

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education  
Spring 2005



**SCIENCE: DOUBLE AWARD A (MODULAR) 346001**  
**BIOLOGY A (MODULAR)**  
**Humans as Organisms (Module 01)**

Wednesday 2 March 2005 Morning Session

**In addition to this paper you will require:**

- a black ball-point pen;
- an answer sheet.

You may use a calculator.

Time allowed: 30 minutes

**Instructions**

- Fill in the boxes at the top of this page.
- Check that your name, candidate number and centre number are printed on the separate answer sheet.
- Check that the separate answer sheet has the title “Humans as Organisms” printed on it.
- Attempt **one Tier only**, **either** the Foundation Tier **or** the Higher Tier.
- Make sure that you use the correct side of the separate answer sheet; the Foundation Tier is printed on one side and the Higher Tier on the other.
- Answer **all** the questions for the Tier you are attempting.
- Record your answers on the separate answer sheet only. Rough work may be done on the question paper.

**Instructions for recording answers**

- Use a **black ball-point pen**.

- For each answer **completely fill in the circle** as shown:
 

1	2	3	4
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

- Do **not** extend beyond the circles.

- If you want to change your answer, **you must** cross out your original answer, as shown:
 

1	2	3	4
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

- If you change your mind about an answer you have crossed out and now want to choose it, draw a ring around the cross as shown:
 

1	2	3	4
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

**Information**

- The maximum mark for this paper is 36.

**Advice**

- Do **not** choose more responses than you are asked to. You will lose marks if you do.
- Make sure that you hand in both your answer sheet and this question paper at the end of the test.
- If you start to answer on the wrong side of the answer sheet by mistake, make sure that you cross out **completely** the work that is not to be marked.

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You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.  
The Higher Tier starts on page 14 of this booklet.

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**FOUNDATION TIER**

**SECTION A**

Questions **ONE** to **FIVE**.

In these questions match the words in the list with the numbers.

Use **each** answer only **once**.

Mark your choices on the answer sheet.

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**QUESTION ONE**

The diagrams show a bacterium and a sperm cell.

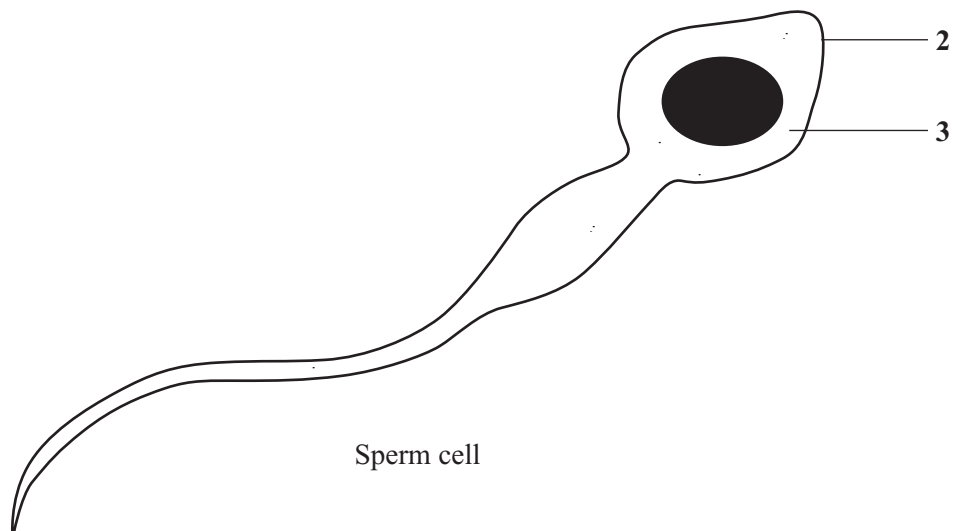
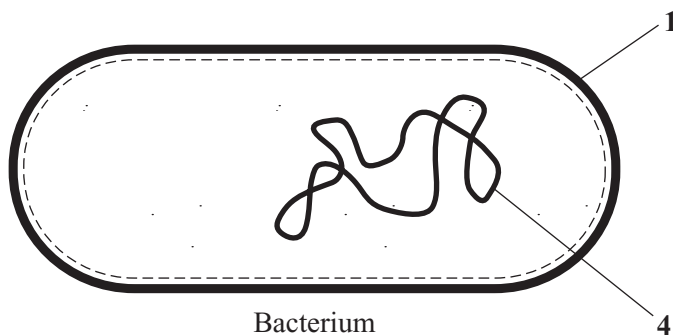
Match words from the list with the labels **1–4** on the diagrams.

**cell membrane**

**cell wall**

**cytoplasm**

**genetic material (genes)**



**QUESTION TWO**

The diagram shows four parts of human blood.

