

Surname		Other Names	
Centre Number			Candidate Number
Candidate Signature			

General Certificate of Secondary Education  
November 2006



**SCIENCE A**  
**Unit Biology B1a (Human Biology)**

**BLY1A**

**BIOLOGY**  
**Unit Biology B1a (Human Biology)**

Wednesday 22 November 2006 Morning Session

**For this paper you must have:**

- a black ball-point pen
- an objective test answer sheet.

You may use a calculator.

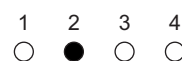
Time allowed: 30 minutes

**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 'Human Biology' 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.
- Do all rough work in this book, **not** on your answer sheet.

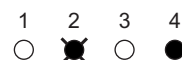
**Instructions for recording answers**

- Use a **black ball-point pen**.
- For each answer **completely fill in the circle** as shown:

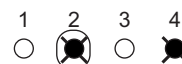


- Do **not** extend beyond the circles.

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



- 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:



**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 ONE

Questions **ONE** to **SIX**.

In these questions match the letters, **A**, **B**, **C** and **D**, with the numbers **1–4**.

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

Mark your choices on the answer sheet.

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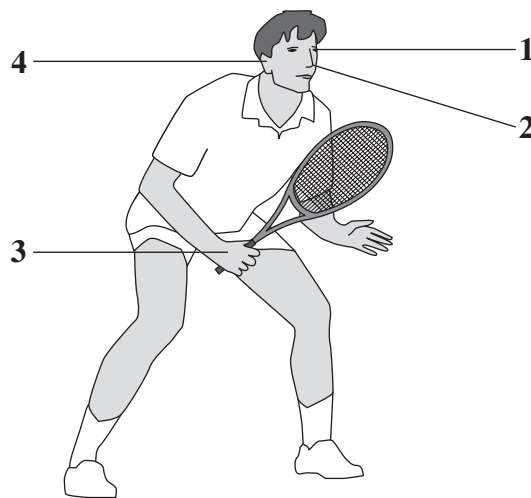
### QUESTION ONE

The drawing shows a tennis player.

The player uses different receptors during a tennis match.

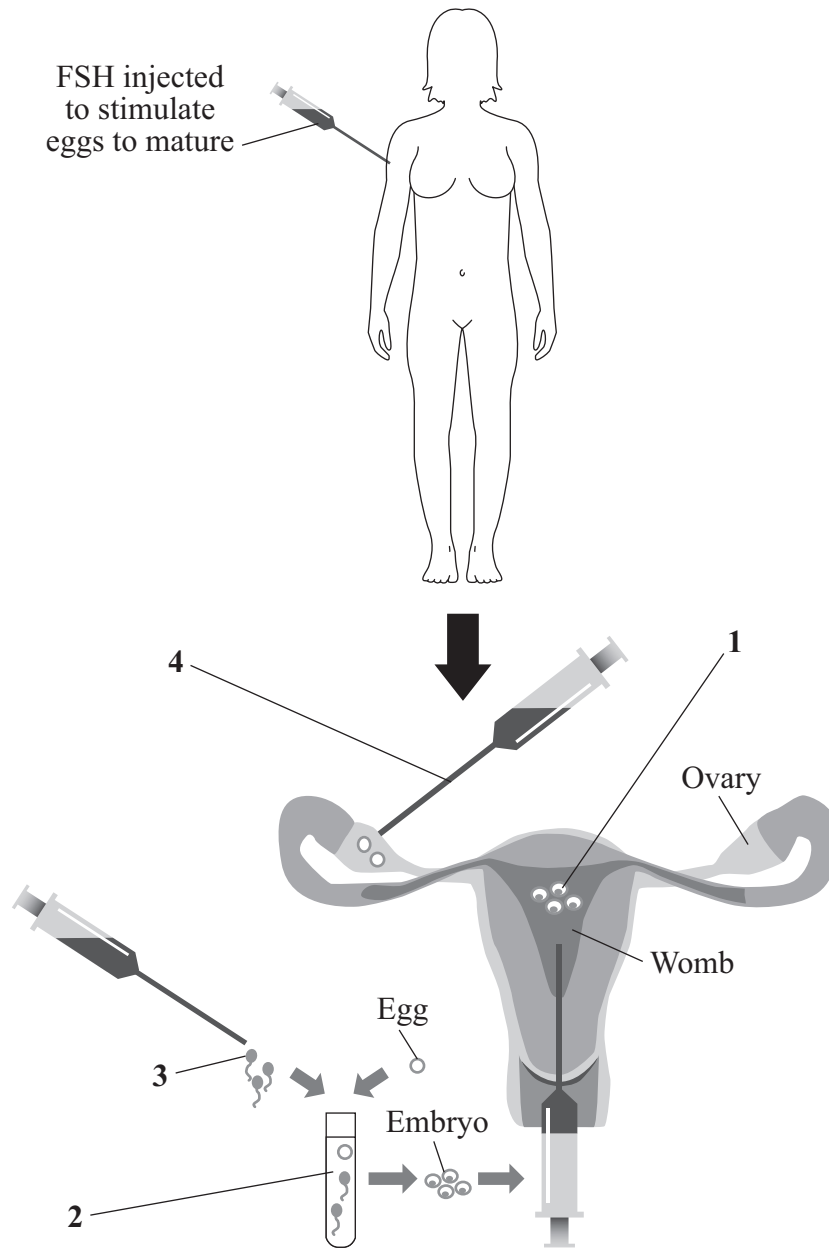
Match statements, **A**, **B**, **C** and **D**, with the labels **1–4** on the drawing.

- A** contains receptors that help him to feel the racket
- B** contains receptors that help him to see the ball
- C** contains receptors that help him to keep his balance
- D** contains receptors that help him to smell the grass on the court



## QUESTION TWO

The drawing shows some of the stages in IVF (in vitro fertilisation).



Match statements, **A**, **B**, **C** and **D**, with the labels **1–4** on the drawing.

- A** egg and sperm mixed together
- B** egg taken from ovary
- C** embryo placed into womb
- D** sperm taken from male

Turn over ►

**QUESTION THREE**

The drug thalidomide was once banned.

Now the drug is being tested to see whether it can be used to treat the disease AIDS.

Match words, **A**, **B**, **C** and **D**, with the numbers **1–4** in the sentences.

- A** research scientists
- B** pregnant women
- C** the government
- D** volunteers

The trials will be carried out by . . . **1** . . . .

