

1)

Fibrinogen and fibrin are both proteins.

A protein consists of a chain of amino acids joined together by bonds.

- (i) In the space below, draw a diagram to show the structure of an amino acid. (3)
- (ii) Name the covalent bond that joins the amino acids into a chain. (1)
- (iii) Suggest **two** differences between fibrinogen and fibrin. (2) -

2)

DNA is a very important molecule in living organisms as it carries the genetic code. Before a cell divides, the DNA molecule replicates so that each resulting daughter cell is genetically identical to the original parent cell.

- (a) Explain the nature of the genetic code. (2)
- *(b) Describe the process of DNA replication. (5)

3)

Lipoprotein lipase is a biological catalyst and is involved in the hydrolysis of triglycerides.

- (a) For each of the statements below, put a cross in the box that corresponds to the correct statement.

(i) A catalyst

- A decreases the rate of reaction by increasing the activation energy
- B decreases the rate of reaction by reducing the activation energy (1)
- C increases the rate of reaction by increasing the activation energy
- D increases the rate of reaction by reducing the activation energy

(ii) Hydrolysis results in bonds between glycerol and a fatty acid

- A being broken and water being formed
- B being broken and water being used (1)
- C being formed and water being formed
- D being formed and water being used

(iii) A triglyceride is made from

- A one glycerol and one fatty acid
- B one glycerol and three fatty acids (1)
- C three glycerols and one fatty acid
- D three glycerols and three fatty acids

(iv) A type of bond found in a triglyceride is

- A an ester bond
- B a glycosidic bond
- C a hydrogen bond
- D a phosphodiester bond

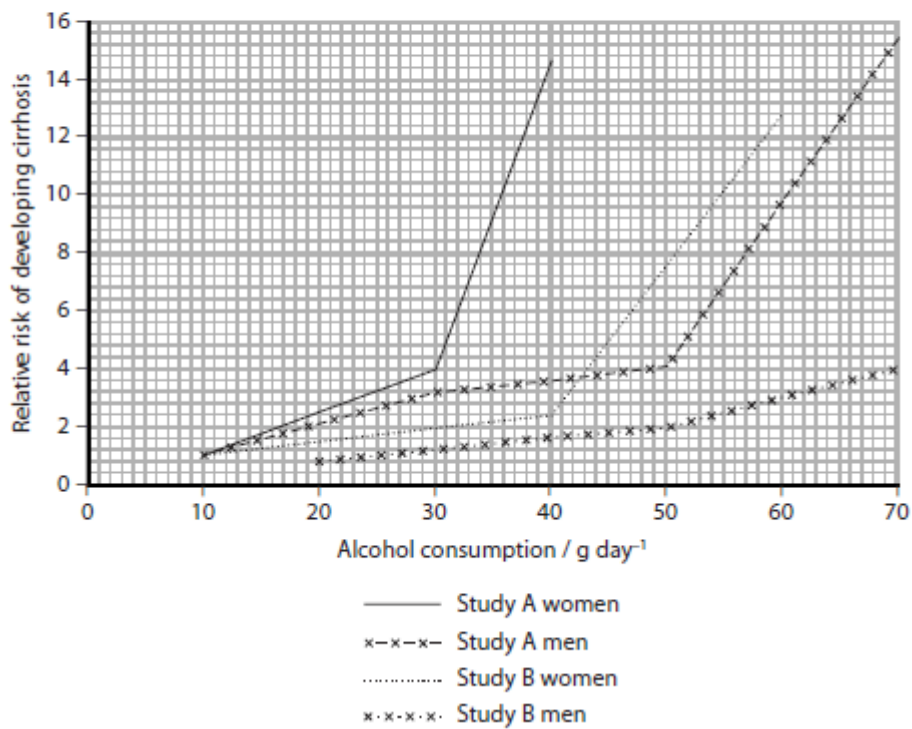
(1)

4)

Cirrhosis is a disease of the liver that is associated with alcohol abuse.

Two studies, study A and study B, were carried out to determine the relative risk of developing cirrhosis in relation to the mass of alcohol consumed each day by men and women.

The graph below shows the results of these two studies.



(a) The results of these studies indicate that there is a correlation between alcohol consumption and cirrhosis.

Explain how these results indicate that there is a **correlation** between alcohol consumption and cirrhosis.

(1)

(b) (i) Using the information in the graph, compare the results for women in studies A and B.

(2)

(ii) Suggest **two** reasons for the differences between the results for women in these two studies.

(2)

(c) Describe the evidence shown in the graph that suggests that the risk of developing cirrhosis depends on gender. (2)

(d) Comment on the reliability of these results. (2)

(e) It is possible that the men and women in these studies underestimated their alcohol consumption.
Suggest **one** reason for this. (1)

5)

All organisms are made up of one or more cells.