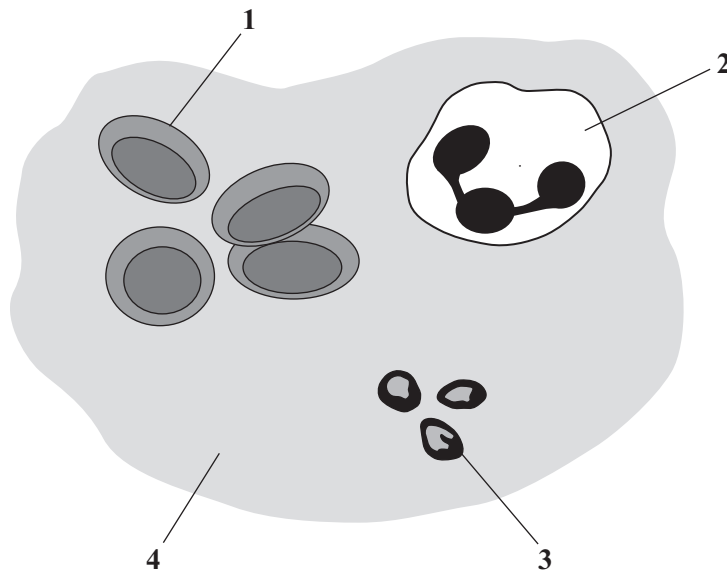
Match words from the list with the labels 1–4 on the diagram.

**plasma**

**platelet**

**red blood cell**

**white blood cell**



**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION THREE**

The diagram shows some of the structures in the thorax.

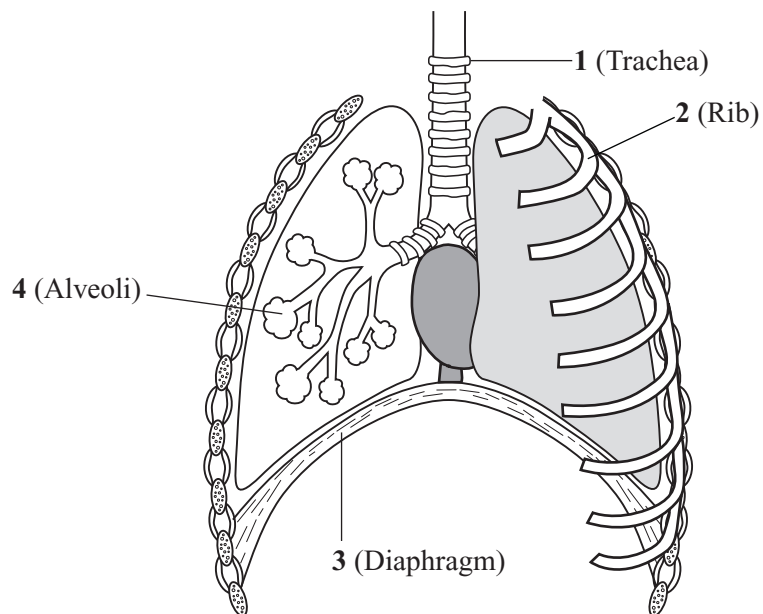
Match words from the list with the labels 1–4 on the diagram.

**carries air to the lungs**

**moves out when we breathe in**

**separates the thorax from the abdomen**

**where gases pass into and out of the blood**



**QUESTION FOUR**

The blood transports many substances to different parts of the body.

Match words from the list with the numbers 1–4 in the table.

**carbon dioxide**

**glucose**

**oxygen**

**urea**

Substance	Enters blood from	Leaves blood at
1	liver cells	the kidneys
2	muscle cells	the lungs
3	the lungs	muscle cells
4	the small intestine	muscle cells

**QUESTION FIVE**

The table is about the ways in which the body defends itself against microorganisms.

Match words from the list with the numbers 1–4 in the table.

**breathing organ**

**skin**

**stomach**

**white blood cell**

Part of body	How it helps to defend your body
1	ingests microorganisms
2	acts as a barrier to the entry of microorganisms
3	produces acid which kills microorganisms
4	produces sticky mucus to trap microorganisms

Turn over ►

**SECTION B**Questions **SIX** and **SEVEN**.In these questions choose the best **two** answers.Do **not** choose more than two.Mark your choices on the answer sheet.

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**QUESTION SIX**

The body produces a number of substances.

Which **two** substances are produced by the body to combat infection?**antibodies****antitoxins****bile****toxins****vaccines****QUESTION SEVEN**Which **two** of the following substances are lipids?**fats****oils****protein****starch****sugar**

**NO QUESTIONS APPEAR ON THIS PAGE**

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**SECTION C**Questions **EIGHT** to **TEN**.