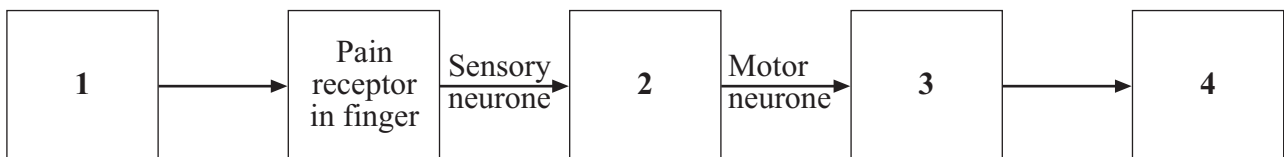
In the trials, the drug will be given to . . . **2** . . . .

The drug should **not** be given to . . . **3** . . . .

The final decision on whether the drug is licensed for use by AIDS patients will be taken by . . . **4** . . . .

**QUESTION FOUR**

The diagram shows the pathway of impulses in a reflex action.



Match words, **A**, **B**, **C** and **D**, with the labels **1–4** on the diagram.

- A** spinal cord
- B** muscles
- C** response
- D** stimulus

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**QUESTION FIVE**

This question is about some substances taken into the body or produced in the body when we are ill.

Match substances, **A**, **B**, **C** and **D**, with the features **1–4** in the table.

- A** antibiotics
- B** antibodies
- C** painkillers
- D** toxins

	<b>Feature</b>
<b>1</b>	chemicals produced by white cells
<b>2</b>	drugs taken to kill bacteria in the body
<b>3</b>	drugs taken to relieve the symptoms of some diseases
<b>4</b>	poisons produced by bacteria

**Turn over for the next question**

**Turn over ►**

**QUESTION SIX**

Hundreds of years ago, it was thought that the cure for a disease would be found where you caught the disease.

In 1760, The Reverend Edward Stone thought that a cure for a fever would be found in wet and boggy ground.

One plant that grew there was the willow tree.

He guessed that willow trees would contain a cure for a fever.

He ground up willow tree bark and gave it as a medicine to a person suffering from the fever.

The patient recovered.

Match words, **A**, **B**, **C** and **D**, with the numbers **1–4** in the sentences.

- A** control
- B** hearsay
- C** hypothesis
- D** investigation

The opinion that ‘the cure for a disease would be found where you caught the disease’ is an example of . . . **1** . . . .

Edward Stone’s guess that the cure was to be found in the willow tree is an example of a . . . **2** . . . .

His . . . **3** . . . involved giving ground-up bark to a patient suffering from a fever.

He could not be sure that it was the bark that had cured the fever because he did not use a . . . **4** . . . .

**Turn over for the next question**

**Turn over ►**

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**SECTION TWO**Questions **SEVEN** to **NINE**.

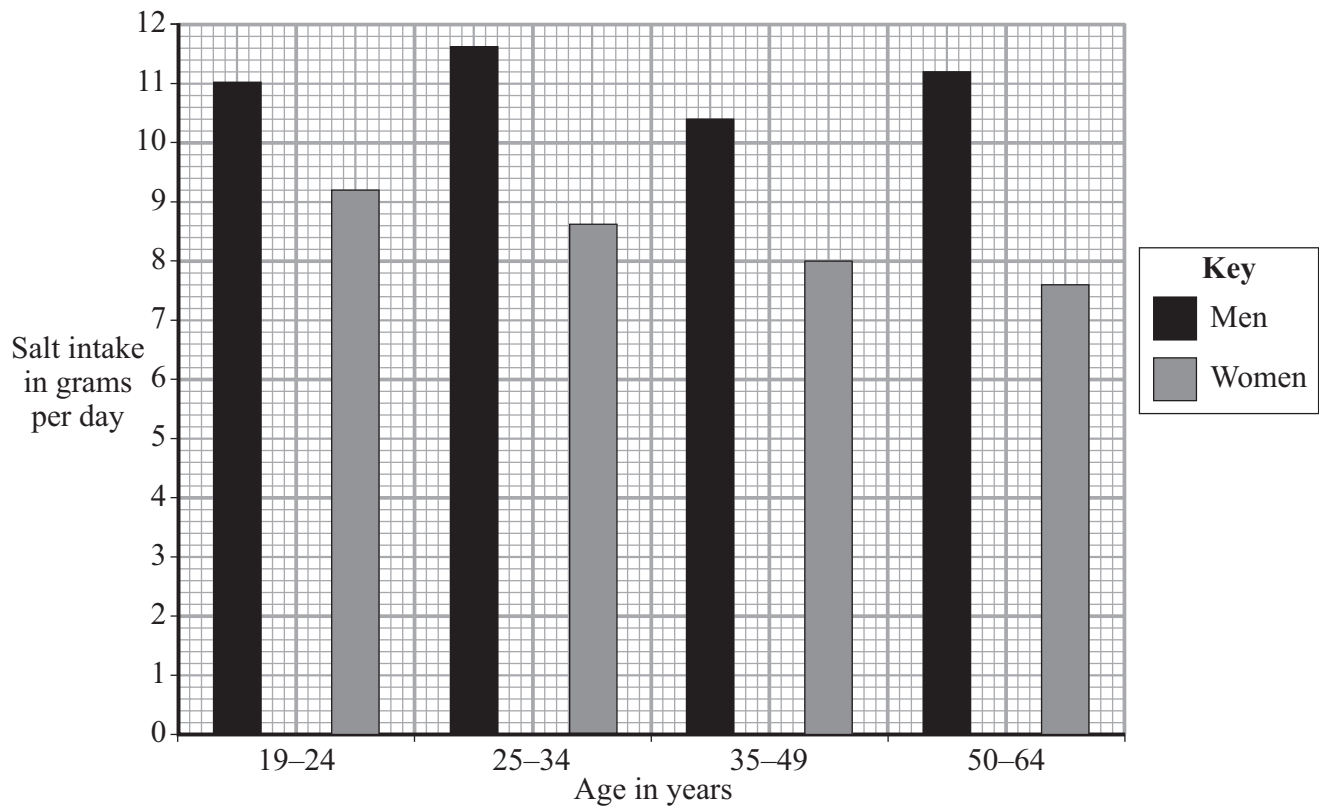
Each of these questions has four parts.

In each part choose only **one** answer.Mark your choices on the answer sheet.

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**QUESTION SEVEN**

A study was carried out to measure the mean daily salt intake of men and women in different age groups. 1100 men and women took part in the study. The results are shown in the chart.



- 7A** The largest difference between the mean daily intakes of salt by men and women was in the . . .
- 1 19-24 age group.
  - 2 25-34 age group.
  - 3 35-49 age group.
  - 4 50-64 age group.

**7B** A second similar study was carried out.

How could the results from the second study be made more reliable than those from the first study?

- 1 ensure that a control is used for each age group
- 2 increase the number of men and women in the study
- 3 measure the salt intake of men and women below 19 years of age and above 64 years of age
- 4 measure the salt intake of men and women over smaller age ranges

**7C** The salt in food is sodium chloride.

Food labels give the amount of salt in the food either as salt per 100 g of food, or sodium per 100 g of food.

