Write your name here

Surname	Other names

Centre Number | Candidate Number

Edexcel IGCSE

Human Biology

Unit: 4HB0
Paper: 01

Monday 9 May 2011 – Afternoon
Time: 2 hours

Paper Reference
4HB0/01

You must have:
Ruler
Candidates may use a calculator.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- Show all the steps in any calculations and state the units.

Information

- The total mark for this paper is **120**.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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P 3 8 7 5 1 A 0 1 2 8

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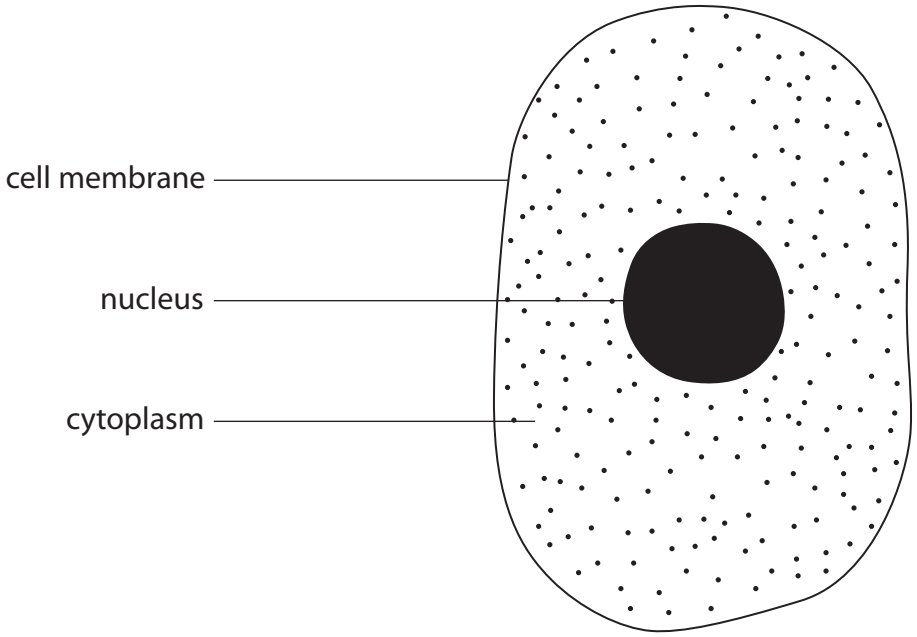
Answer ALL questions.

1 For each of the questions (a) to (j), choose an answer A, B, C or D and put a cross in the box ☒. Mark only one answer for each question. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

(a) The diagram shows a cheek cell.



Which part controls substances that enter and leave the cell?

(1)

☒ **A** cell membrane

☒ **B** nucleus

☒ **C** cytoplasm

☒ **D** none of these

(b) Bone is an example of

(1)

☒ **A** a cell

☒ **B** a tissue

☒ **C** an organ

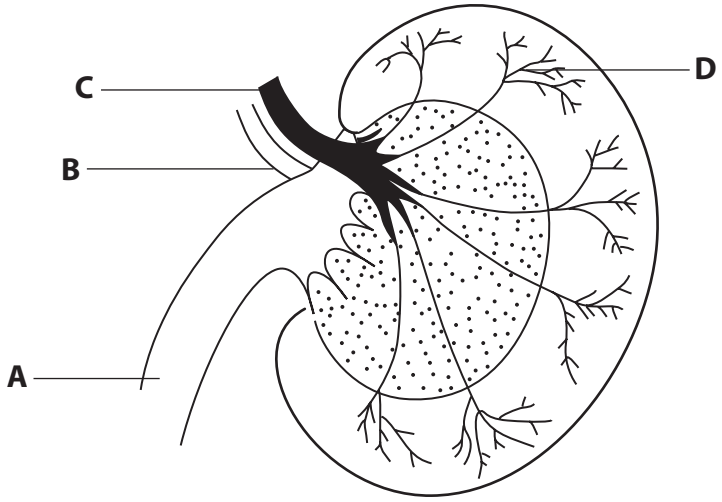
☒ **D** an organ system

(c) Which gas is required for aerobic respiration?

(1)

- ☒ **A** carbon dioxide
- ☒ **B** hydrogen
- ☒ **C** nitrogen
- ☒ **D** oxygen

(d) This is a diagram of a kidney with some parts labelled.



(1)

Which part is the ureter?

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(e) Which is **no**t an organ of excretion?

