and in some cases this forms 'red tides'.

State which functions of life have been described in this passage on dinoflagellates.

[4 marks]

[4 marks]

Question 2a

a)
Amoeba proteus is a unicellular organism that inhabits freshwater ponds and streams.

At its largest size, *Amoeba proteus* can be visible to the naked eye.

State how the surface area to volume ratio changes as the *Amoeba proteus* grows.

[1 mark]

[1 mark]

Question 2b

b)
Gaseous exchange allows the *Amoeba* to undergo respiration.

State which aspect of the surface area to volume ratio has the greater effect on the rate of gaseous exchange.

[1 mark]

[1 mark]

Question 2c

c)
The contractile vacuole of the *Amoeba* helps maintain its osmotic equilibrium by excreting excess water from the cell.

State which aspect of the surface area to volume ratio would depend on this organelle.

[1 mark]

[1 mark]

Question 3a

a)
Glia and skeletal muscle cells are two examples of specialised cells. However, they were once stem cells.

Define the term stem cell.

[2 marks]

[2 marks]

Question 3b

b)
The specialised cells mentioned in part (a) will differentiate when certain genes are expressed, as all cells contain the same genes.

State the term used to describe an organism's entire set of genes.

[1 mark]

[1 mark]

Question 3c

c)
It is hoped that our knowledge of stem cells can allow doctors to use them for therapeutic uses.

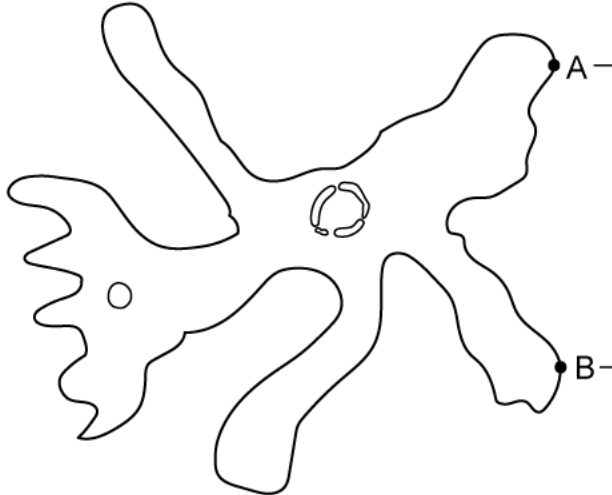Describe how stem cells are being used to treat Stargardt's macular dystrophy.

[2 marks]

[2 marks]

Question 4a

a)

The diagram below is of an *Amoeba*. The actual size, measured between points **A** and **B**, is 320 μm.

When a student measured the same distance using an image from a microscope they determined the size to be 128 000 μm.

Calculate the magnification of this *Amoeba*. Show your working.

[2 marks]

[2 marks]

Question 4b

b)

Whilst examining the *Amoeba,* the student also measured the length of the organelles present, including the nucleus. The length of the nucleus on the microscope image was 28 000 μm.

If the student was examining the nucleus using the same magnification as part (a), in millimetres (mm), calculate the actual size of the nucleus.

[2 marks]

[2 marks]

Question 4c

c)
The freshwater habitats of *Amoeba proteus* may contain organisms that have more complex structures eg. freshwater snails. The snails have primitive gills enabling them to breathe under water and mucus-producing glands that allow them to hibernate when the water freezes.

Independently these structures have different properties but when combined they provide the snails with survival properties in the aquatic environment.

State the type of property that multicellular organisms, like the freshwater snail, have.
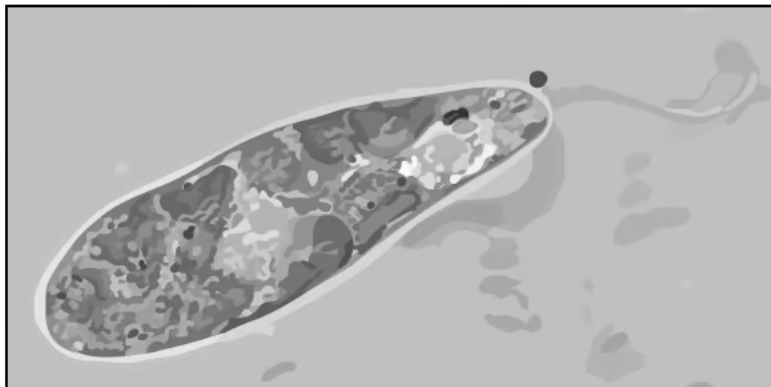
[1 mark]

[1 mark]

Question 5a

One mark is available for clarity of communication throughout this question.

a)
Draw a biological diagram of the *Euglena* sp. below.

[4 marks]

[4 marks]

Question 5b

b)
Although almost all organisms conform to the cell theory, there are exceptions.

List **three** examples and state why they are an exception to the theory.

[6 marks]

[6 marks]

Question 5c

c)
Explain why cells differentiate, using examples within your answer.

[5 marks]

[5 marks]