The amount of salt in food can be calculated by multiplying the amount of sodium in the food by 2.5

$$\text{Amount of salt} = \text{amount of sodium in the food} \times 2.5$$

What is the amount of salt in 200 g of a food containing 0.6 g of sodium per 100 g?

- 1 1.2 g
- 2 1.5 g
- 3 3.0 g
- 4 30.0 g

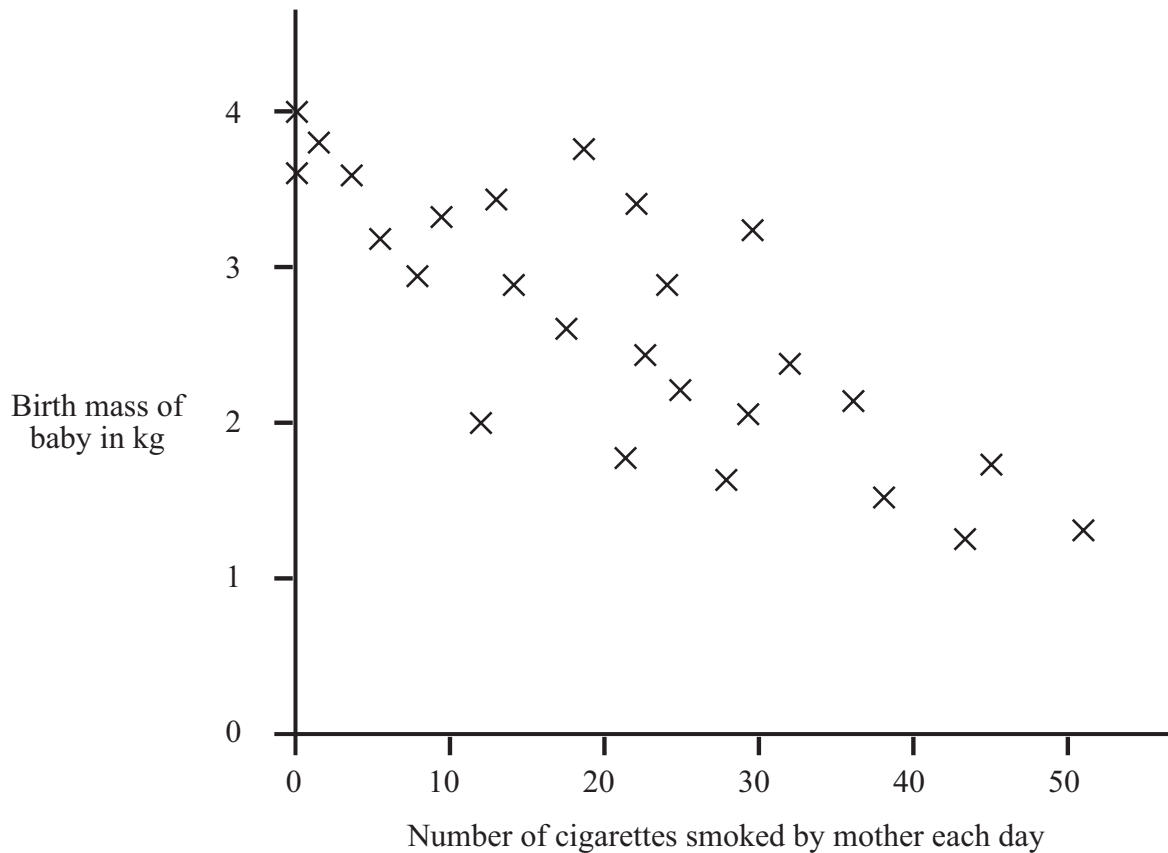
**7D** Which condition is associated with high salt intake?

- 1 arthritis
- 2 cancer
- 3 high blood pressure
- 4 irregular periods

**Turn over ►**

**QUESTION EIGHT**

The graph shows the effect of smoking during pregnancy on the birth masses of babies.



**8A** The graph indicates that . . .

- 1 cigarette smoke contains nicotine.
- 2 the smoking of cigarettes during pregnancy always reduces the birth mass of babies.
- 3 the smoking of cigarettes during pregnancy has no effect on the birth mass of babies.
- 4 the smoking of cigarettes during pregnancy often leads to a lower birth mass of babies.

**8B** The chemical in cigarette smoke that reduces the ability of blood to carry oxygen is . . .

- 1 carbon dioxide.
- 2 carbon monoxide.
- 3 carcinogen.
- 4 nicotine.

**8C** One addictive substance in tobacco is . . .

- 1 alcohol.
- 2 carbon monoxide.
- 3 nicotine.
- 4 tar.