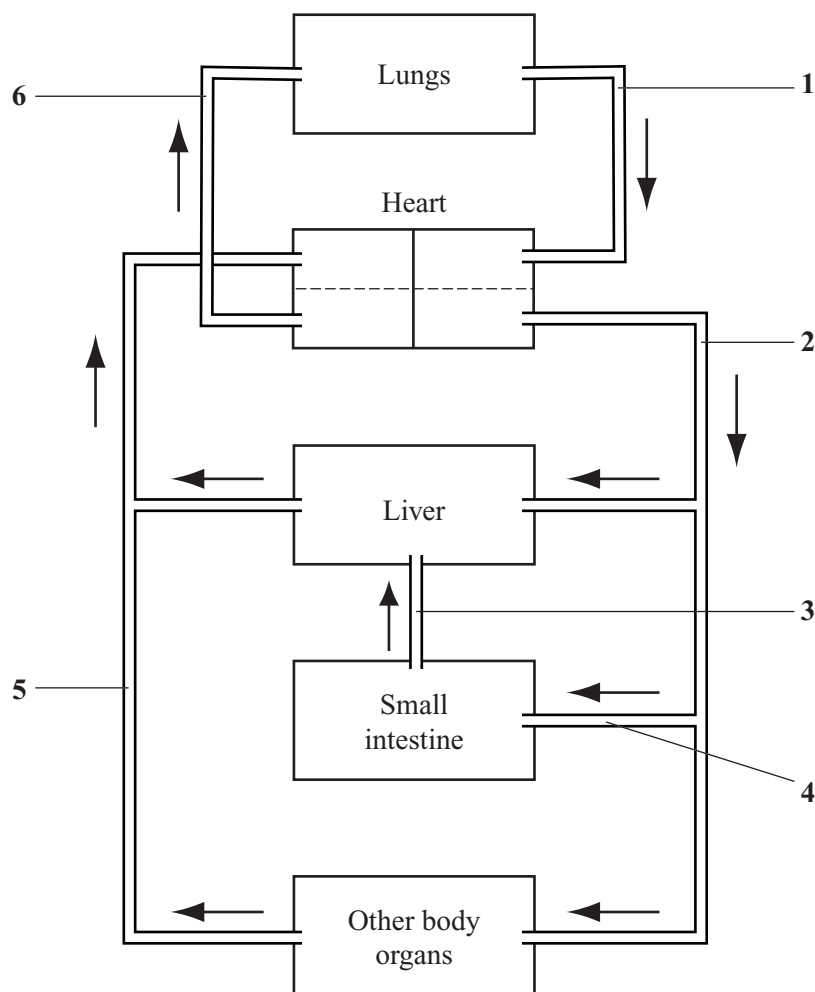
Each of these questions has four parts.

In each part choose only **one** answer.

Mark your choices on the answer sheet.

**QUESTION EIGHT**

The circulation system transports substances around the body.  
The diagram shows part of this system.



**8.1** Blood vessel **6** is . . . . .

- A** an artery.
- B** a bronchus.
- C** a capillary.
- D** a vein.



- 8.2 After a meal rich in starch, the blood with the highest concentration of sugar would be in blood vessel . . . . .
- A 2
- B 3
- C 4
- D 5
- 8.3 The two blood vessels containing blood with the highest concentration of oxygen are . . . . .
- A 1 and 2
- B 1 and 3
- C 2 and 5
- D 2 and 6
- 8.4 Blood travels from the heart to the lungs and then back to the heart, using blood vessels 6 and 1.

Which line in the table shows the parts of the heart involved?

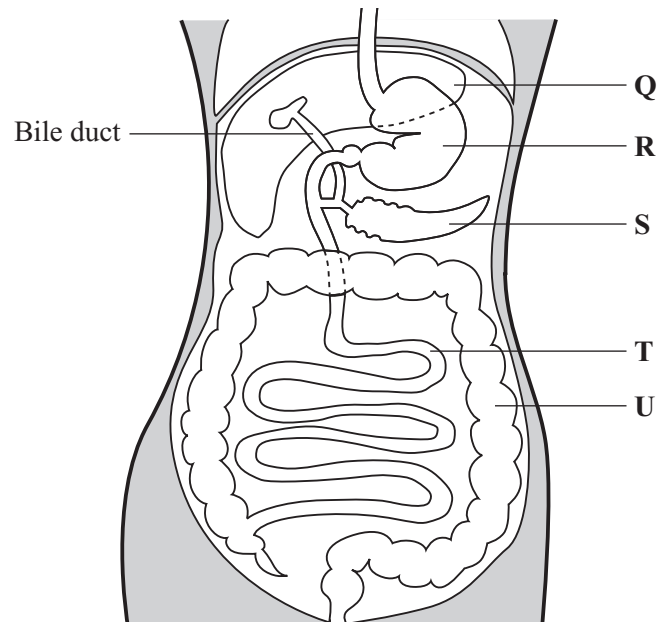
	<b>Part of the heart from which blood leaves to go to the lungs</b>	<b>Part of the heart receiving blood from the lungs</b>
<b>A</b>	atrium	atrium
<b>B</b>	atrium	ventricle
<b>C</b>	ventricle	atrium
<b>D</b>	ventricle	ventricle

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION NINE**

The diagram shows some of the structures concerned with digestion.