(1)

- ☒ **A** kidney
- ☒ **B** liver
- ☒ **C** lung
- ☒ **D** skin

(f) Which part of the blood starts the process of blood clotting?

(1)

- ☒ **A** red cells
- ☒ **B** white cells
- ☒ **C** platelets
- ☒ **D** plasma

(g) The information in the table is from a packet containing rice.

Contents	Amount per 100 g
carbohydrate	84 g
protein	6 g
fat	3 g
energy	1800 kJ

A person eats 50 g of rice.
How much carbohydrate does he eat?

(1)

- ☒ **A** 21 g
- ☒ **B** 42 g
- ☒ **C** 84 g
- ☒ **D** 168 g

(h) Which of the following statements is correct?

(1)

- ☒ **A** a gene is a section of a molecule of DNA
- ☒ **B** a gene is made up of several chromosomes
- ☒ **C** an allele contains two genes
- ☒ **D** a chromosome contains only one gene

(i) This is a diagram of a human sperm.

The number of chromosomes a human sperm contains is

(1)

☒ **A** 4

☒ **B** 23

☒ **C** 26

☒ **D** 46

(j) Human activities may contribute to greenhouse gases. Below is a list of gases.

carbon dioxide

methane

nitrous oxide

water vapour

How many of these gases are greenhouse gases?

(1)

☒ **A** 1

☒ **B** 2

☒ **C** 3

☒ **D** 4

(Total for Question 1 = 10 marks)

2 A student tested some food samples for starch, glucose, lipid and protein.

(a) Here is a list of chemicals.

alcohol	**Benedict's**	**Biuret**
bicarbonate indicator	**iodine**	**limewater**

Choose the appropriate chemical from the list that the student should use to test for:

(i) starch .....

(1)

(ii) glucose .....

(1)

(iii) lipid .....

(1)

(iv) protein .....

(1)

(b) Complete the table to show the colours if the food group is present or absent. Use colours from the list below.

Each colour may be used once, more than once, or not at all.

(6)

blue	**blue/black**	**brick red**	**lilac**	**white**	**yellow/orange**

Type of food	Colour if present	Colour if absent
starch		
glucose		
protein		

(c) Name **two** elements found in all carbohydrates, lipids and proteins.

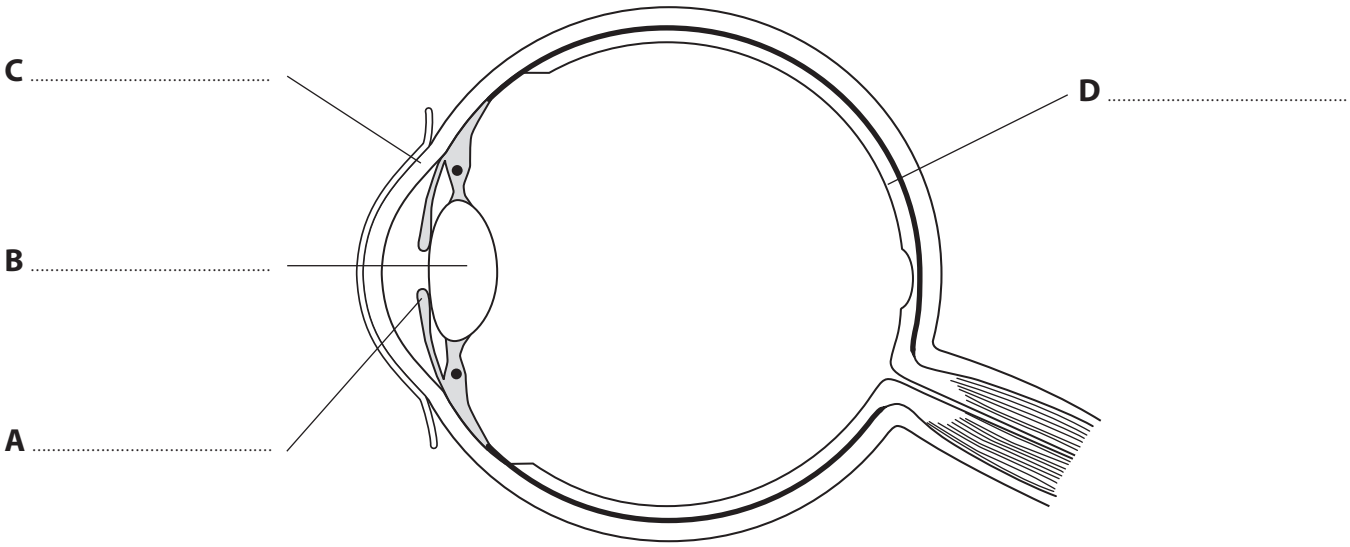
(2)

1 .....