**8D** When deprived of certain harmful drugs, a person may suffer from . . .

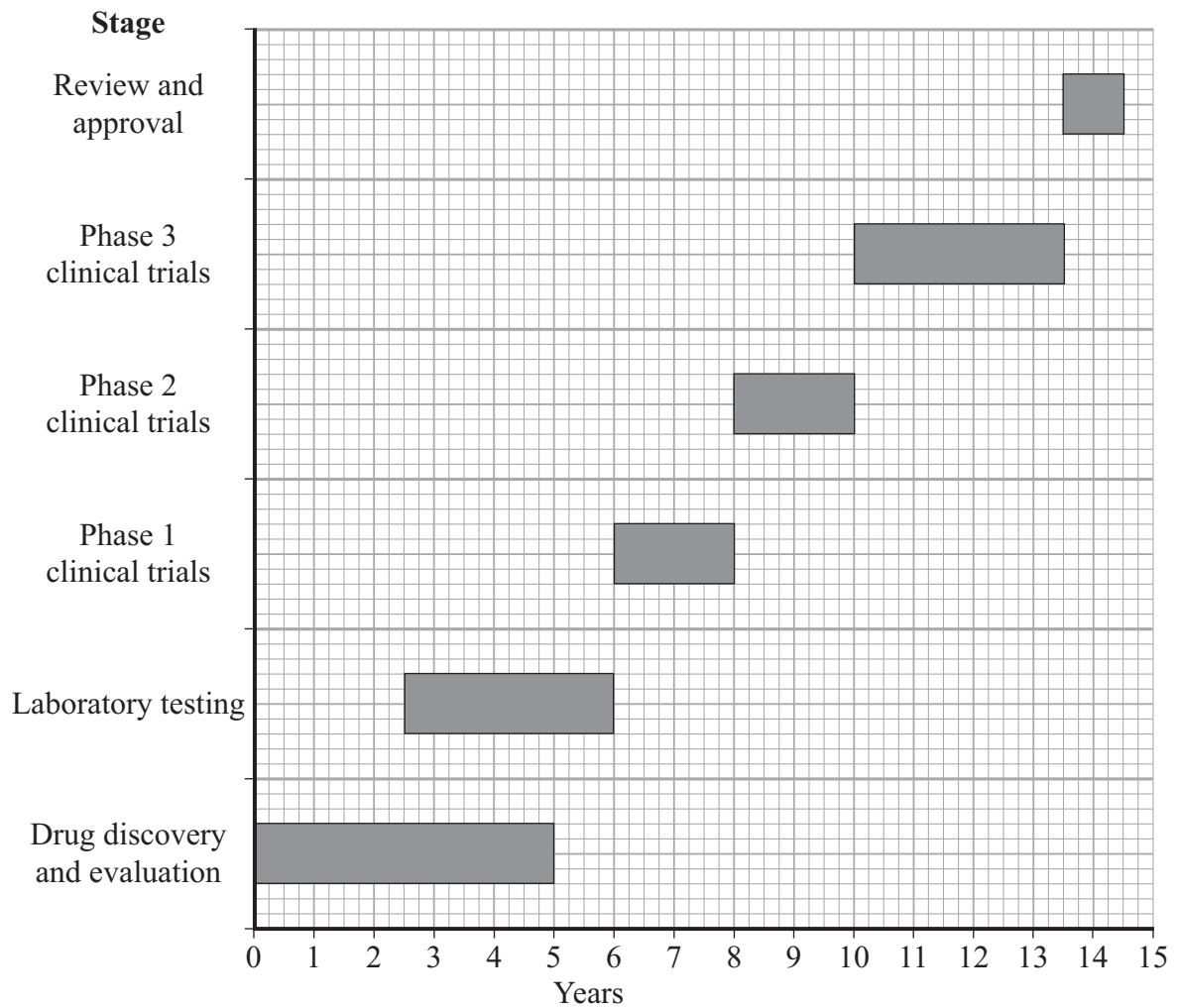
- 1 addiction.
- 2 a coma.
- 3 obesity.
- 4 withdrawal symptoms.

**Turn over for the next question**

**Turn over ►**

**QUESTION NINE**

The chart shows the main stages involved in the development of a new drug.



**9A** How long after the end of the discovery and evaluation stage did it take to get final approval for the drug's use?

- 1 8 years
- 2  $9\frac{1}{2}$  years
- 3 10 years
- 4  $14\frac{1}{2}$  years

**9B** How long was the drug in clinical trial phases?

- 1  $7\frac{1}{2}$  years
- 2 8 years
- 3  $8\frac{1}{2}$  years
- 4  $10\frac{1}{2}$  years

**9C** At which stage would the drug first be tested to find out whether it was toxic?

- 1 during clinical trials
- 2 when it was discovered
- 3 during laboratory testing
- 4 during review and approval

**9D** When clinical trials of a new drug are carried out, half of the volunteers are given a placebo (a pill which does not contain the drug).

What is the purpose of this?

- 1 so that only the dependent variable is changed
- 2 so that the results from both groups of the volunteers are the same
- 3 so that the results of the trial are due only to the drug being tested
- 4 so that the trial is carried out on a random basis

**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 ONE**

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

In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1–4**.

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

Mark your choices on the answer sheet.

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**QUESTION ONE**

Hundreds of years ago, it was thought that the cure for a disease would be found where you caught the disease.

In 1760, The Reverend Edward Stone thought that a cure for a fever would be found in wet and boggy ground.

One plant that grew there was the willow tree.

He guessed that willow trees would contain a cure for a fever.

He ground up willow tree bark and gave it as a medicine to a person suffering from the fever.

The patient recovered.

Match words, **A**, **B**, **C** and **D**, with the numbers **1–4** in the sentences.

- A** control
- B** hearsay
- C** hypothesis
- D** investigation

The opinion that ‘the cure for a disease would be found where you caught the disease’ is an example of . . . **1** . . . .

Edward Stone’s guess that the cure was to be found in the willow tree is an example of a . . . **2** . . . .

His . . . **3** . . . involved giving ground-up bark to a patient suffering from a fever.

He could not be sure that it was the bark that had cured the fever because he did not use a . . . **4** . . . .

**QUESTION TWO**

This question is about the possible effects of some substances on the body.

Match effects, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table.

- A** may cause damage to the liver and brain
- B** may lead to heart disease
- C** may lead to becoming addicted to hard drugs
- D** may lead to a reduced level of cholesterol in the blood

	<b>Effect may be caused by . . .</b>
<b>1</b>	drinking large amounts of alcohol.
<b>2</b>	eating food containing a lot of polyunsaturated fats.
<b>3</b>	eating large amounts of low density lipoproteins.
<b>4</b>	taking cannabis.

**Turn over for the next question**

**Turn over ►**

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**SECTION TWO**Questions **THREE** to **NINE**.

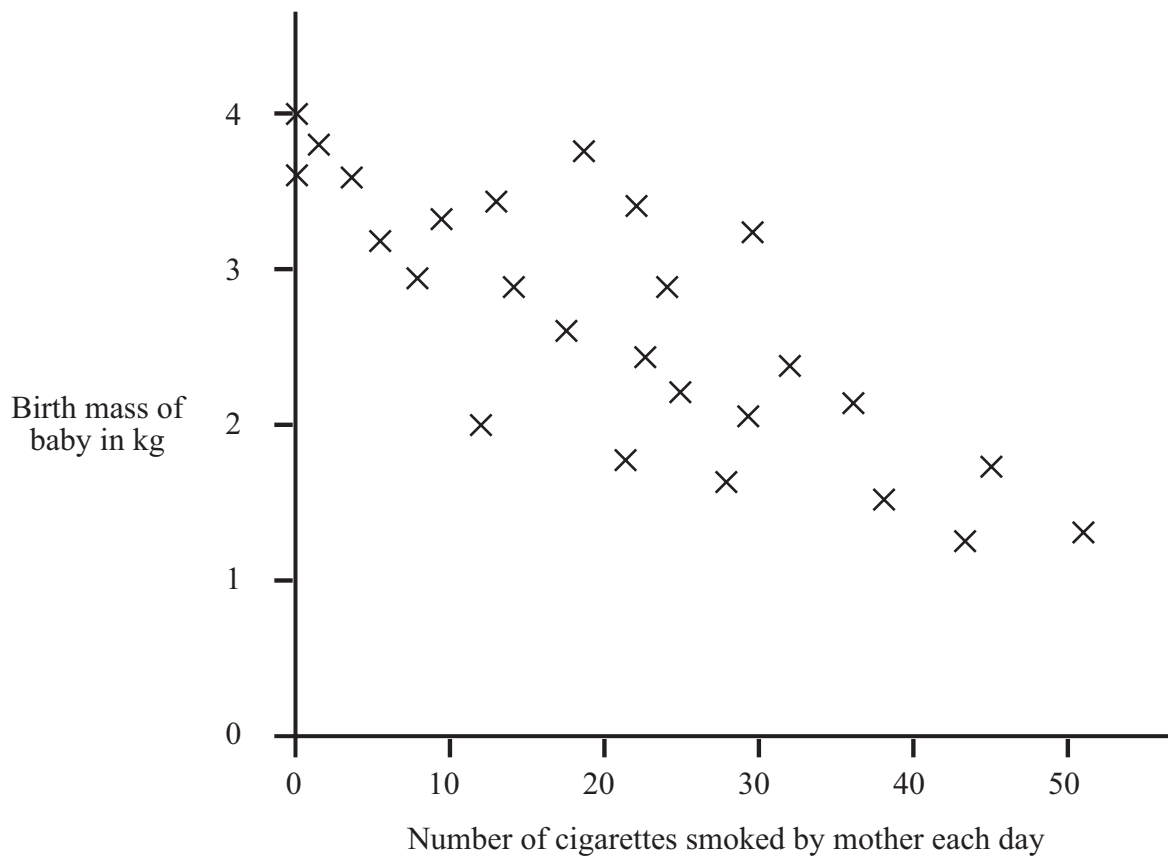
Each of these questions has four parts.

