**1.** Outline the process of endocytosis.

**(Total 5 marks)**

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

**(Total 8 marks)**

**3.** (a) Distinguish between diffusion and osmosis.

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**(1)**

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

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**(2)**

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

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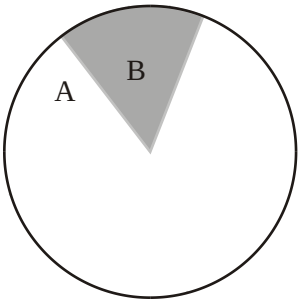
**(2)**

**(Total 5 marks)**



**4.** According to cell theory all cells arise from pre-existing cells. The following diagram shows the cell cycle of a eukaryotic (body) cell of a diploid organism.



(a) Define the term diploid.

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**(1)**

(b) Identify the parts of the cell cycle labelled A and B.

A .....

B .....

**(1)**

(c) State **three** activities that occur during part A of the cell cycle.

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**(3)**

(d) Outline the differences in cytokinesis in animal and plant cells.

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**(2)**

(e) Explain the significance of complementary base pairing in relation to the cell cycle.

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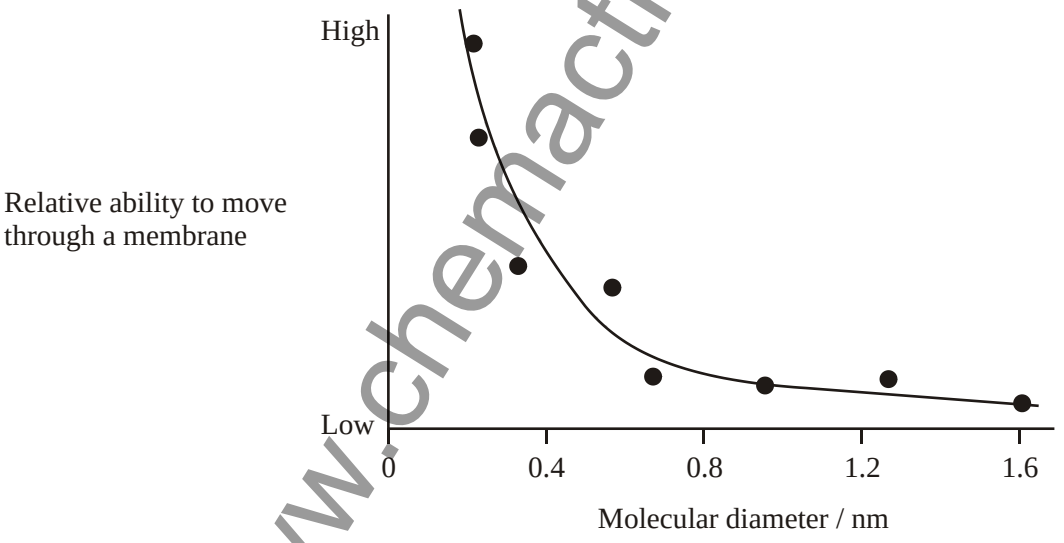
**(3)**
**(Total 10 marks)**

**5.** 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.

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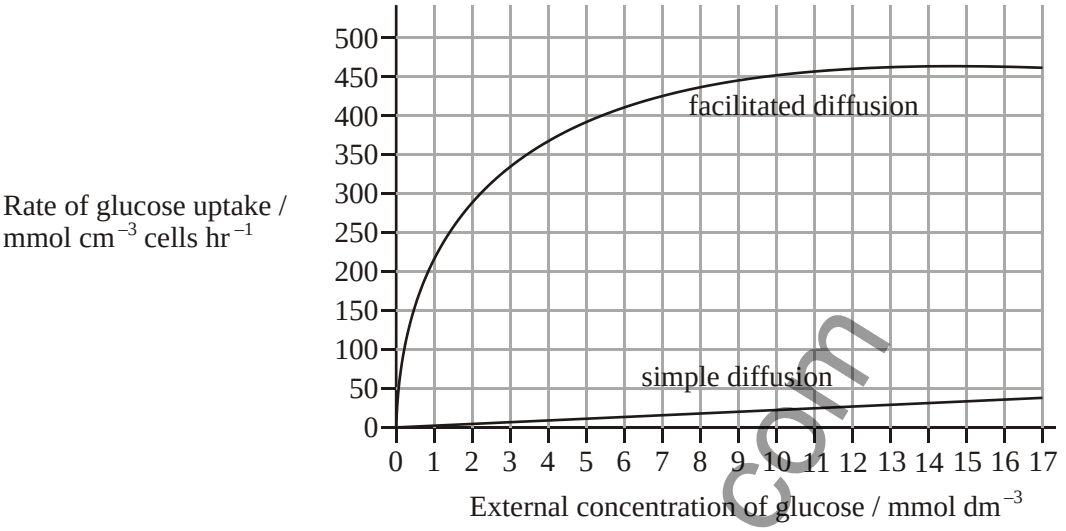
**(2)**

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.