2 .....

(Total for Question 2 = 12 marks)

3 The diagram shows a section through a human eye.



(a) On the diagram, name the parts labelled **A**, **B**, **C** and **D**.

(4)

(b) Which letter represents the part that responds to a change in light intensity? Put a cross in the correct box.

(1)

- ☒ **A**
- ☒ **B**
- ☒ **C**
- ☒ **D**

(c) Which **two** letters represent the parts that focus the light rays?

(1)

.....

(d) Using a line and the letter **O**, label the optic nerve on the diagram.

(1)

(Total for Question 3 = 7 marks)

4 Oestrogen is a hormone that is involved in the development of secondary sexual characteristics in females.

(a) State **two** secondary sexual characteristics in females.

(2)

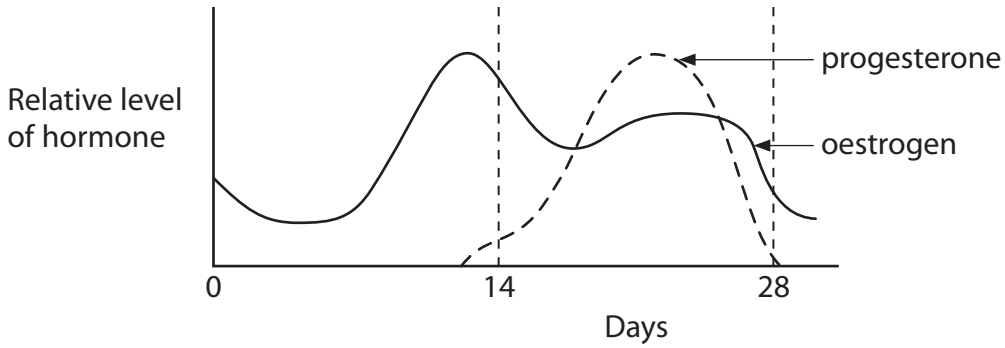
1 .....

.....

2 .....

.....

(b) The diagram shows how the levels of oestrogen and progesterone vary during the menstrual cycle.



(i) On the diagram, show how the line for progesterone would change if the woman became pregnant.

(1)

(ii) Which other hormone is responsible for the release of the ovum at day 14?

(1)

.....

(c) Complete the passage using appropriate words.

(4)

The fusion of the sperm and an ovum is known as ..... .

This process initially produces a ..... that undergoes a

type of cell division called ..... and develops into

an ..... before becoming a baby.

(Total for Question 4 = 8 marks)

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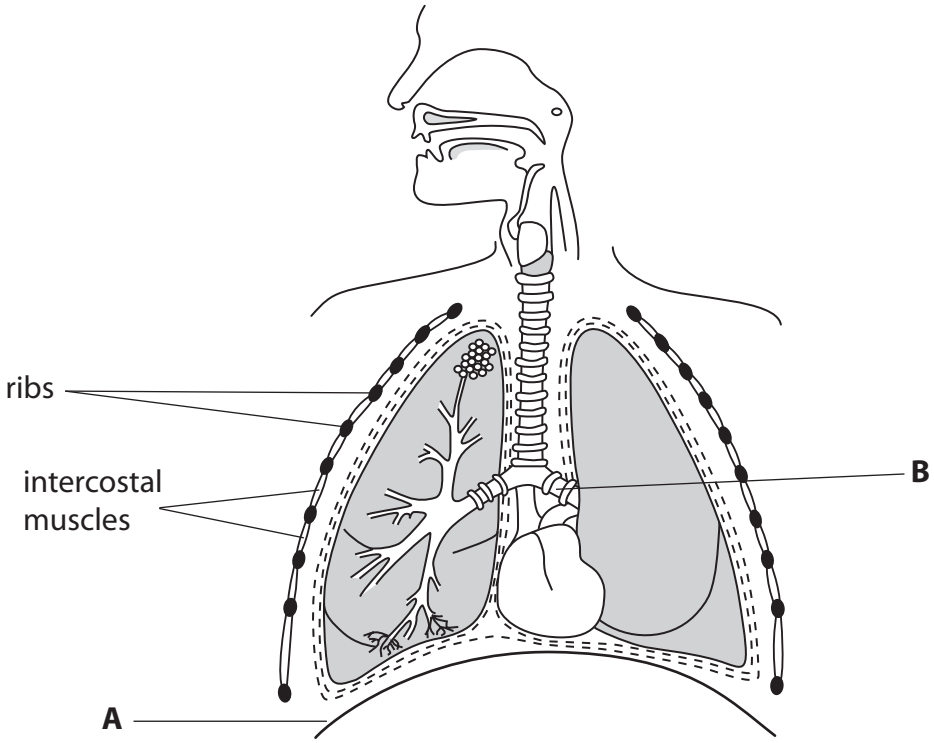
5 The diagram shows the structure of the respiratory system.