In each part choose only **one** answer.Mark your choices on the answer sheet.

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**QUESTION THREE**

The graph shows the effect of smoking during pregnancy on the birth masses of babies.

**3A** The graph indicates that . . .

- 1 cigarette smoke contains nicotine.
- 2 the smoking of cigarettes during pregnancy always reduces the birth mass of babies.
- 3 the smoking of cigarettes during pregnancy has no effect on the birth mass of babies.
- 4 the smoking of cigarettes during pregnancy often leads to a lower birth mass of babies.

**3B** The chemical in cigarette smoke that reduces the ability of blood to carry oxygen is . . .

- 1 carbon dioxide.
- 2 carbon monoxide.
- 3 carcinogen.
- 4 nicotine.

**3C** One addictive substance in tobacco is . . .

- 1 alcohol.
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- 3 nicotine.
- 4 tar.

**3D** When deprived of certain harmful drugs, a person may suffer from . . .

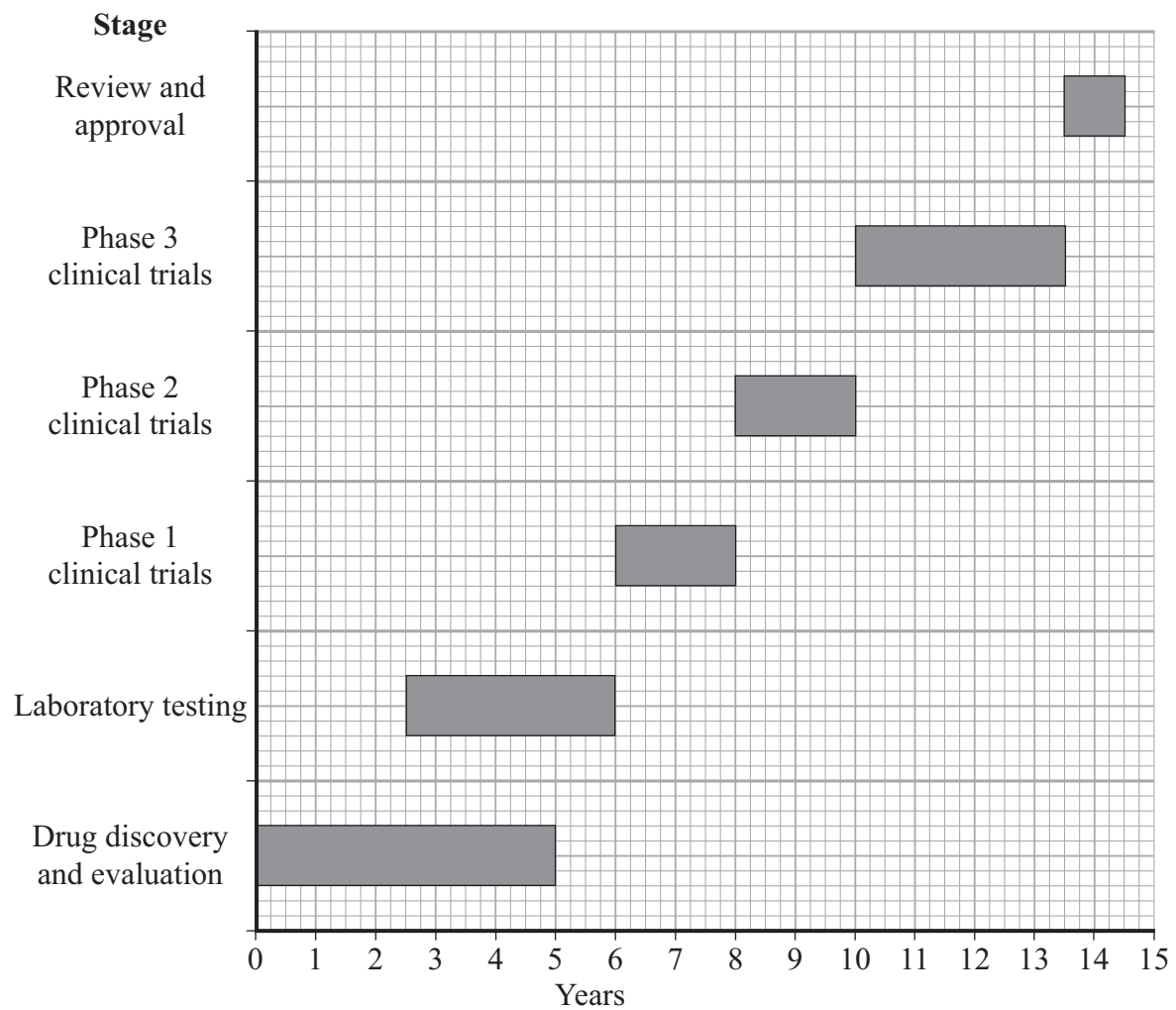
- 1 addiction.
- 2 a coma.
- 3 obesity.
- 4 withdrawal symptoms.

**Turn over for the next question**

**Turn over ►**

**QUESTION FOUR**

The chart shows the main stages involved in the development of a new drug.



**4A** How long after the end of the discovery and evaluation stage did it take to get final approval for the drug's use?