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**(3)**

(ii) Predict, with a reason, the effect on glucose uptake by facilitated diffusion of increasing the external concentration of glucose to 30 mmol $dm^{-3}$.

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**(2)**

**(Total 9 marks)**

**6.** Outline the advantages of using light microscopes in comparison with electron microscopes.

**(Total 3 marks)**

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

**(Total 6 marks)**

**8.** Explain how the structure and properties of phospholipids help to maintain the structure of cell membranes.

**(Total 9 marks)**

**9.** What is/are the advantage(s) of using an electron microscope?

I. Very high resolution

II. Very high magnification

III. The possibility of examining living material

A. I only

B. I and II only

C. II and III only

D. I, II and III

**(1)**

**10.** What is essential for diffusion?

A. A concentration gradient

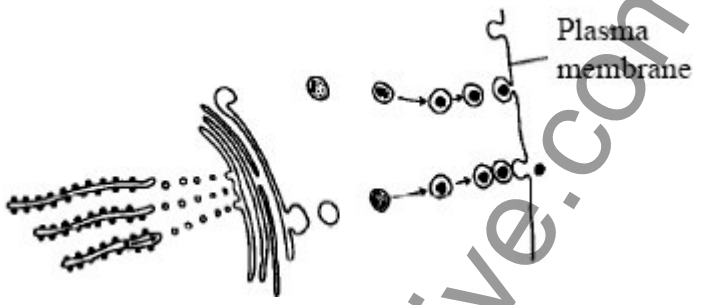
B. A selectively permeable membrane

C. A source of energy

D. A protein

**(1)**

**11.** In the diagram below macromolecules are being transported to the exterior of a cell.




What is the name of this process?

A. Exocytosis

B. Pinocytosis

C. Endocytosis

D. Phagocytosis

**(1)**

**12.** Draw a diagram of the ultrastructure of an animal cell as seen in an electron micrograph.

**(Total 6 marks)**

**13.** Describe the process of active transport.

**(Total 4 marks)**

**14.** Draw diagrams to show the four stages of mitosis in an animal cell with four chromosomes.

**(Total 5 marks)**

**15.** Outline the differences between the behaviour of the chromosomes in mitosis and meiosis.

**(Total 5 marks)**

**16.** List the functions of membrane proteins.

**(Total 4 marks)**

**17.** (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. | ..... ..... ..... |

**(2)**

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

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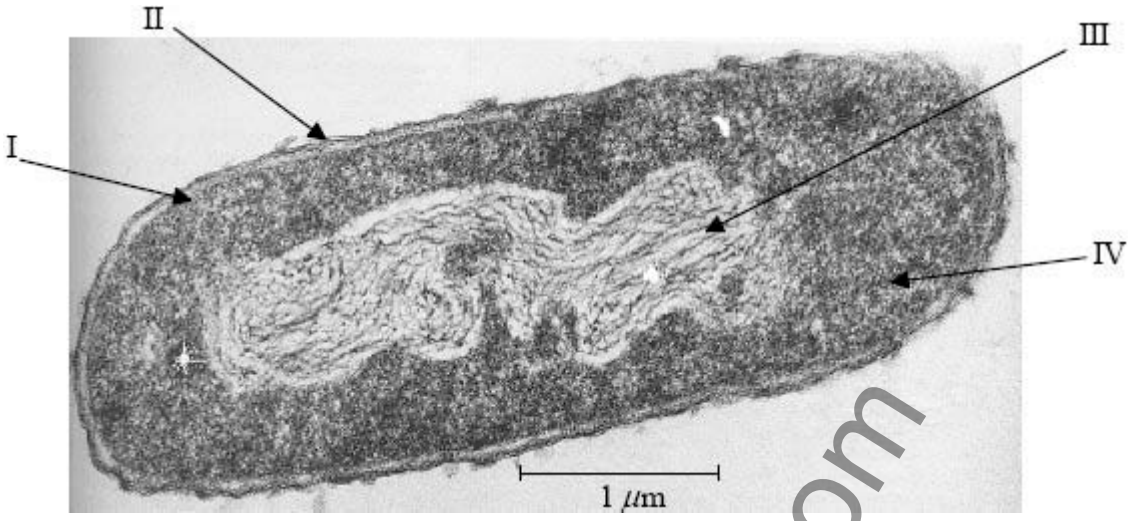
**(2)**
**(Total 4marks)**

**18.** (a) Label the following electron micrograph of a prokaryotic cell.




[Source: Stephen Wolfe, *Biology of the Cell*, (1995) 2nd edition, Brooks Cole, page 5]

I: .....

