

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education
March 2007



SCIENCE A
Unit Biology B1a (Human Biology)

BLY1A

BIOLOGY
Unit Biology B1a (Human Biology)

Monday 12 March 2007 Morning Session

For this paper you must have:

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

You may use a calculator.

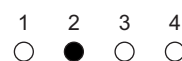
Time allowed: 30 minutes

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.

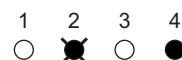
Instructions for recording answers

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

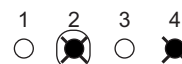


- Do **not** extend beyond the circles.

- 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.

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

FOUNDATION TIER

SECTION ONE

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

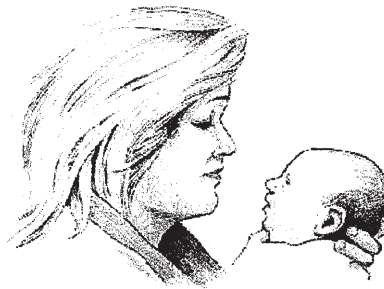
In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1–4**.

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

Mark your choices on the answer sheet.

QUESTION ONE

The drawing shows a mother and her young baby.



The table is about the stimuli that the baby detects.

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

- A** ear
- B** eye
- C** nose
- D** skin

	Stimulus it detects
1	the feel of a toy
2	the movement of his mother's head
3	the smell of food
4	the sound of his mother's voice

QUESTION TWO

Disease can be caused by many different factors.

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

- A** arthritis
- B** diabetes
- C** heart disease
- D** high blood pressure

	Factor
1	a disease in which the blood sugar level is high
2	a disease in which the joints become worn
3	a disease caused directly by too much cholesterol
4	a disease caused by too much salt in the diet

Turn over for the next question

Turn over ►

QUESTION THREE

The table shows some of the reflexes in a very young baby.

Reflex	Stimulus	Baby's response
A	flash of light	baby closes eyes
B	palm of hand touched	baby makes a tight fist
C	cheek stroked	baby turns towards stimulus
D	mouth touched by mother's finger	baby starts to suck

The reflexes help the baby to survive.

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

	How the reflex helps the baby to survive
1	helps the baby to feed on milk
2	helps the baby to find a nipple when feeding
3	helps the baby to hold onto mother
4	protection

QUESTION FOUR

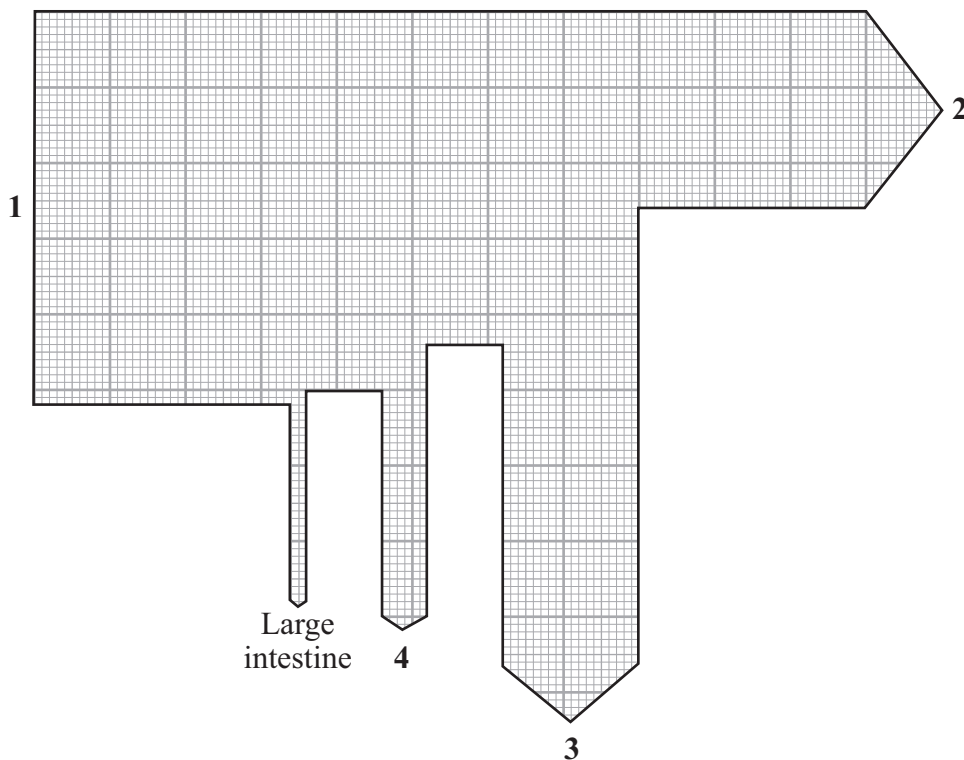
This question is about water loss from the body.

