**Topic 2: Cells Data Analysis and Essay Questions (CLASS SET)**

**1.** A student observes and draws an Amoeba, using the high power lens of a microscope. The diameter of the drawing is 100 mm. The actual diameter of the Amoeba is 100 *µ*m. What is the magnification of the drawing?

A. 0.001 B. 100 C. 400 D. 1000

**2.** (a) State the **typical** size of

(i) a bacterium; .....................................................................................................

(ii) an average eukaryotic cell. ...............................................................................

(b) Explain the importance of the surface area to volume ratio in limiting cell size.(2)

(Total 4 marks)

**3.** Outline the differentiation of cells in a multicellular organism.

(Total 4 marks)

**4.** Compare, with the aid of a diagram, the structure of generalized prokaryotic and eukaryotic animal cells.

(Total 8 marks)

**5.** State **one** function of each of the following organelles.

 Lysosome  
 Golgi apparatus  
 Rough endoplasmic recticulum  
 Nucleus  
 Mitochondrion

(Total 5 marks)

**6.** The key below can be used to identify some of the structures in the cytoplasm of liver cells. Which structures are ribosomes?

1. Enclosed in a membrane go to 2

Not enclosed in a membrane go to 3

2. Diameter less than 100 nm A.

Diameter greater than 100 nm B.

3. Composed of one globular structure C.

Composed of two sub-units D.

(Total 1 mark)

**7.** (a) An organelle is a discrete structure within a cell with a specific function. In the table below, identify the missing organelles and outline the missing functions.

|  |  |  |
| --- | --- | --- |
| **Name of  organelle** | **Structure of organelle** | **Function of organelle** |
| Nucleus | Region of the cell containing  chromosomes, surrounded by a double membrane, in which there are pores. | Storage and protection of chromosomes |
| Ribosome | Small spherical structures,  consisting of two subunits. | ..........................................................  ..........................................................  .......................................................... |
| .................. | Spherical organelles, surrounded  by a single membrane and  containing hydrolytic enzymes. | Digestion of structures that are not needed within cells. |
| .................. | Organelles surrounded by two  membranes, the inner of which is  folded inwards. | ..........................................................  ..........................................................  .......................................................... |

(4)

(b) The table above shows some of the organelles found in a particular cell. Discuss what type of cell this could be.(2)

(Total 6 marks)

**8.** Distinguish between the structure of plant and animal cells.

(Total 6 marks)

**9.** Draw a labelled diagram of the fluid mosaic model of the plasma membrane.

(Total 5 marks)

**10.** Explain how the structure and properties of phospholipids help to maintain the structure of cell membranes. (Total 9 marks)

**11.** (a) Distinguish between diffusion and osmosis.(1)

(b) Explain how the properties of phospholipids help to maintain the structure of the cell surface membrane.(2)

(c) State the composition and the function of the plant cell wall.(2)

(Total 5 marks)

**12.** A study was carried out to determine the relationship between the diameter of a molecule and its movement through a membrane. The graph below shows the results of the study.



[Source: Knox, *et al., Biology,* Mcgraw Hill, Sydney, 1994, page 65]

(a) From the information in the graph alone, describe the relationship between the diameter of a molecule and its movement through a membrane.(2)

A second study was carried out to investigate the effect of passive protein channels on the movement of glucose into cells. The graph below shows the rate of uptake of glucose into erythrocytes by simple diffusion and facilitated diffusion.



(b) Identify the rate of glucose uptake at an external glucose concentration of 4 mmol dm–3 by

(i) simple diffusion; .........................................(1)

(ii) facilitated diffusion. .........................................(1)

(c) (i) Compare the effect of increasing the external glucose concentration on glucose uptake by facilitated diffusion and by simple diffusion.(3)

(ii) Predict, with a reason, the effect on glucose uptake by facilitated diffusion of increasing the external concentration of glucose to 30 mmol dm–3.(2)

(Total 9 marks)

**13.** Explain the various methods cells use to transport materials across membranes. (Total 8 marks)

**14.** Draw diagrams to show the four stages of mitosis in an animal cell with four chromosomes. (Total 5 marks)

**15.** Up to two additional marks are available for the construction of your answers.(2)

(a) Draw and label a diagram of the ultrastructure of a liver cell.(4)

(b) Explain how mitosis produces two genetically identical nuclei.(8)

(c) Outline **one** therapeutic use of stem cells.(6) **(Total 20 marks)**