II: .....

III: .....

IV: .....

**(2)**

(b) Calculate the magnification of the prokaryotic cell.

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**(1)**

(c) State **two** advantages of using a light microscope over an electron microscope.

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**(2)**

**(Total 5 marks)**

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

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

**(Total 5 marks)**

**20.** Which of the following is a characteristic of organelles?

A. They are only found in eukaryotic cells

B. They are only found in prokaryotic cells

C. They are sub-cellular structures

D. They are all membrane bound

**(1)**

**21.** Discuss possible exceptions to the cell theory.

**(Total 4 marks)**

**22.** (a) Explain how the surface area to volume ratio influences cell sizes.

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**(3)**

(b) State **one** function for each of the following organelles.

(i) Ribosomes

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(ii) Rough endoplasmic reticulum

.....

(iii) Golgi apparatus

.....

**(3)**

(c) Compare prokaryotic and eukaryotic cells in regards to **three** different features.

| | **Prokaryotic** | **Eukaryotic** |
|---|---|---|
| **1.** | ..... ..... | ..... ..... |
| **2.** | ..... ..... | ..... ..... |
| **3.** | ..... ..... | ..... ..... |

**(3)**
**(Total 9 marks)**

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

**(Total 4 marks)**

**24.** (a) Define the term *sex linkage*.

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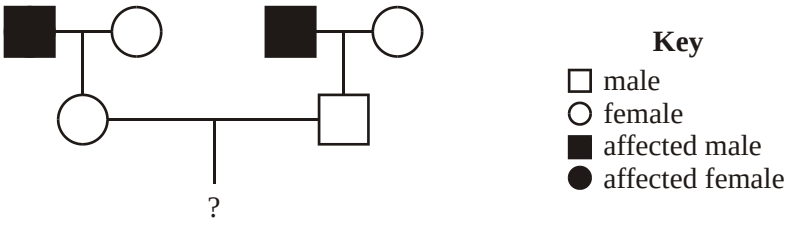
**(1)**

(b) A male and female with normal color vision each have a father who is color blind. They are planning to have children. Predict, showing your working, the possible phenotypes and genotypes of male and female children.

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**(3)**

(c) Explain the relationship between Mendel's law of segregation and meiosis.

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**(3)**

(d) Distinguish the differences between animal cells and plant cells undergoing mitosis and cytokinesis.

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**(2)**

**(Total 9 marks)**

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

**(Total 5 marks)**

**26.** Describe passive transport across a biological membrane.

**(Total 5 marks)**

**27.** Draw a labelled diagram of a prokaryotic cell as seen in electron micrographs.

**(Total 6 marks)**

**28.** If a red blood cell has a diameter of 8 μm and a student shows it with a diameter of 40 mm in a drawing, what is the magnification of the drawing?

A. × 0.0002

B. × 0.2

C. × 5

D. × 5000

**(1)**

**29.** How do animals use cholesterol?

A. To form part of the structure of cell membranes

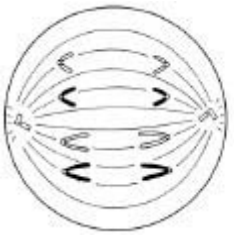
B. To increase the blood pressure during exercise

C. To insulate neurones between nodes of Ranvier

D. To help in the storage of energy

**(1)**

**30.** Which phases of mitosis are shown in diagrams I and II?



I

II

| | I | II |
|---|---|---|
| A. | metaphase | prophase |
| B. | metaphase | telophase |
| C. | anaphase | prophase |
| D. | anaphase | metaphase |

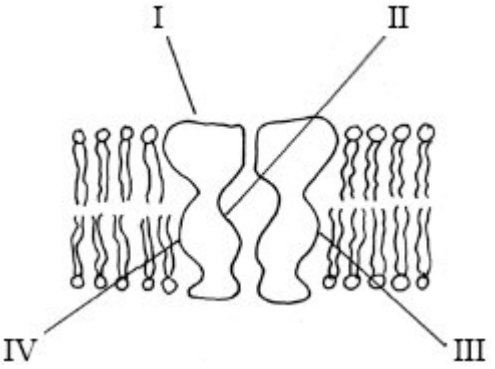
**(1)**

**31.** 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. |

**(1)**

**32.** The diagram below shows a channel protein in a membrane. Which parts of the surface of the protein would be composed of polar amino acids.