- 1 8 years
- 2  $9\frac{1}{2}$  years
- 3 10 years
- 4  $14\frac{1}{2}$  years

**4B** How long was the drug in clinical trial phases?

- 1  $7\frac{1}{2}$  years
- 2 8 years
- 3  $8\frac{1}{2}$  years
- 4  $10\frac{1}{2}$  years

**4C** At which stage would the drug first be tested to find out whether it was toxic?

- 1 during clinical trials
- 2 when it was discovered
- 3 during laboratory testing
- 4 during review and approval

**4D** When clinical trials of a new drug are carried out, half of the volunteers are given a placebo (a pill which does not contain the drug).

What is the purpose of this?

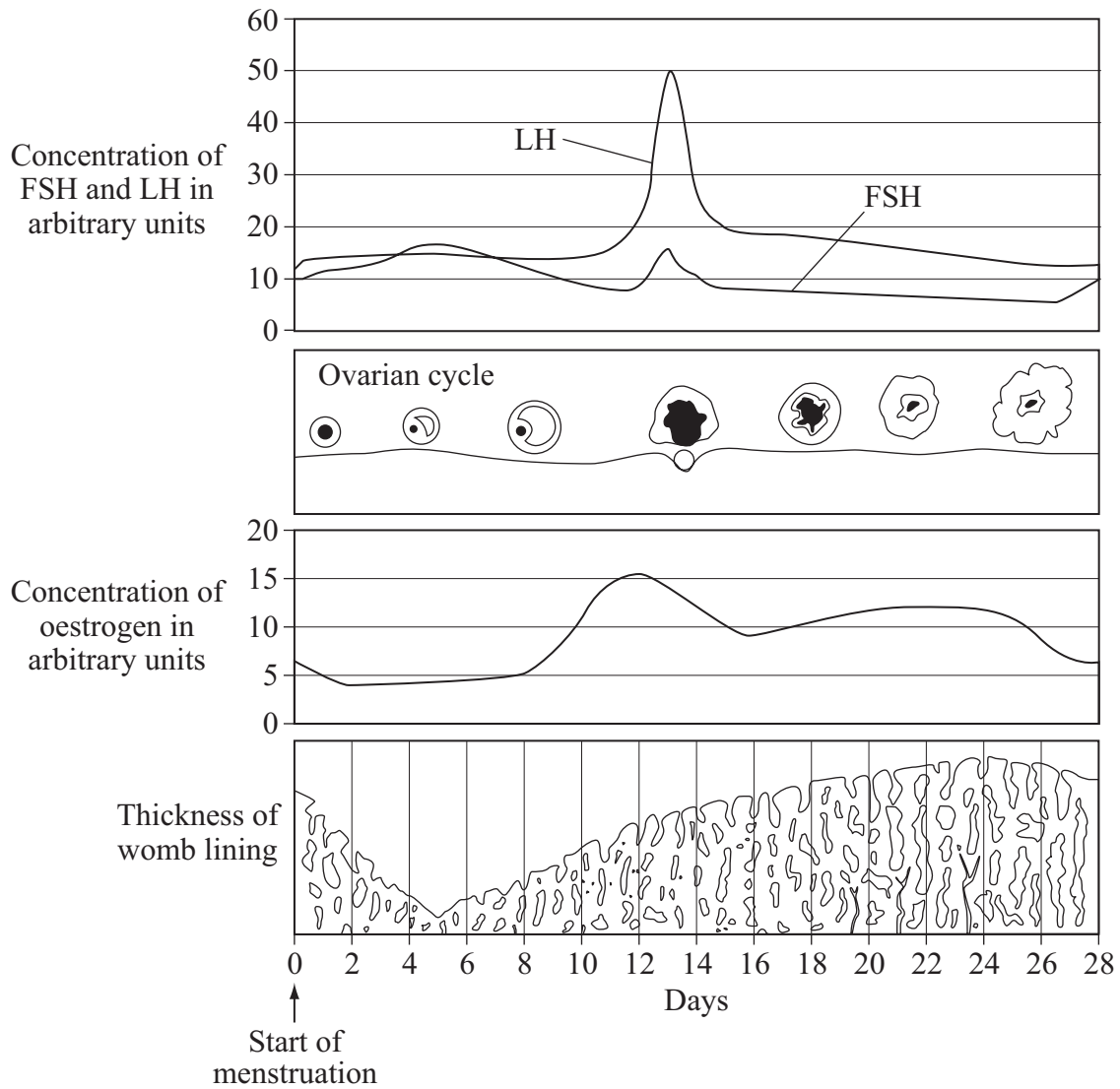
- 1 so that only the dependent variable is changed
- 2 so that the results from both groups of the volunteers are the same
- 3 so that the results of the trial are due only to the drug being tested
- 4 so that the trial is carried out on a random basis

**Turn over for the next question**

**Turn over ►**

### QUESTION FIVE

The diagram shows some of the changes in a woman's menstrual cycle.



**5A** For how many days does menstruation last for this woman?

- 1 3
- 2 5
- 3 9
- 4 14

**5B** Between Day 12 and Day 14 . . .

- 1 the concentration of oestrogen falls from 16 arbitrary units to 8 arbitrary units.
- 2 the concentration of FSH rises from 9 arbitrary units to a maximum and then falls to 21 arbitrary units.
- 3 the concentration of LH reaches a peak of 50 arbitrary units and then begins to fall.
- 4 the concentration of FSH reaches a peak of 25 arbitrary units.

**5C** Which organ produces oestrogen?

- 1 the brain
- 2 the ovary
- 3 the pituitary gland
- 4 the womb

**5D** The table gives some information about hormones.

Which row in the table is correct?

	<b>Produced by . . .</b>	<b>Transported by the . . .</b>
<b>1</b>	the blood	nerves
<b>2</b>	the brain	nerves
<b>3</b>	glands	blood
<b>4</b>	target organs	blood

**Turn over for the next question**

**Turn over ►**

**QUESTION SIX**

Digitalis is a toxin which is extracted from plants such as foxgloves.

Digitalis can be used to treat patients who are likely to suffer from heart failure. Digitalis affects the rate of heartbeat and the volume of blood pumped per heartbeat.

The table shows the effect of using different concentrations of digitalis on the heart action of a male patient.

<b>Concentration of digitalis in arbitrary units</b>	<b>Mean rate of heartbeat in beats per minute</b>	<b>Mean volume of blood pumped per heartbeat in cm<sup>3</sup></b>
0	136	35
10	120	46
20	103	54
30	71	59
40	59	62
50	47	63

**6A** If 20 arbitrary units of digitalis were used on this patient, the amount of blood pumped by his heart, at rest, would be . . .

- 1      1.91 cm<sup>3</sup> per minute
- 2      5.15 cm<sup>3</sup> per minute
- 3      2060.0 cm<sup>3</sup> per minute
- 4      5562.0 cm<sup>3</sup> per minute

- 6B** Which one of the following best describes the effect that increasing the dose of digitalis has on the activity of the heart?