(a) Name the parts labelled **A** and **B**.

(2)

A .....

B .....

(b) Describe the role of the intercostal muscles when breathing in.

(3)

.....

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.....

.....

.....

.....

(c) Match up the terms with their correct definitions by drawing a line from each term to its definition.

(2)

Term	**Definition**
tidal volume	the maximum volume of air that can be breathed in one breath
vital capacity	the number of breaths taken in one minute
breathing rate	the volume of air exchanged during quiet breathing in one breath

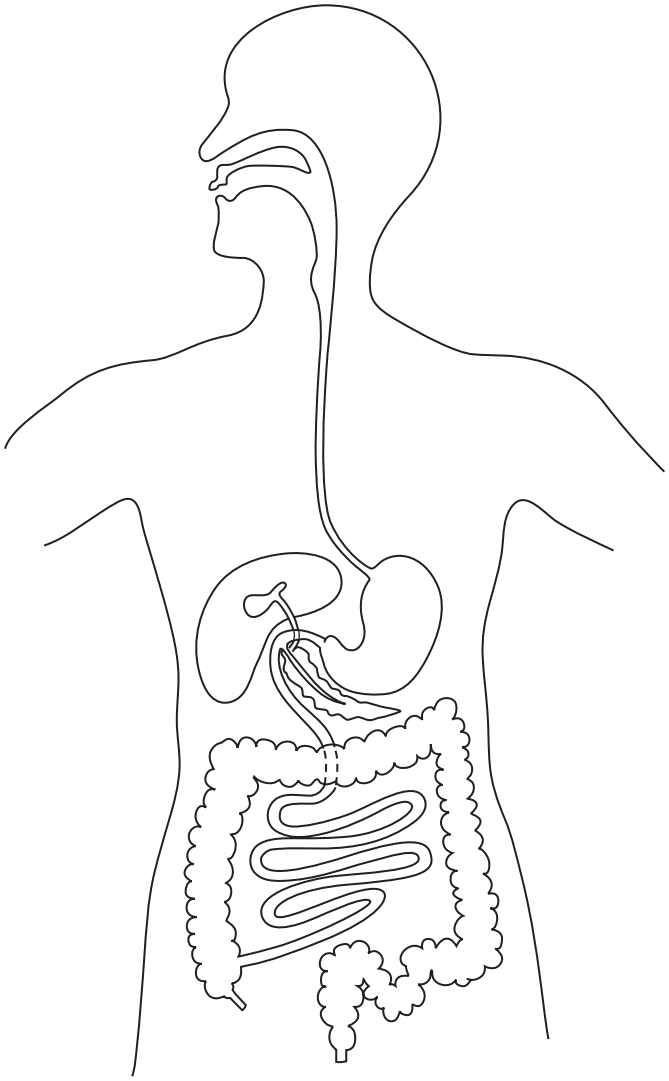
(d) Name the machine used to measure lung volumes.

(1)

.....

(Total for Question 5 = 8 marks)

6 The diagram shows the human digestive system.



(a) The stomach is involved in digestion.

(i) Using a line and the letter **S**, label the stomach on the diagram.

(1)

(ii) Name the food group that starts being chemically digested in the stomach.

(1)

(b) The table shows some major food groups, the enzymes involved in their digestion and the end products of digestion. Complete the table.

(3)

Major food group	Enzyme involved	End product of digestion
starch		maltose
protein	protease	
	lipase	glycerol and fatty acids

(c) Tick (✓) **two** boxes next to foods rich in carbohydrate.

(2)

chicken ☐

chocolate ☐

potatoes ☐

rice ☐

(d) Explain why dietary fibre is important for the human alimentary canal.

