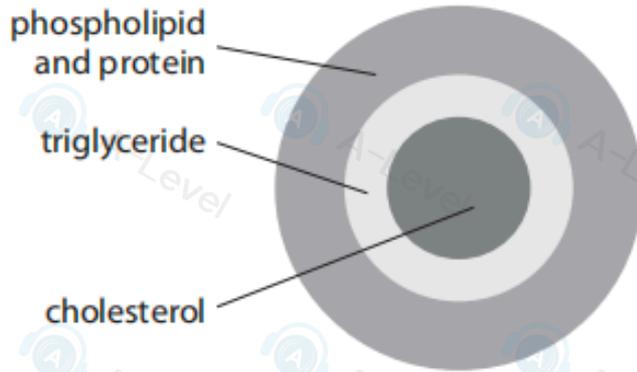


8 Low-density lipoproteins (LDLs) transport lipids around the body in the blood.

Low-density lipoproteins can result in the development of atherosclerosis.

They can be absorbed into the endothelial cells lining arteries and broken down by free radicals.

The diagram shows a low-density lipoprotein containing cholesterol.



(a) Compare and contrast the structure of a triglyceride and a phospholipid.

(3)

(b) Explain why the properties of LDLs enable cholesterol to be transported in the blood.

(3)

(c) The diameters of LDLs range from 19 nm to 24 nm.

The table shows some information about LDLs.

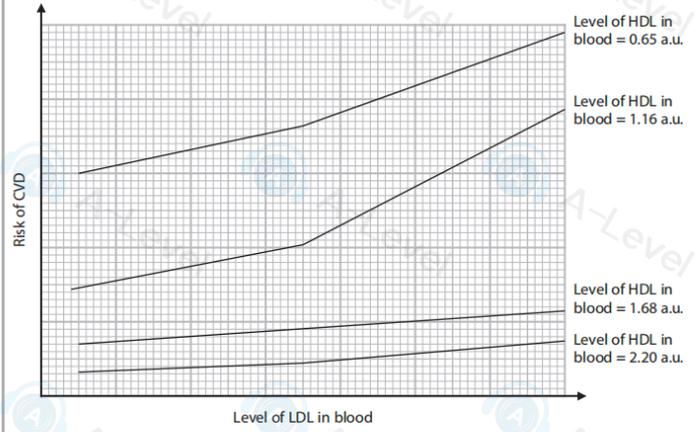
Diameter of LDL / nm	Volume of LDL / nm ³	Volume of cholesterol / nm ³	Ratio of LDL volume to cholesterol volume
19	3590	523	7:1
24		523	

(i) Complete the table by calculating the volume of LDL and the ratio of LDL volume to cholesterol volume.

Use the formula $v = \frac{4}{3}\pi r^3$

(3)

(ii) The graph shows the relationship between LDLs, high-density lipoproteins (HDLs) and the risk of CVD.



Explain why measuring only the level of LDL in the blood is **not** a reliable predictor of CVD.

Use the graph, all the information in this question and your own knowledge to support your answer.

(6)

(Total for Question 8 = 15 marks)

TOTAL FOR PAPER = 80 MARKS

2 The giraffe is the tallest mammal and has a long neck.

The photograph shows a giraffe.



(Source: © Eugen Haag/Shutterstock)

(a) (i) Which structure joins the bones of the neck together?

(1)

- A actin
- B ligament
- C muscle
- D tendon

(ii) Which structure joins a muscle to a bone?

(1)

- A actin
- B ligament
- C myosin
- D tendon

(iii) Which chemical group contains actin and myosin?

(1)

- A carbohydrates
- B fatty acids
- C nucleic acids
- D proteins

6 Starch from plants is used in the production of food, paper and building materials.

The structural and chemical properties of starch depend on its amylose and amylopectin content.

(a) The table shows some of the bonds found in amylose and amylopectin.