**9.1** Protein digestion occurs in parts . . . . .

- A** R and S
- B** R and T
- C** S and T
- D** T and U

**9.2** What is the role of part **Q** in digestion?

- A** It digests sugars
- B** It produces an enzyme that digests fats
- C** It produces bile which emulsifies fats
- D** It stores excess starch

**9.3** The bile duct can be blocked by gall stones.

Which of the following may be a result of this blockage?

- A** Enzymes would not be produced by the pancreas
- B** Fats would not be digested properly
- C** Lipase enzymes would not be produced
- D** Soluble food would not be absorbed into the blood

**9.4** The absorption of water takes place mainly in part . . . . .

- A** R
- B** S
- C** T
- D** U

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION TEN**

The table gives some information about the number of cases of five infectious diseases.

	<b>Number of cases in thousands</b>				
<b>Year</b>	<b>Whooping cough</b>	<b>Tuberculosis</b>	<b>Measles</b>	<b>Mumps</b>	<b>Rubella</b>
1970	19.4	13.7	155.2	132.6	131.2
1975	9.9	12.6	158.6	100.4	130.5
1980	22.9	10.5	147.9	99.8	76.4
1985	24.2	6.6	104.8	19.6	29.3
1990	16.9	5.9	15.6	3.8	24.5
1995	2.4	6.2	9.0	2.1	11.3
2000	0.9	7.1	2.9	3.4	3.6

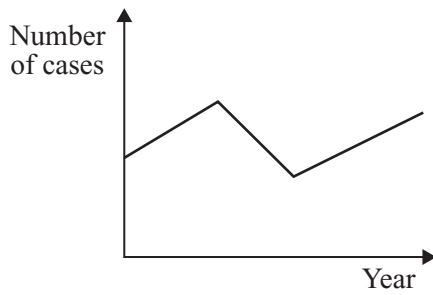
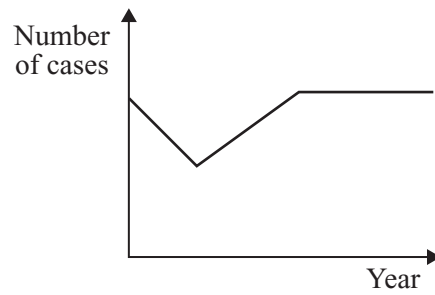
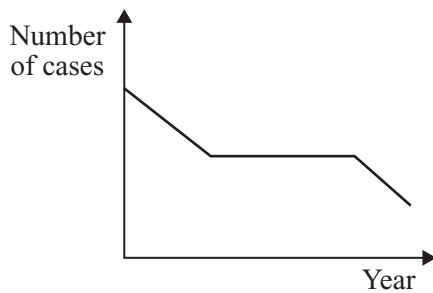
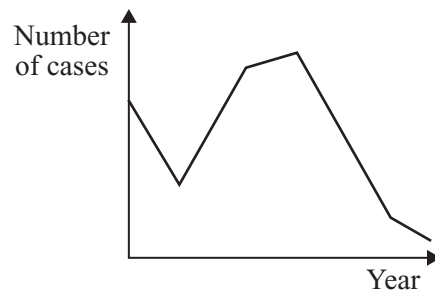
**10.1** For which disease did the number of cases fall every five years?

- A Mumps
- B Rubella
- C Tuberculosis
- D Whooping cough

**10.2** Between 1970 and 2000, the number of cases (in thousands) of measles fell by . . . . .

- A 15.23
- B 152.3
- C 2 900
- D 152 300

**10.3** Which graph shows the number of cases of whooping cough between 1970 and 2000?

**A****B****C****D**

**10.4** A vaccine against a disease contains . . . . .

- A** a dead or mild form of the microbe that causes the disease.
- B** antibodies from the microbe that causes the disease.
- C** toxins from a person who has recovered from the disease.
- D** white blood cells from a person who has had the disease.

**END OF TEST**

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You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.  
The Foundation Tier is earlier in this booklet.

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**HIGHER TIER**

**SECTION A**

Questions **ONE** and **TWO**.

In these questions match the words in the list with the numbers.

Use **each** answer only **once**.

Mark your choices on the answer sheet.

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**QUESTION ONE**

The table is about the ways in which the body defends itself against microorganisms.

Match words from the list with the numbers **1–4** in the table.

**breathing organ**

**skin**

**stomach**

**white blood cell**

<b>Part of body</b>	<b>How it helps to defend your body</b>
<b>1</b>	ingests microorganisms
<b>2</b>	acts as a barrier to the entry of microorganisms
<b>3</b>	produces acid which kills microorganisms
<b>4</b>	produces sticky mucus to trap microorganisms

**QUESTION TWO**

The diagram shows some of the structures in the thorax.