(2)

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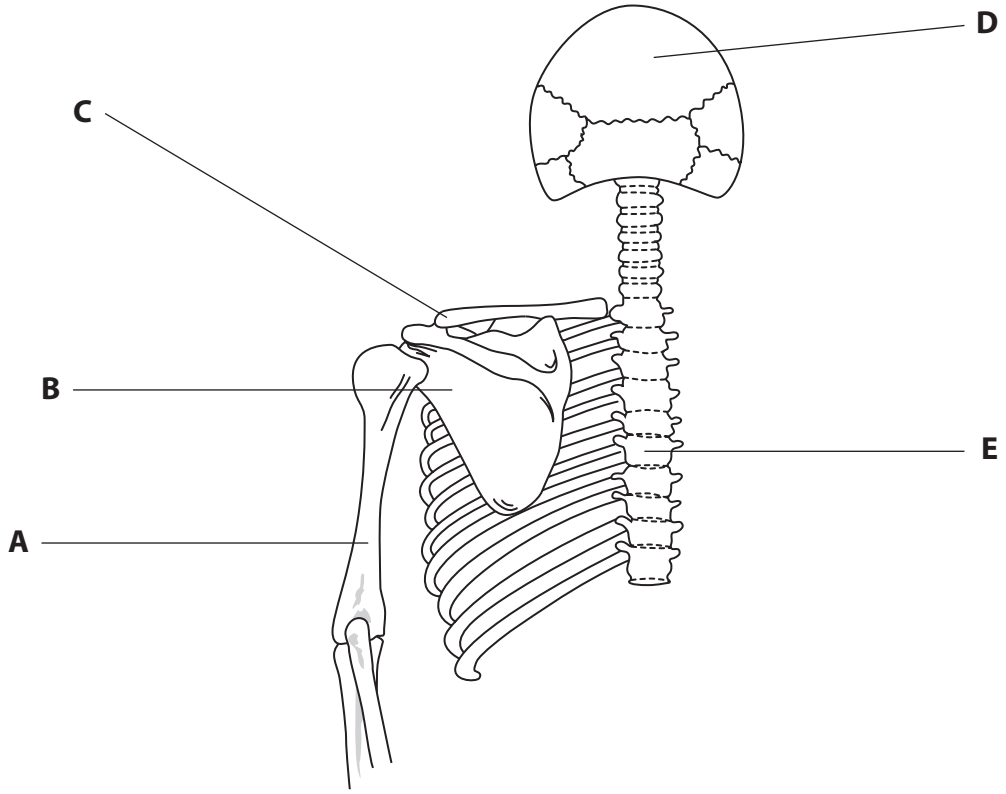
(Total for Question 6 = 9 marks)

7 The diagram shows part of a human skeleton viewed from behind.



(a) Name the parts labelled **A** and **B**.

(2)

A .....

B .....

(b) The bones in the skeleton belong to the axial skeleton or the appendicular skeleton.

Complete the table to show where the bones labelled in the diagram belong. Bones C and D have been filled in for you.

(2)

Axial skeleton	Appendicular skeleton
D	C

(c) Explain the function of the joint at the shoulder.

(2)

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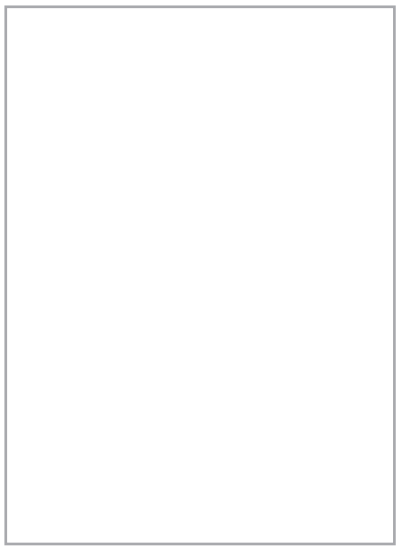
(Total for Question 7 = 6 marks)

8 (a) Barley is a crop grown mainly to feed animals such as sheep. Humans eat the meat from sheep.



(i) In the space below, draw a food chain containing sheep, humans and barley.

(2)

(ii) Name the primary consumer in the food chain.

(1)

.....

(iii) Explain why not all the energy is passed from one trophic level to the next in a food chain.

(2)

.....

.....

.....

.....

(b) Barley crops need minerals such as nitrates for healthy growth and increased yield. Artificial fertilisers may be used to provide these minerals. Sometimes these minerals leach into rivers.

Explain how the leaching of minerals into rivers may be harmful to fish.