	<b>Effect on heart rate</b>	<b>Effect on volume of blood pumped per beat</b>
<b>1</b>	increase	increase
<b>2</b>	increase	decrease
<b>3</b>	decrease	decrease
<b>4</b>	decrease	increase

- 6C** It would be unsafe to use the results from this patient to decide the dose for other patients because . . .

- 1** digitalis has not been trialled on human volunteers.
- 2** side-effects may harm the patient.
- 3** the sample size is not large enough to draw clear conclusions.
- 4** drug companies may put undue weight on the results from the first patient.

- 6D** Which of the following best describes the term ‘toxin’?

- 1** a chemical that affects the heart
- 2** a poisonous substance
- 3** a substance produced by a plant
- 4** a useful drug

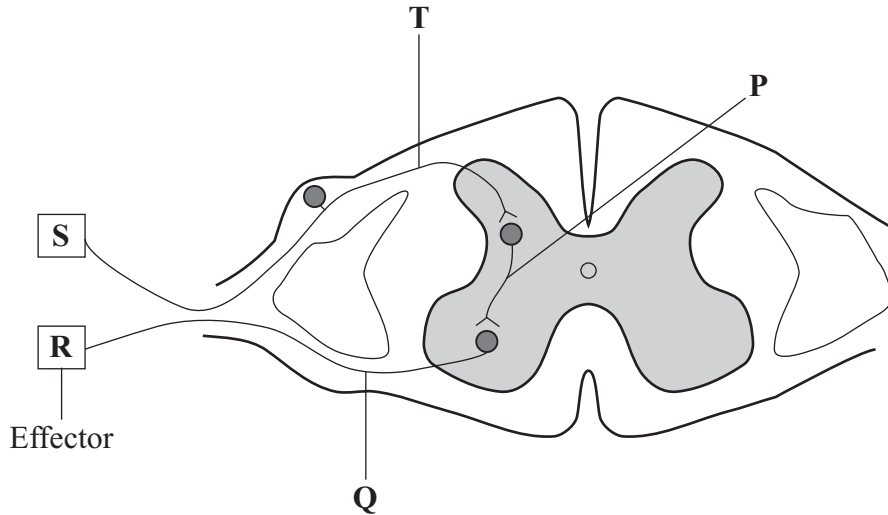
**Turn over for the next question**

**Turn over ►**

**QUESTION SEVEN**

A person accidentally touches a drawing pin. Their hand automatically moves away from the pin.

The diagram shows the parts involved in this reflex action.



**7A** Which of the following shows the pathway of nerve impulses of this reflex?

- 1 R → Q → P → T → S
- 2 S → R → Q → P → T
- 3 S → T → P → Q → R
- 4 T → P → Q → R → S

**7B** Which row in the table shows the correct names of the neurones in the diagram?

	Sensory neurone	Relay neurone	Motor neurone
1	P	Q	T
2	Q	T	P
3	T	P	Q
4	T	Q	P

7C For the structures in the diagram, which row in the table is correct?

	<b>Receptor</b>	<b>Effector</b>
<b>1</b>	pain receptor in the skin	motor neurone in the arm
<b>2</b>	pain receptor in the skin	muscle in the arm
<b>3</b>	pressure receptor in the skin	motor neurone in the arm
<b>4</b>	touch receptor in the skin	sensory neurone in the arm

7D How does information pass across a synapse?

- 1 by an electrical signal passing along a relay neurone
- 2 by an impulse jumping across the gap
- 3 by an impulse passing along a sensory neurone
- 4 by movement of a chemical

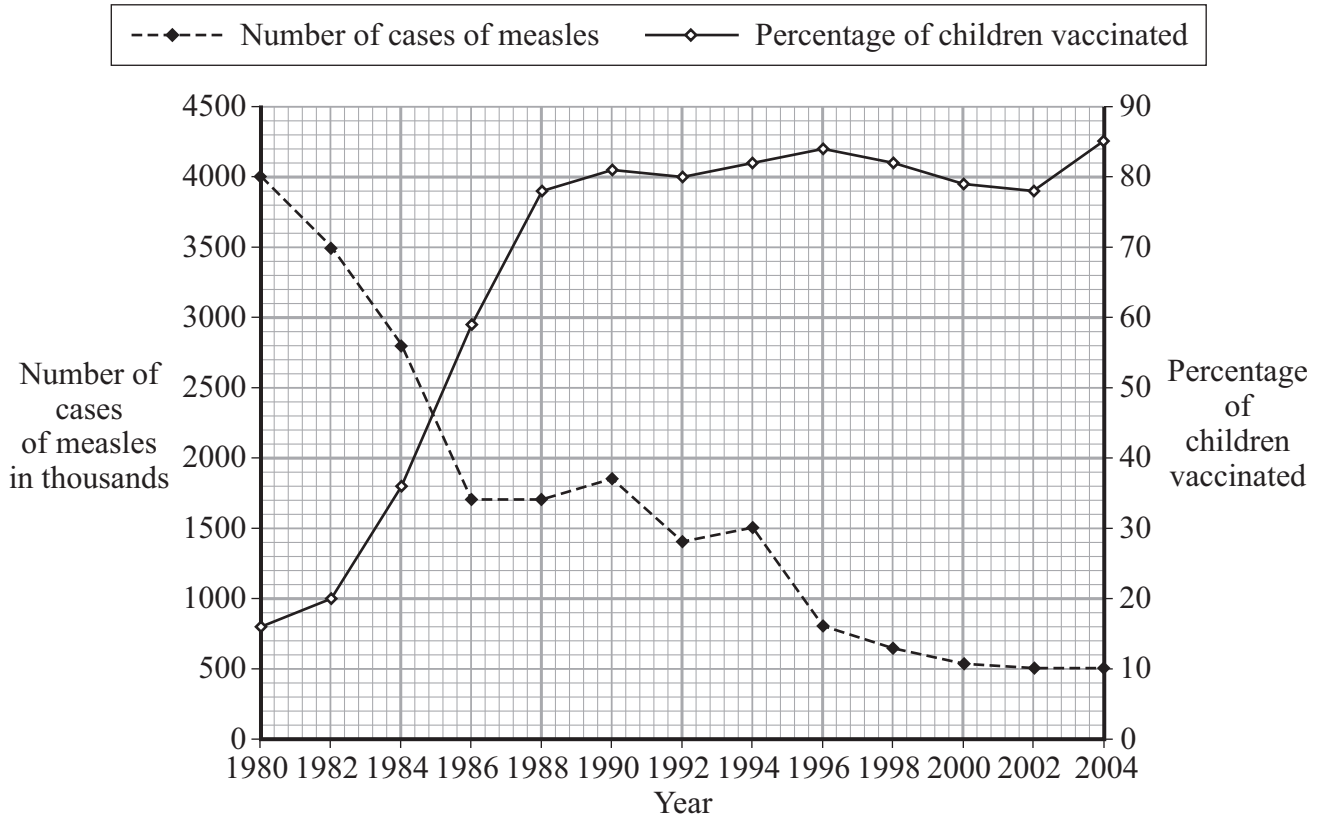
**Turn over for the next question**

**Turn over ►**

**QUESTION EIGHT**

The graph shows the number of cases of measles in the world from 1980 to 2004.