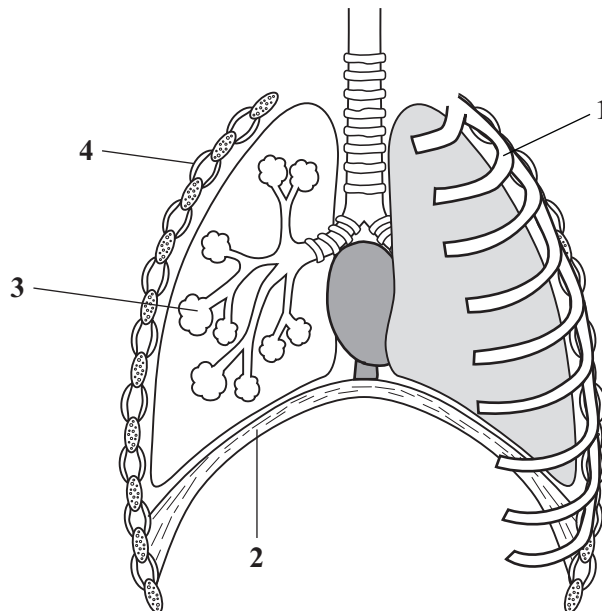
Match words from the list with the labels 1–4 on the diagram.

**contracts to move the ribs upwards**

**has a thin wall for the exchange of gases**

**moves down to reduce the volume of the thorax**

**relaxes and moves up when we exhale**



**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**SECTION B**

Questions **THREE** and **FOUR**.

In these questions choose the best **two** answers.

Do **not** choose more than two.

Mark your choices on the answer sheet.

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**QUESTION THREE**

Which **two** of the following substances are lipids?

**fats**

**oils**

**protein**

**starch**

**sugar**

**QUESTION FOUR**

Which **two** of the following are the features of red blood cells?

**contain haemoglobin**

**lack a nucleus**

**produce antibodies**

**transport carbon dioxide**

**transport urea**



**NO QUESTIONS APPEAR ON THIS PAGE**

**TURN OVER FOR THE NEXT QUESTION**

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**SECTION C**Questions **FIVE** to **TEN**.

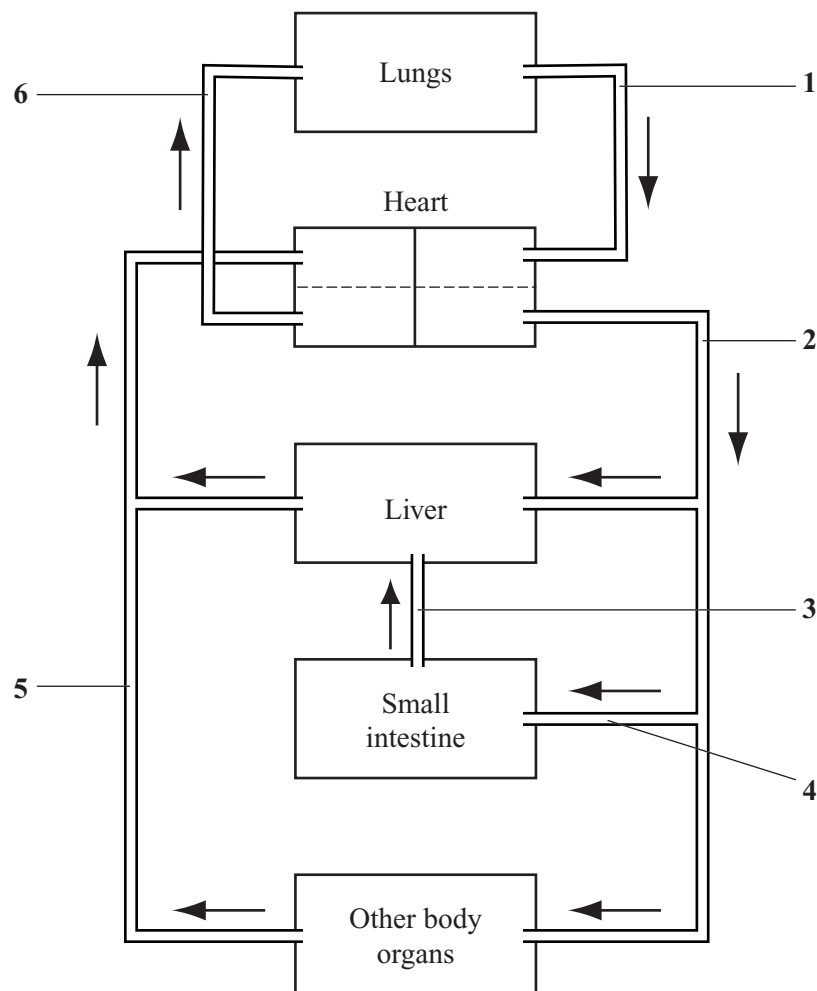
Each of these questions has four parts.