A. I and II only

B. II and III only

C. III and IV only

D. I and IV only

**(1)**

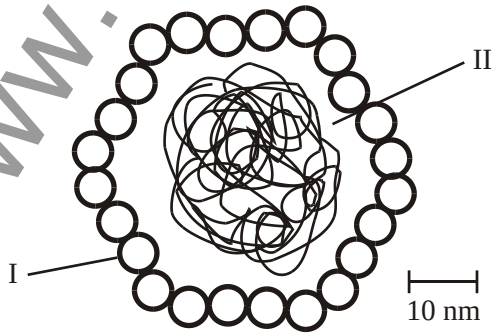
**33.** Describe the process of active transport across membranes.

**(Total 5 marks)**

**34.** Explain the various methods cells use to transport materials across membranes.

**(Total 8 marks)**

**35.** The drawing below shows the structure of a virus.




(a) Identify structures labelled I and II.

I: .....

II: .....

**(2)**

(b) Use the scale bar to calculate the maximum diameter of the virus. Show your working.

Answer: .....

**(2)**

(c) Explain briefly why antibiotics are effective against bacteria but not viruses.

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**(3)**

(d) Explain how antibiotic resistance develops in bacteria.

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**(3)**

**(Total 10 marks)**

**36.** Explain how vesicles are used in cells, including the way in which they form and are reabsorbed.

**(Total 8 marks)**

**37.** (a) State **one** type of secondary structure of a protein.

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**(1)**

(b) Outline the differences between globular and fibrous proteins, giving a named example of each.

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**(3)**

(c) Explain the significance of polar amino acids for membrane proteins.

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**(2)**
**(Total 6 marks)**

**38.** Which of the following is required for osmosis to occur?

A. An enzyme

B. A fully permeable membrane

C. ATP

D. A solute concentration gradient

**(1)**

**39.** What is an advantage of using an electron microscope?

A. Living cells can be observed

B. Virus particles can be observed

C. Pigments can be observed

D. Whole cells can be observed

**(1)**

**40.** What is facilitated diffusion?

A. The passive movement of a particle through the phospholipid bilayer of the cell membrane.

B. The passive movement of a particle across a cell membrane via a channel protein.

C. The movement of a particle down a concentration gradient helped by active pumping.

D. The movement of a particle up a concentration gradient helped by active pumping.

**(1)**

**41.** Which group of organisms, identified by this key, represents the Fungi?

| | | |
|---|---|---|
| 1 | Nuclei present | .....2 |
| | No nuclei present | .....A |
| 2 | Develops from an embryo | .....3 |
| | Does not develop from an embryo | .....4 |
| 3 | Cell wall present | .....B |
| | No cell wall | .....C |
| 4 | Cell wall of chitin | .....D |
| | Cell wall of cellulose or no cell wall | .....Protoctista |

**(1)**

**42.** (a) State **two** processes which involve mitosis.

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**(2)**

(b) Explain the importance of the surface area to volume ratio as a factor limiting cell size.

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**(3)**

(c) State **one** difference between the proteins produced by free ribosomes and those produced by ribosomes attached to the endoplasmic reticulum.

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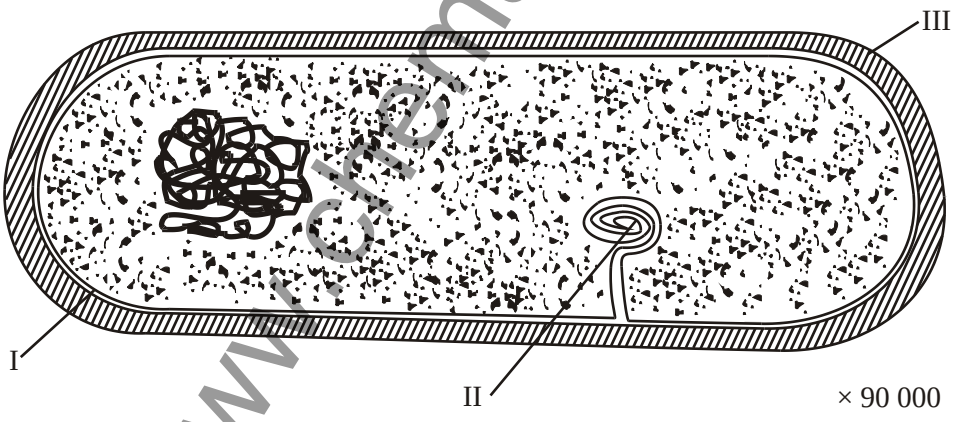
**(1)**

**(Total 6 marks)**

**43.** The diagram below shows the structure of a cell.




(a) State the names of I and II.

I: .....

II: .....

**(2)**

(b) Calculate the actual length of the cell, showing your working.

Answer: .....

**(2)**

(c) State the function of the structure labelled III.

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**(1)**

(d) Deduce which type of cell is shown in the diagram, giving reasons for your answer.

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**(2)**

**(Total 7 marks)**