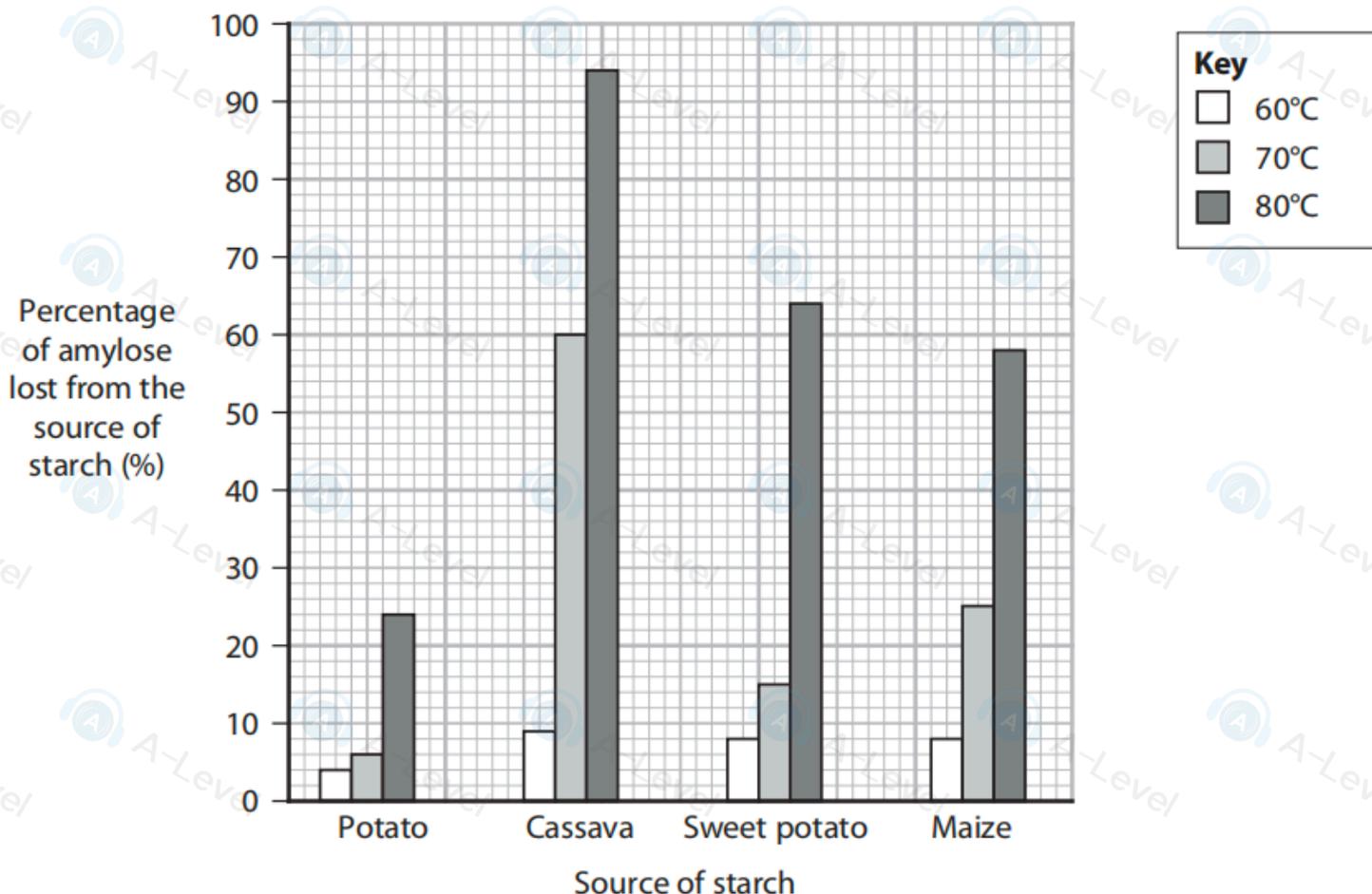
Put **one** cross in the appropriate box in each row to show whether the bond is present in these molecules.

(3)

Types of bond	Bonds found in			
	amylose only	amylopectin only	both amylose and amylopectin	neither amylose nor amylopectin
glycosidic bonds	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1-6 α bonds	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
hydrogen bonds	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

(b) When sources of starch are heated in water, amylose moves into the water.