(a) For each of the descriptions below, put a cross ☒ in the box that corresponds to the correct statement about the features of animal, plant and prokaryotic cells. (6)

(i) Genetic material is

- A separate strands in animal and prokaryotic cells
- B separate strands in animal and plant cells
- C circular in animal and prokaryotic cells
- D circular in animal and plant cells

(ii) Centrioles are present in

- A plant cells only
- B animal cells only
- C prokaryotic cells only
- D animal, plant and prokaryotic cells

(iii) The cell surface membrane is present in

- A plant cells only
- B animal cells only
- C prokaryotic cells only
- D animal, plant and prokaryotic cells

(iv) Pits are found in the cell walls of

- A plant cells only
- B prokaryotic cells only
- C plant and prokaryotic cells
- D animal, plant and prokaryotic cells

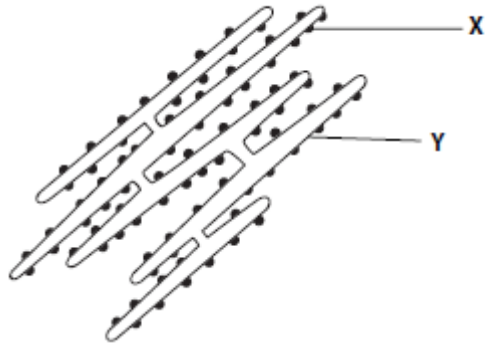
(v) The tonoplast may be present in

- A plant cells only
- B prokaryotic cells only
- C plant and prokaryotic cells
- D animal, plant and prokaryotic cells

(vi) Cell walls are found in

- A plant cells only
- B prokaryotic cells only
- C plant and prokaryotic cells
- D animal, plant and prokaryotic cells

(b) The diagram below shows a structure found in the cytoplasm of both plant and animal cells, as seen using an electron microscope.



- (i) Name the structure shown in the diagram. (1)
- (ii) Name the parts labelled X and Y. (2)

6)

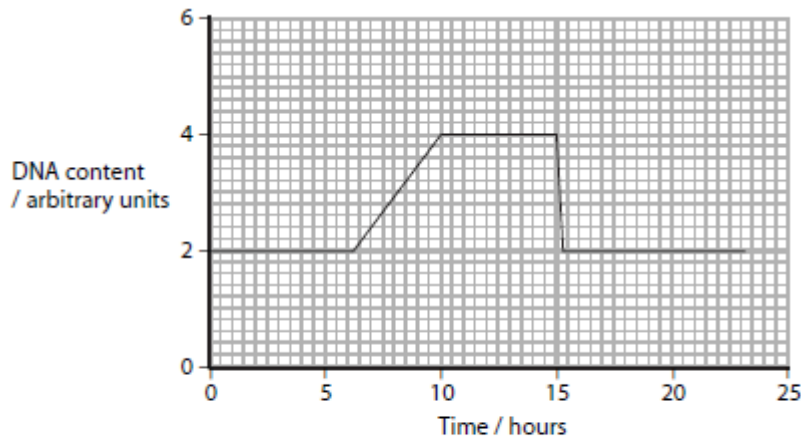
Cell division produces more cells. Groups of cells become organised into tissues and further organisation results in the formation of a multicellular organism.

(a) Complete the diagram below by writing in the boxes the missing levels of organisation in the correct order.

(2)



(b) The graph below shows the changes in the DNA content of an onion cell, during one cell cycle.

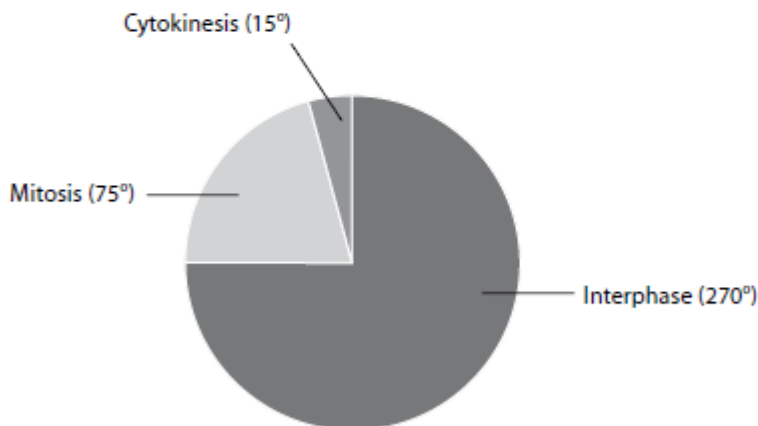


(i) Explain why the DNA content of the cell doubles. (2)

(ii) Using the graph, state how long the S phase (DNA synthesis) takes. (1)

..... hours

(iii) In onion cells, interphase lasts an average of 18 hours. Using this information and the diagram below, calculate how long mitosis takes. The figures in brackets show the number of degrees for each sector of the circle. Show your working. (2)



Answer hours

*(c) Prophase is a stage in mitosis. Describe the events that occur during prophase. (3)

7)

Meiosis is involved in producing gametes such as sperm cells and egg cells.

(a) Describe **three** structural differences between a human sperm cell and a human egg cell. (3)

(b) When a sperm cell reaches an egg cell, enzymes are released from the head of the sperm. Explain the reasons for the release of these enzymes. (2)

(c) Describe what happens in the egg cell once the sperm cell nucleus has entered it. (2)

(d) In plants, a double fertilisation occurs.

(i) One fertilisation involves a male gamete nucleus fusing with the egg cell nucleus. Give **two** functions of this fertilisation. (2)

(ii) In the second fertilisation, the other male gamete nucleus fuses with two polar nuclei forming a triploid structure. Name the triploid structure formed. (1)