The table shows the volume of water lost from the body.

Organ	Water loss in cm ³ per day
kidney	1300
lungs	300
skin	900
large intestine	100

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

- A** total water loss from the body
- B** water loss from the kidneys
- C** water loss from the lungs
- D** water loss from the skin



(On the Sankey diagram, the thicker the arrow the greater the proportion)

Turn over ►

QUESTION FIVE

This question is about substances containing drugs.

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

A can be used to treat the symptoms of some diseases

B can lead to addiction to hard drugs

C contains carbon monoxide

D often leads to lack of self-control



1
Alcohol



2
Painkillers



3
Cannabis



4
Cigarette smoke

QUESTION SIX

Avian influenza (bird flu) is caused by a virus which was first identified in 1900. Recently there have been concerns that new strains of the virus may be able to infect humans.

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

- A** antibiotics
- B** natural selection
- C** pandemic
- D** resistance

Avian influenza cannot be treated with . . . **1**

The influenza virus may develop . . . **2** . . . to the drugs used as a result of . . . **3**

This may cause a . . . **4** . . . of the disease.

Turn over for the next question

Turn over ►

SECTION TWOQuestions **SEVEN** to **NINE**.

Each of these questions has four parts.

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

QUESTION SEVEN

The drug Bupropion has been used for many years as a treatment for depression. It was suggested that Bupropion could be used to help people to stop smoking.

Research was carried out to see if the drug did help smokers to give up smoking.

7A The suggestion that the drug could be used to help people stop smoking probably came from . . .

- 1 a drug company that decided to test the drug on people who smoked.
- 2 a scientist who thought that it might be a good idea.
- 3 patients who lost their craving for tobacco after being given Bupropion.
- 4 researchers, as a result of tests carried out on animals.

7B Trials were carried out to find out if the drug did help people to stop smoking.

Which of the following groups of volunteers would it be best to use in the trials?

- 1 a large group of adult smokers
- 2 a large group of male and female smokers suffering from depression
- 3 a large group of male teenage smokers
- 4 one large group of smokers and one large group of non-smokers suffering from depression

7C How would the drug have been used in the trial?

- 1 The drug would have been given to all the volunteers.
- 2 The drug would have been given to all the volunteers and half of them would have been told to stop smoking.
- 3 The drug would have been given to half the volunteers and a placebo given to the other half.
- 4 The drug would have been given to half the volunteers with nothing given to the other half.

7D Which of the following would make the results of the trials **less** valid?

- 1 the volunteers all having different weights
- 2 some of the volunteers developing side-effects
- 3 some of the volunteers suffering from depression
- 4 some of the volunteers using nicotine patches in addition to taking Bupropion

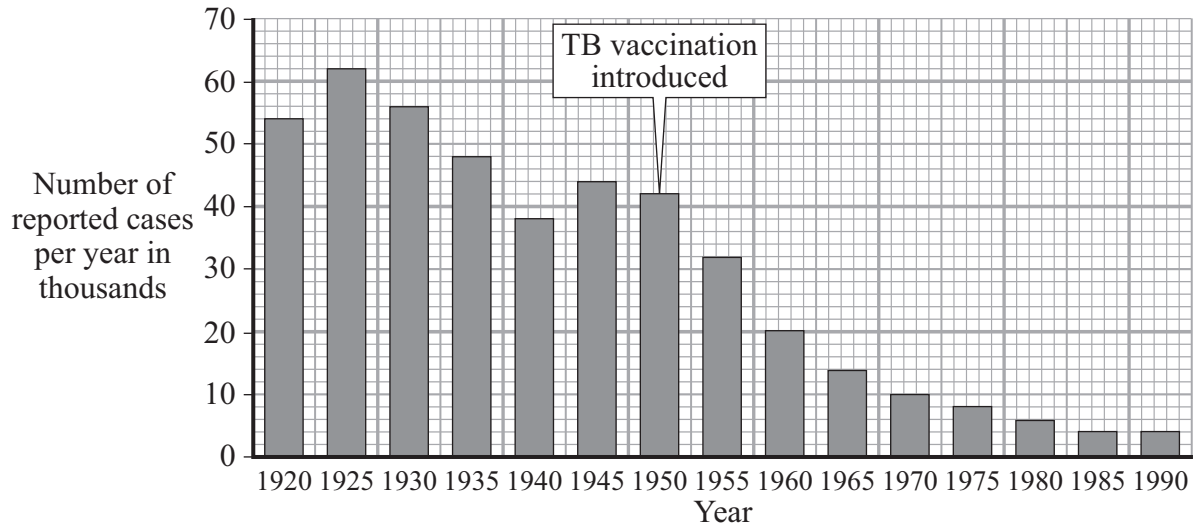
Turn over for the next question

Turn over ►

QUESTION EIGHT

Tuberculosis (TB) is a disease caused by a bacterium.