In each part choose only **one** answer.

Mark your choices on the answer sheet.

**QUESTION FIVE**

The circulation system transports substances around the body.  
The diagram shows part of this system.



**5.1** Blood vessel **6** is . . . . .

- A** an artery.
- B** a bronchus.
- C** a capillary.
- D** a vein.

5.2 After a meal rich in starch, the blood with the highest concentration of sugar would be in blood vessel . . . . .

- A 2
- B 3
- C 4
- D 5

5.3 The two blood vessels containing blood with the highest concentration of oxygen are . . . . .

- A 1 and 2
- B 1 and 3
- C 2 and 5
- D 2 and 6

5.4 Blood travels from the heart to the lungs and then back to the heart, using blood vessels 6 and 1.

Which line in the table shows the parts of the heart involved?

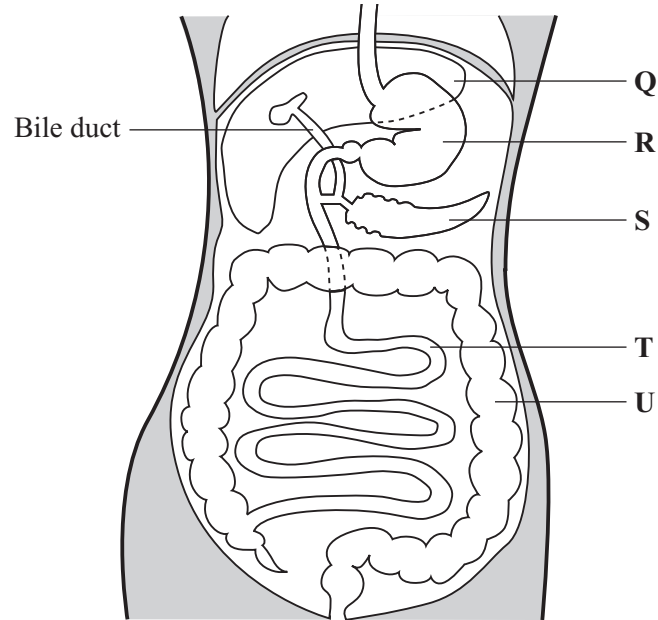
	<b>Part of the heart from which blood leaves to go to the lungs</b>	<b>Part of the heart receiving blood from the lungs</b>
<b>A</b>	atrium	atrium
<b>B</b>	atrium	ventricle
<b>C</b>	ventricle	atrium
<b>D</b>	ventricle	ventricle

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION SIX**

The diagram shows some of the structures concerned with digestion.



**6.1** Protein digestion occurs in parts . . . . .

- A R and S
- B R and T
- C S and T
- D T and U

**6.2** What is the role of part Q in digestion?

- A It digests sugars
- B It produces an enzyme that digests fats
- C It produces bile which emulsifies fats
- D It stores excess starch

**6.3** The bile duct can be blocked by gall stones.

Which of the following may be a result of this blockage?

- A Enzymes would not be produced by the pancreas
- B Fats would not be digested properly
- C Lipase enzymes would not be produced
- D Soluble food would not be absorbed into the blood

**6.4** The absorption of water takes place mainly in part . . . . .

- A R
- B S
- C T
- D U

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION SEVEN**

The table gives some information about the number of cases of five infectious diseases.

	<b>Number of cases in thousands</b>				
<b>Year</b>	<b>Whooping cough</b>	<b>Tuberculosis</b>	<b>Measles</b>	<b>Mumps</b>	<b>Rubella</b>
1970	19.4	13.7	155.2	132.6	131.2
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1990	16.9	5.9	15.6	3.8	24.5
1995	2.4	6.2	9.0	2.1	11.3
2000	0.9	7.1	2.9	3.4	3.6