The graph shows the percentage of amylose that is lost from four sources of starch at three temperatures.



Describe **two** conclusions that can be made about the effects of temperature and source of starch on the loss of amylose.

(2)

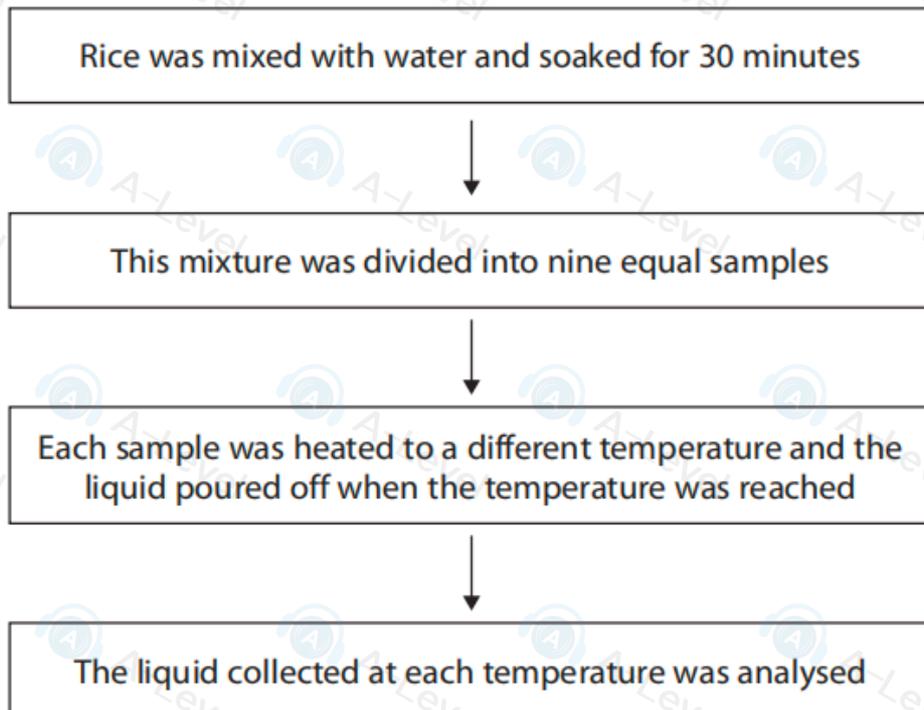
1 Effect of temperature

2 Effect of source of starch

- (c) The loss of amylose and amylopectin during the cooking of rice affects the hardness and stickiness of the cooked rice.

The effect of temperature on the loss of amylose and amylopectin was investigated.

The diagram shows part of the method used.



(iii) Suggest why rice should be cooked in a measured volume of water, with the lid on, until all the cooking liquid has been absorbed.

Use the information in the table to support your answer.

(2)

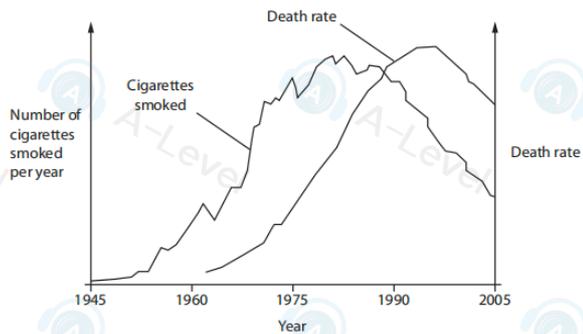
(Total for Question 6 = 13 marks)

5 Gas exchange surfaces have specific adaptations.

(a) Lungs contain the gas exchange surfaces of humans.

Smoking causes lung damage.

(i) The graph shows that there is a correlation between smoking and death rate from lung cancer in men.



Explain how this graph shows that there is a correlation between smoking and death rate from lung cancer in men.

(2)

(ii) Smoking is a cause of emphysema.

People with emphysema have weakened alveoli that can collapse, creating fewer but larger alveoli.