(4)

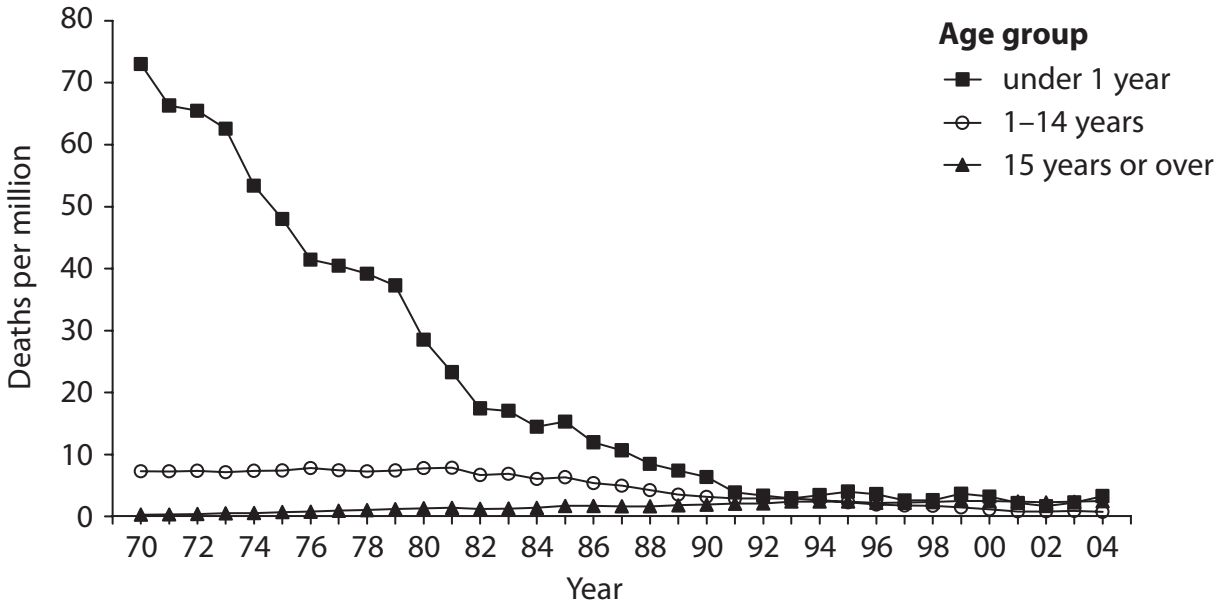
(Total for Question 8 = 9 marks)

9 Cystic fibrosis is a condition that affects people who inherit two recessive alleles.

(a) Explain what is meant by the term **recessive allele**.

(2)

(b) The number of deaths from cystic fibrosis per million of the population changed in the UK from 1970 until 2004. The graph shows these changes for three different age groups.



Describe the conclusions that can be made from the graph.

(4)

(c) Cystic fibrosis is a condition that affects the lungs. Mucus in the lungs of someone who has cystic fibrosis is much stickier and thicker than usual. This means that less air can be breathed in.

The build-up of this mucus makes it easy for bacteria to grow and this can lead to serious lung infections.

(i) What type of medicine is usually given to someone who has a bacterial infection?

(1)

.....

(ii) Explain why someone who has cystic fibrosis may find it hard to exercise.

(3)

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.....

.....

.....

.....

.....

(Total for Question 9 = 10 marks)

10 Movement of substances into and out of cells can be by diffusion, osmosis or active transport.

(a) Match up the statements to the correct process by drawing a line from each process to the most appropriate statement.

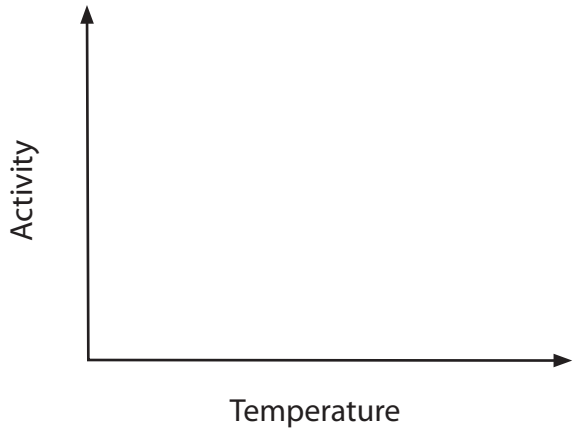
(2)

Process	**Statement**
diffusion	molecules move against a concentration gradient
osmosis	movement is from a high to a low concentration
active transport	involves the movement of water

(b) Active transport involves the enzyme ATPase. Its activity may be affected by temperature and pH.

(i) Sketch on the axes below how the activity is likely to be affected by temperature.

