

1)

(a) Fig. 2.1, on the insert, shows a yeast cell with scars resulting from its reproductive process.

(i) Name the process of asexual reproduction in yeast.

..... [1]

(ii) Outline the process of asexual reproduction in yeast.

..... [2]

(b) (i) A yeast cell can continue producing new cells until its surface is covered by scars.

The surface area of a sphere is given by the formula $4\pi r^2$, where $\pi = 3.14$.

The area of a circle is given by the formula πr^2 .

Assuming that the cell in Fig. 2.1 contained no scars, calculate how many potential new cells could be produced by this cell.

Show your working.

Answer = [2]

(ii) Even when the environmental conditions are perfect, one yeast cell rarely produces the calculated number of potential new cells.

Suggest why the reproductive potential of the yeast cell is not reached.

(c) Yeast cells separate after cell division. In a multicellular organism, the cells do not separate but become organised to form the body structure.

Describe how the cells in a multicellular organism are organised.



In your answer you should use appropriate technical terms, spelled correctly.

.....

(5 Marks)

2)

- (a) The structure of cell membranes can be described as 'proteins floating in a sea of lipids'. This membrane structure allows certain substances to pass through freely whereas other substances cannot.

State the term used to describe a membrane through which some substances can pass freely but others cannot.

..... [1]

- (b) Complete the following paragraph about cell membranes, using the most appropriate terms.

The model of cell membrane structure is called the model. Phospholipid bilayers with specific membrane proteins account for the ability of the membrane to allow both passive and transport mechanisms. Ions and most polar molecules are insoluble in the phospholipid bilayer. However, the bilayer allows diffusion of most non-polar molecules such as Protein channels, which may be gated, and proteins enable the cell to control the movement of most polar substances. [4]

- (c) One function of membranes that is not mentioned in (b) is cell signalling.

- (i) State what is meant by *cell signalling*.

..... [1]

- (ii) Explain how cell surface membranes contribute to the process of cell signalling.



In your answer you should use appropriate technical terms, spelled correctly.

..... [4]

3)

(a) Complete Table 5.1 below which compares different types of cell.

Place a tick (✓) or a cross (x) in each box to indicate whether the feature is present or absent. The first row has been completed for you.

Feature	Cell type		
	Plant cell	Animal cell	Bacterial cell
mitochondria	✓	✓	x
chloroplasts			
cellulose cell wall			
centrioles			
ribosomes			

Table 5.1

[4]

(b) In an investigation, cells were broken up (homogenised) and the component organelles were separated into tubes.

Each tube was then tested to determine the identity of the component organelle(s).

The observations are shown in Table 5.2.

Test for the...	Tube			
	1	2	3	4
ability to make ATP	no ATP produced	ATP produced	no ATP produced	no ATP produced
presence of DNA	DNA present	trace amount	no DNA present	no DNA present
ability to produce proteins	no proteins made	no proteins made	no proteins made	proteins made
ability to digest bacteria	none	some ability	none	none

Table 5.2

4)

- (a) Complete the passage below using the most appropriate terms.

Enzymes are proteins and are therefore soluble. They alter the rate of metabolic reactions and are described as biological

Some enzymes, such as those found in cytoplasm, are described as enzymes. Other enzymes, such as those that digest food in the small intestine, are known as enzymes. Some medicinal drugs reduce enzyme activity. These are called enzyme

[5]

- (b) Many enzymes are associated with non-protein molecules known as cofactors. Some cofactors are small inorganic ions.

Rennin is an enzyme that is involved in the digestion of milk. It converts soluble caseinogen in milk into insoluble casein. The cofactor Ca^{2+} is associated with this reaction.

A student wished to investigate the effect of Ca^{2+} on the action of rennin.

Describe how the student could carry out this investigation and produce valid results.

..... [5]

- (c) Enzyme cofactors are often derived from vitamins and minerals in the diet.

Proteins are required in large amounts in the diet whereas vitamins and minerals are required only in small amounts.

Suggest why.

[1]

[Total: 11]

5)

- (a) Lipids form an important part of a balanced diet but if too many lipids are consumed this can result in obesity.

What is meant by the term *balanced diet*?

..... [2]

- (b) (i) Lipids are used for energy storage and as a respiratory substrate.

List **three** other roles of lipids in the human body.

..... [3]

- (ii) Other than obesity, outline why a diet high in lipids might have a negative effect on the health of an individual.

..... [3]

(c) Two examples of lipid molecules are triglycerides and phospholipids.

Identify **two** differences and **two** similarities in the **structures** of triglycerides and phospholipids.

Write your answers in the appropriate boxes in the table below.

	Triglyceride	Phospholipid
Difference		
Difference		
Similarity		
Similarity		

[4]

(d) It is possible to test for the presence of lipids in a food sample.

(i) Name the test used to identify the presence of lipids.

..... [1]

(ii) Describe how you would carry out this test on a food sample.

..... [3]

(iii) State the expected result if lipid is present in the food sample.

..... [1]

[Total: 17]

6)

(a) Glucose is a hexose sugar and is a monomer in many carbohydrates.

Name the precise group of carbohydrate molecules of which glucose is an example.

..... [1]

(b) Fig. 6.1 represents the structure of a β -glucose molecule.

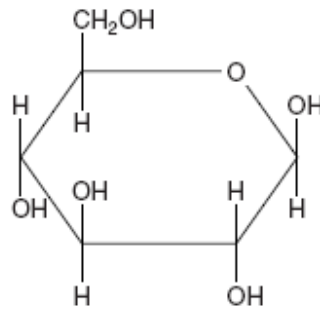


Fig. 6.1

(i) Use Fig. 6.1 to draw a similar representation of an α -glucose molecule in the space provided below.

[2]

(ii) The cells of living organisms require glucose.

State and explain **two** ways in which the glucose molecule is well suited to its function in living organisms.

..... [2]

(c) Deoxyribose is a pentose sugar that is a component of the double-stranded DNA molecule.

Describe the structural relationship between deoxyribose and the other components of the DNA molecule.

..... [3]

(d) Cellulose is a carbohydrate.

A student described the structure of cellulose as follows:

<p>The cellulose molecule is insoluble. It contains only the elements carbon, hydrogen and oxygen. It is made up of α-glucose subunits. The glucose subunits are linked by 1-4 glycosidic bonds formed by hydrolysis reactions. It also has some 1-6 glycosidic bonds. It is made of many long chains. The chains have branches.</p>
--

(i) Identify **three** mistakes made by the student when describing the structure of cellulose.

..... [3]

(ii) Suggest the name of a molecule that closely matches the student's description.

..... [1]

[Total: 12]