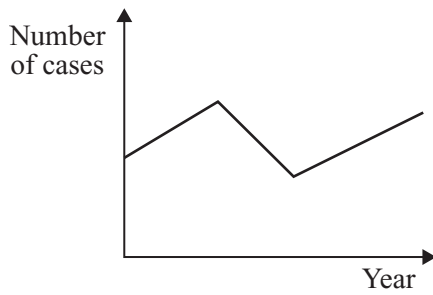
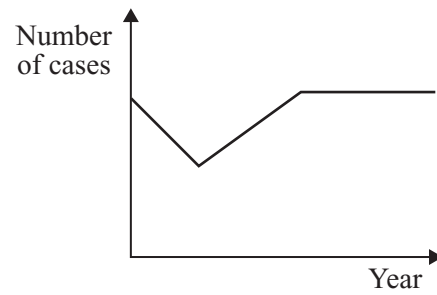
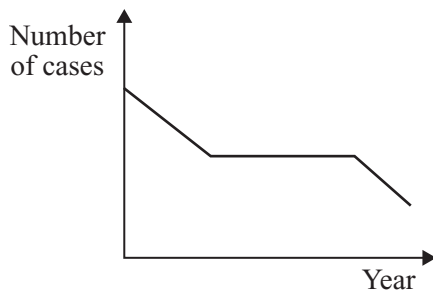
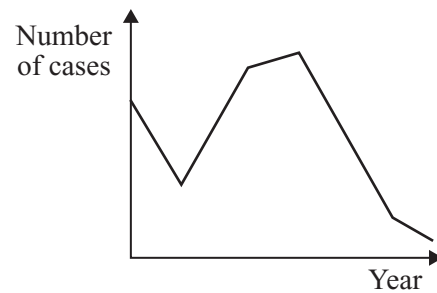
**7.1** For which disease did the number of cases fall every five years?

- A** Mumps
- B** Rubella
- C** Tuberculosis
- D** Whooping cough

**7.2** Between 1970 and 2000, the number of cases (in thousands) of measles fell by . . . . .

- A** 15.23
- B** 152.3
- C** 2 900
- D** 152 300

7.3 Which graph shows the number of cases of whooping cough between 1970 and 2000?

**A****B****C****D**

7.4 A vaccine against a disease contains . . . . .

- A** a dead or mild form of the microbe that causes the disease.
- B** antibodies from the microbe that causes the disease.
- C** toxins from a person who has recovered from the disease.
- D** white blood cells from a person who has had the disease.

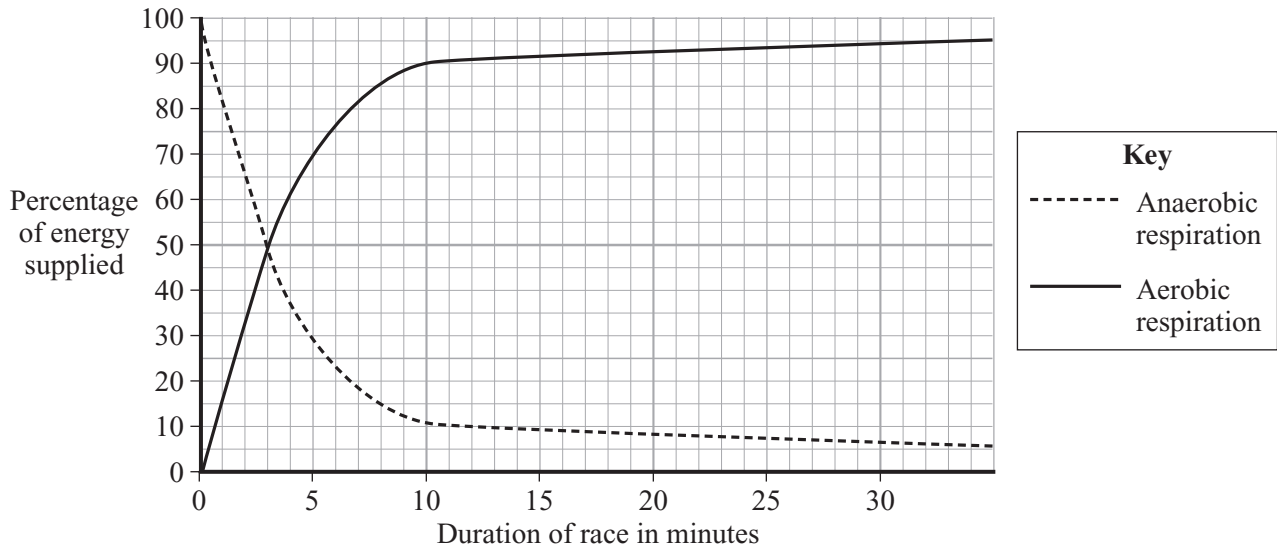
**TURN OVER FOR THE NEXT QUESTION**

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**QUESTION EIGHT**

During a race, energy is supplied to the muscles by both anaerobic and aerobic respiration.

The graph shows the percentage of energy supplied by each type of respiration in races of different duration.



- 8.1** For which duration of race are the percentages of energy supplied by anaerobic respiration and aerobic respiration the same?
- A 1 minute  
 B 3 minutes  
 C 10 minutes  
 D 30 minutes
- 8.2** Which of the following statements is supported by the data in the graph?
- A Anaerobic respiration only takes place in short races  
 B Anaerobic respiration provides most of the energy in a sprint race lasting 25 seconds  
 C Anaerobic respiration provides very little energy  
 D The longer the race the more lactic acid is produced per minute



- 8.3** The products of aerobic respiration are . . . . .
- A** carbon dioxide + lactic acid + energy.
  - B** carbon dioxide + water + energy.
  - C** lactic acid + energy.
  - D** lactic acid + water + energy.
- 8.4** An athlete might have an oxygen debt after a race. This is because . . . . .
- A** she has not enough haemoglobin.
  - B** she has to get rid of accumulated lactic acid.
  - C** she has too much carbon dioxide in her blood.
  - D** she is short of breath.