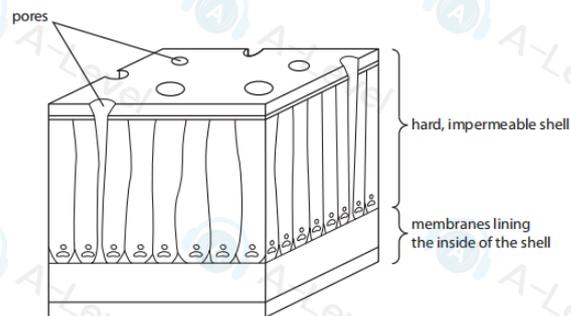
Explain how this will affect gas exchange in people with emphysema.

(2)

(b) Bird embryos develop inside hard-shelled eggs.

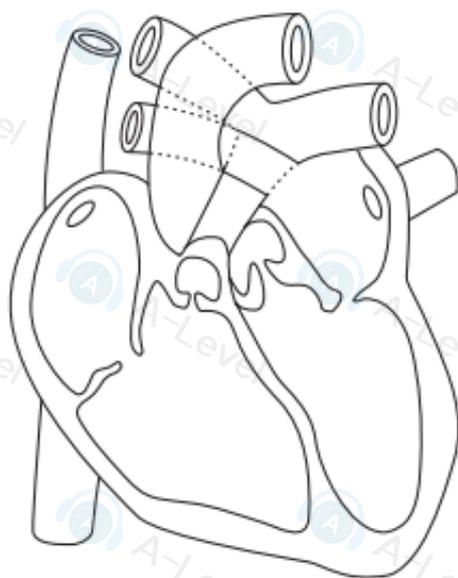
Gas exchange occurs across the shell of the egg. The oxygen diffuses into the bloodstream of the developing embryo and carbon dioxide diffuses back out.

The diagram shows a section through the shell of an egg.



The thickness of the egg shell is 0.5 mm. The density of the pores in the shell varies from 40 to 400 per cm².

7 The diagram below shows a section through a mammalian heart.



(a) (i) Name the vessel that carries blood from the lungs to the heart.

(1)

(ii) On the diagram, draw arrows to show blood entering the right ventricle of the heart and flowing towards the lungs.

(2)

Answer ALL questions. Write your answers in the spaces provided.

Some questions must be answered with a cross . If you change your mind about an answer, put a line through the box and then mark your new answer with a cross .

1 The polysaccharides and proteins that we eat are digested. The products of digestion are then transported in the blood plasma as a solution in water.

(a) Which of the following statements about water are correct?

1. A single molecule of water is composed of an oxygen atom joined to two hydrogen atoms by hydrogen bonds.
2. Water is a solvent.
3. The oxygen in a water molecule has a small negative charge and the hydrogen atoms each have a small positive charge.

(1)

- A 1 and 2 only
- B 1 and 3 only
- C 2 and 3 only
- D 1, 2 and 3

(b) The table shows some information about the structure of amylose and amylopectin.

Put **one** cross in the appropriate box in each row to show whether the structure is present in these molecules.

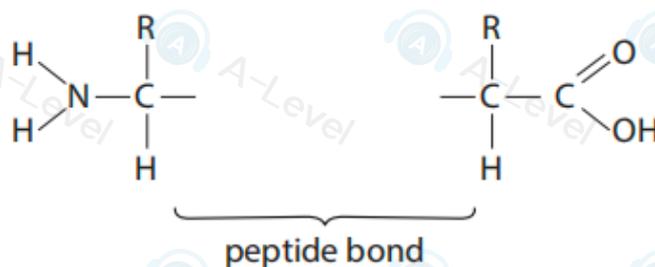
(3)

Structure	Structure found in			
	amylose only	amylopectin only	both amylose and amylopectin	neither amylose nor amylopectin
glycosidic bonds	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1-4 α bonds	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
branched side chains	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

(c) The diagram shows parts of two amino acids.

Complete the diagram to show a peptide bond joining these two amino acids.

(1)



(Total for Question 1 = 5 marks)