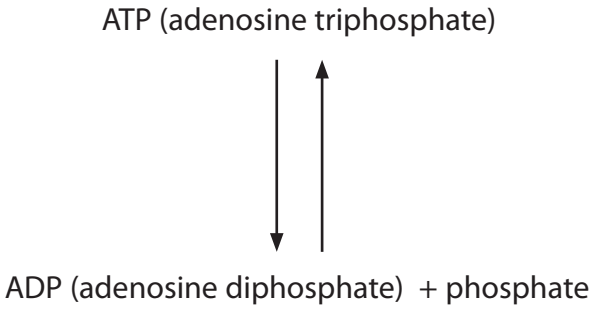
(2)



(ii) Explain how an enzyme's activity is usually affected by pH.

(3)

(iii) The diagram shows the breakdown and regeneration of ATP.

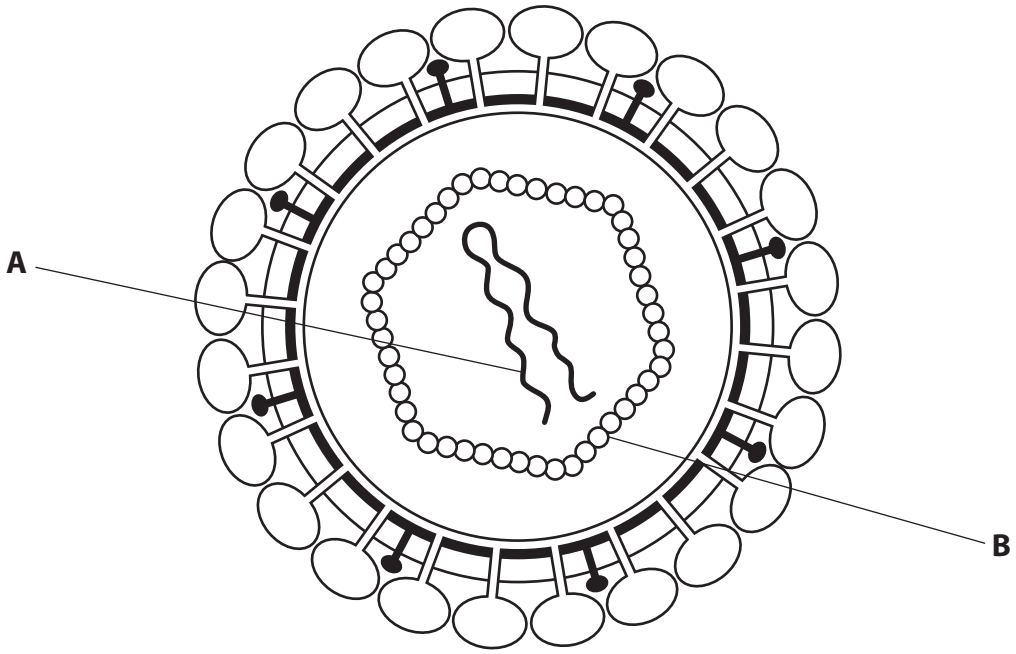


Using the information in the diagram, describe what happens during the process of respiration.

(2)

(Total for Question 10 = 9 marks)

11 The diagram shows a virus.



(a) (i) Complete the table to give the names of the parts labelled **A** and **B**.

(2)

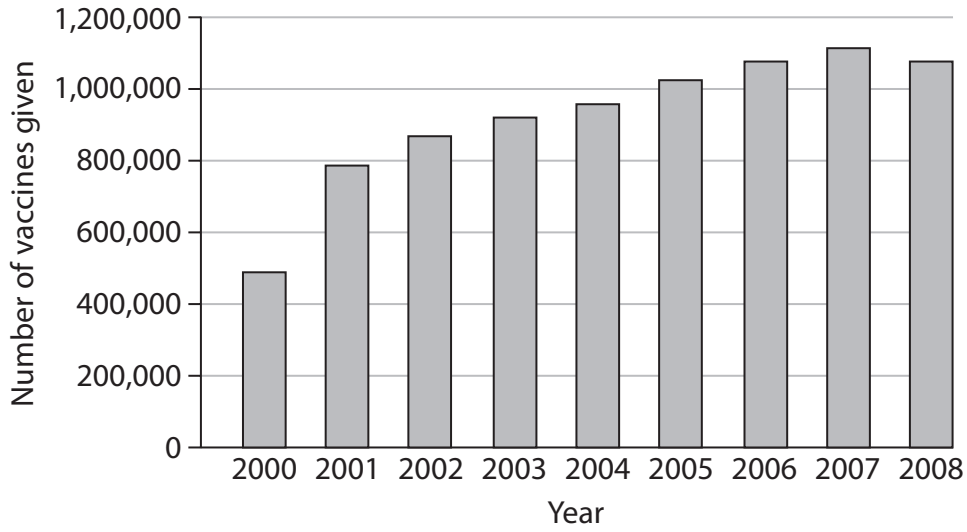
Letter	Name of part
A	
B	

(ii) Where do viruses reproduce?