It also shows the percentage of children vaccinated against measles over the same period.



**8A** How many cases of measles were there in 1988?

- 1 1 700
- 2 170 000
- 3 1 700 000
- 4 17 000 000

**8B** By how much did the percentage of children that were vaccinated increase between 1982 and 2004?

- 1 by  $4\frac{1}{4}$  times
- 2 by  $4\frac{1}{2}$  times
- 3 from 20 % to 84 %
- 4 by 400 %

**8C** The percentage of children vaccinated against measles fell after 1996.

The most likely reason for this is . . .

- 1 the measles virus mutated.
- 2 governments stopped recommending the vaccination.
- 3 parents became worried about the side effects of the vaccine.
- 4 the vaccine became too expensive.

**8D** The data for time and number of cases of measles are presented as a line graph.

This is because . . .

- 1 both variables are continuous.
- 2 both variables are categoric.
- 3 the dependent variable is categoric and the independent variable is continuous.
- 4 the dependent variable is continuous and the independent variable is categoric.

**Turn over for the next question**

**Turn over ►**

**QUESTION NINE**

Cholesterol is needed to form cell membranes. It can be made in the body or taken in as part of food.

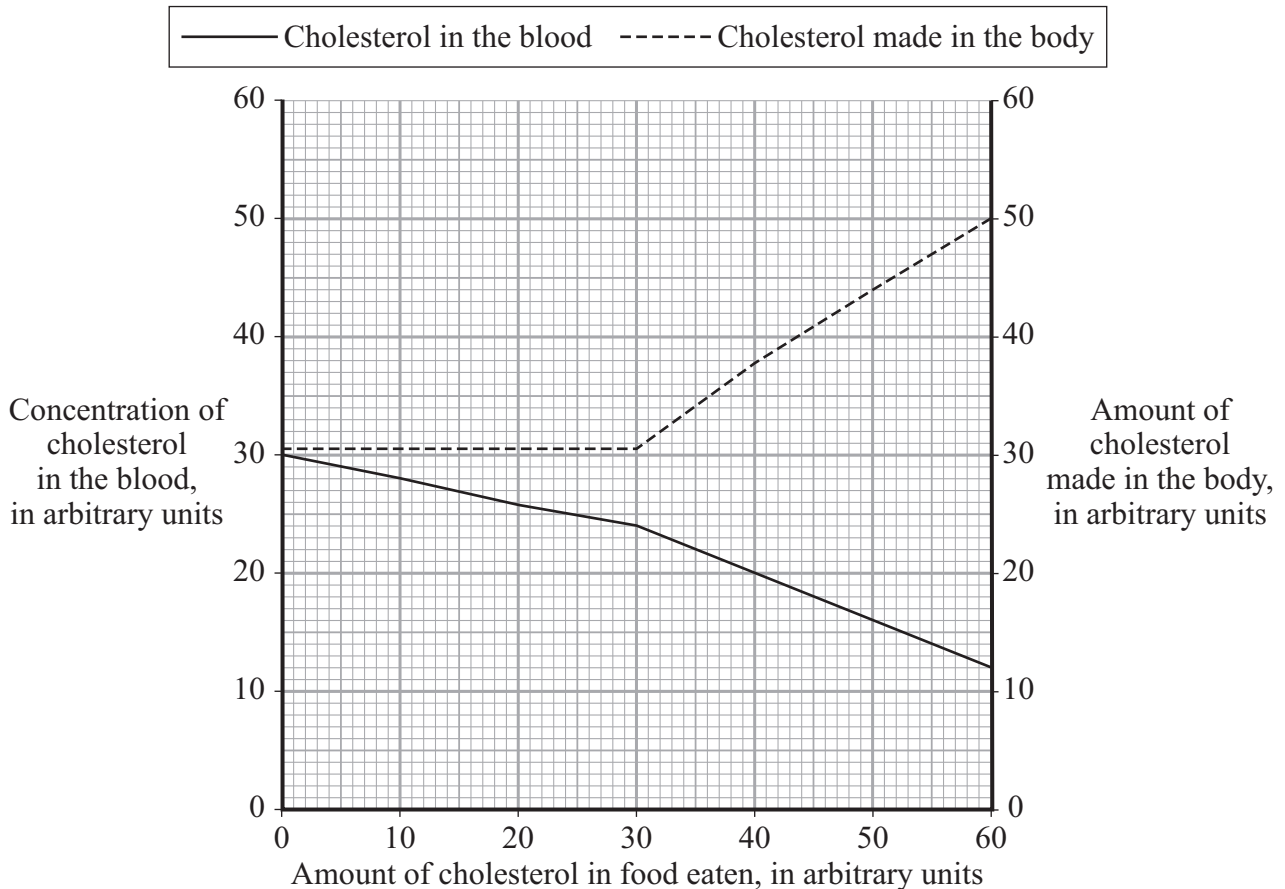
**9A** In the body, cholesterol is made in the . . .

- 1 brain.
- 2 heart.
- 3 kidney.
- 4 liver.

**9B** Which one of the following statements about cholesterol is true?

- 1 Cholesterol is a type of enzyme involved in digesting lipids.
- 2 Low density lipoproteins (LDLs) are considered to be 'good' cholesterol.
- 3 The concentration of cholesterol in the blood depends only on the amount of fat in the diet.
- 4 Cholesterol is carried around the body by both types of lipoprotein.

- 9C** The graph shows how the amount of cholesterol in the diet affects both the amount of cholesterol made in the body and the concentration of cholesterol in the blood.



When the amount of cholesterol in food eaten is 35 arbitrary units, . . .

- 1 the body makes 12 arbitrary units of cholesterol.
  - 2 the body makes 34 arbitrary units of cholesterol.
  - 3 there are 24 arbitrary units of cholesterol in the blood.
  - 4 there are 34 arbitrary units of cholesterol in the blood.
- 9D** When four similar people, who had eaten the same food, were tested for their blood cholesterol levels, values of 5.6, 4.9, 5.7 and 4.8 arbitrary units were recorded.

These differences are likely to be due to . . .

- 1 poor accuracy of the measuring instruments.
- 2 poor calibration of the measuring instruments.
- 3 systematic error.
- 4 variation in inherited factors of the people.

**END OF TEST**

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