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

### QUESTION NINE

**Table 1** shows the percentage of blood flowing through various parts of the body of a student as the level of exercise increases.

Part of Body	Percentage of blood flowing to parts of body when		
	exercising gently	jogging	running fast
Muscles attached to skeleton	45	65	85
Brain	10	5	3
Heart muscle	5	5	5

**Table 1**

**Table 2** shows the total volume of blood flowing from the heart as the level of exercise increases.

	exercising gently	jogging	running fast
Total volume of blood flowing from heart in $\text{cm}^3$ per minute	9000	18000	30000

**Table 2**

**9.1** When jogging, what volume of blood flows to the muscles attached to the skeleton?

- A 900  $\text{cm}^3$  per minute
- B 4050  $\text{cm}^3$  per minute
- C 11 700  $\text{cm}^3$  per minute
- D 21 250  $\text{cm}^3$  per minute

**9.2** As the level of exercise increases, the volume of blood flowing to the brain . . . . .

- A increases.
- B is 18%.
- C reduces.
- D stays the same.

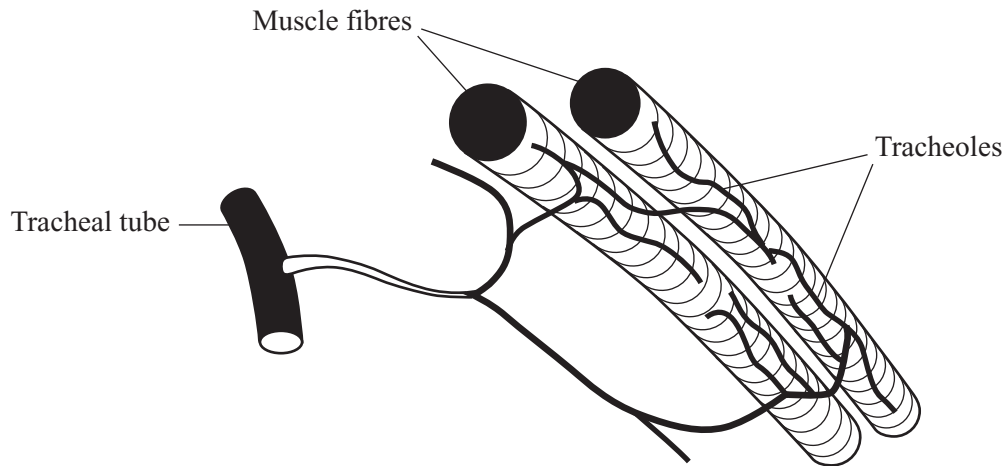
- 9.3** When running fast, the volume of blood flowing to the heart muscle is . . . . .
- A** double the volume when jogging.
  - B** more than three times the volume when exercising gently.
  - C** one third of the volume when exercising gently.
  - D** the same volume as when exercising gently.
- 9.4** During exercise, the volume of blood flowing to the digestive system is reduced.
- One result of this is that . . . . .
- A** the intestines stop producing enzymes.
  - B** the rate of absorption of soluble food decreases.
  - C** the surface area of the villi decreases.
  - D** the temperature of the stomach falls.

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

**QUESTION TEN**

The drawing shows some of the breathing organs of an insect. Air is supplied directly to the muscle cells by a system of air tubes called tracheal tubes and tracheoles. Oxygen is **not** transported by the blood.



- 10.1** The advantage of having many finely branched tracheoles is that . . . . .
- A gases can diffuse faster along narrow tubes.
  - B gases can diffuse in both directions in narrow tubes.
  - C they give a larger surface area for gas exchange.
  - D they give a larger volume for gas exchange.
- 10.2** Oxygen diffuses along the tracheal tubes towards the muscle fibres. This is because . . . . .
- A the insect needs energy to fly.
  - B the muscle fibres have membranes.
  - C the muscles absorb oxygen from the air at the ends of the tracheoles.
  - D there is 20% oxygen in the air.
- 10.3** When insects fly, lactic acid accumulates rapidly in their muscle fibres. This is because . . . . .
- A carbon dioxide is produced.
  - B insects do **not** breathe through their mouths.
  - C oxygen cannot diffuse to the muscles quickly enough.
  - D the muscles quickly run out of glucose.

**10.4** When the insect stops flying, the lactic acid will be . . . . .

- A** digested.
- B** excreted.
- C** oxidised to carbon dioxide and water.
- D** used in anaerobic respiration.

**END OF TEST**

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