(1)

.....

(b) Influenza is caused by a virus. People can be immunised against influenza. The graph shows the annual number of influenza vaccines given in Scotland from 2000 to 2008.



(i) Describe how the number of vaccines given changed from 2000 to 2008.

(2)

(ii) The influenza vaccine does not contain any live viruses. Explain how it can protect us against the virus.

(2)

(iii) Explain why people need to be vaccinated against the influenza virus every year.

(2)

(Total for Question 11 = 9 marks)

12 Mountain biking is a popular sport and one that requires a high degree of fitness. The cyclists shown here are taking part in a tour across a desert. The cyclists will experience very hot conditions during the three days of the tour.

(a) When he gets too hot a cyclist starts to sweat.

(i) Explain how sweating cools the cyclist down.

(2)

(ii) Describe **one** other mechanism the body has for cooling down.

(2)

(b) When mountain biking, it is important to replace any fluid lost.

Describe the role of antidiuretic hormone (ADH) in replacing fluid lost from the blood.

(2)

(c) The action of sweating and ADH are both examples of homeostasis.

Define the term **homeostasis**.

(2)

(d) Design an experiment to show that people sweat more when they exercise.

(4)

(Total for Question 12 = 12 marks)

13 A woman was admitted into hospital after accidentally cutting herself very severely.

(a) The main artery in her leg had been cut.

Explain why blood loss is likely to be higher when an artery, rather than a vein, has been cut.

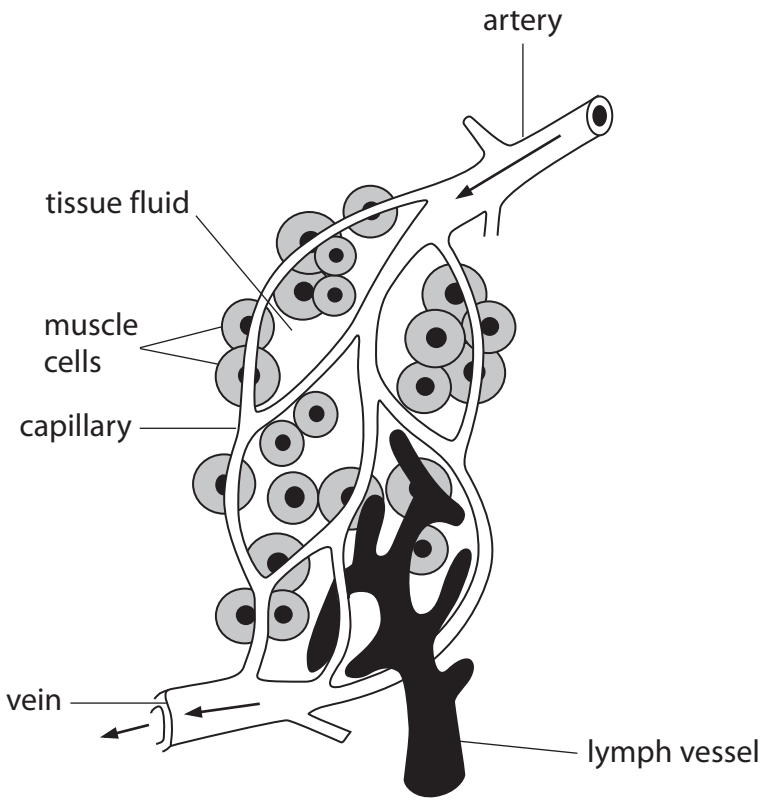
(2)

(b) The woman was found to need a blood transfusion. She has blood group A.

Explain why she can be given blood from blood group O as well as from blood group A, but **not** from blood group B.

(5)

(c) The woman also needed a transfusion of tissue fluid. The diagram shows tissue fluid in a capillary bed in muscle tissue.



Use the information in the diagram to describe the role of tissue fluid.

(4)

(Total for Question 13 = 11 marks)

TOTAL FOR PAPER = 120 MARKS

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