The bar chart shows the number of reported cases of TB from 1920 to 1990.



8A What was the maximum number of reported cases of TB in a year during the period from 1920 to 1990?

- 1 60
- 2 62
- 3 44 000
- 4 62 000

8B The number of cases of TB decreased after the introduction of vaccination.

Vaccination may not have been the only reason for this decrease.

What evidence from the graph suggests that there may have been other reasons?

- 1 The number of cases decreased between 1925 and 1940.
- 2 The number of cases decreased between 1950 and 1990.
- 3 The number of cases decreased very rapidly between 1950 and 1960.
- 4 The number of cases increased between 1940 and 1950.

8C The TB vaccination causes . . .

- 1 red blood cells to produce antibodies.
- 2 white blood cells to produce antibodies.
- 3 white blood cells to produce toxins.
- 4 white blood cells to stop producing antitoxins.

8D TB is spread by breathing in infected droplets which have been coughed out by infected people.

Which of the following is **least** likely to reduce the spread of TB?

- 1 isolating people with the disease
- 2 vaccinating all adults
- 3 vaccinating all children
- 4 vaccinating people who have the disease

Turn over for the next question

Turn over ►

QUESTION NINE

Read the passage.

Sunshine For Breakfast

A journalist for a national newspaper reported that American army doctors had recognised that soldiers stationed in many sunny countries were less likely to suffer from some types of cancer.

They suggested that this was due to increased levels of vitamin D which is made in the skin when exposed to sunlight.

Vitamin D can be found in a range of foods such as cheese, eggs and milk.

Vitamin D helps with the absorption of calcium and phosphorus from food and reduces the chances of suffering from rickets.

The doctors compared data from large numbers of soldiers who had spent most of their careers in either sunny or less sunny climates.

Following the newspaper report, shoppers quickly bought all the vitamin D tablets from supermarkets and shops.

A spokesman for a leading health store said, 'It is unlikely that someone could overdose on vitamin D.'

9A What initial observation was made by the doctors?

- 1 Shoppers bought large amounts of vitamin D tablets when the newspaper report was released.
- 2 Soldiers in sunny countries are less likely to suffer from some types of cancer.
- 3 Vitamin D can be found in a range of foods such as cheese, eggs and milk.
- 4 Vitamin D is made in the skin.

9B What explanation did the doctors give for the initial observation?

- 1 Sunlight contains vitamin D.
- 2 There is insufficient data to come to a conclusion.
- 3 Vitamin D can be made in the skin when exposed to sunlight.
- 4 Vitamin D might help to reduce the number of some types of cancers.

- 9C** Which of these groups of people is most likely to provide valid evidence about the effect of vitamin D?
- 1 American army doctors
 - 2 the journalist who wrote the newspaper article
 - 3 one of the soldiers who were studied
 - 4 the spokesman for the leading health store
- 9D** A lack of vitamin D in the diet can lead to any of the following problems **except** . . .
- 1 a deficiency disease.
 - 2 liver problems caused by absorbing too much calcium.
 - 3 malnourishment.
 - 4 rickets.

END OF TEST

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

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.

QUESTION ONE

Avian influenza (bird flu) is caused by a virus which was first identified in 1900. Recently there have been concerns that new strains of the virus may be able to infect humans.

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

- A** antibiotics
- B** natural selection
- C** pandemic
- D** resistance

Avian influenza cannot be treated with . . . **1**

The influenza virus may develop . . . **2** . . . to the drugs used as a result of . . . **3**

This may cause a . . . **4** . . . of the disease.

QUESTION TWO

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

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

- A** may cause damage to the liver and brain
- B** may cause less oxygen to be carried by the blood
- C** may cause withdrawal symptoms
- D** may lead to becoming addicted to a hard drug

	May be caused by . . .
1	breathing in carbon monoxide in cigarette smoke.
2	drinking alcohol.
3	giving up taking cocaine.
4	taking cannabis.

Turn over for the next question

Turn over ►

SECTION TWOQuestions **THREE** to **NINE**.

Each of these questions has four parts.

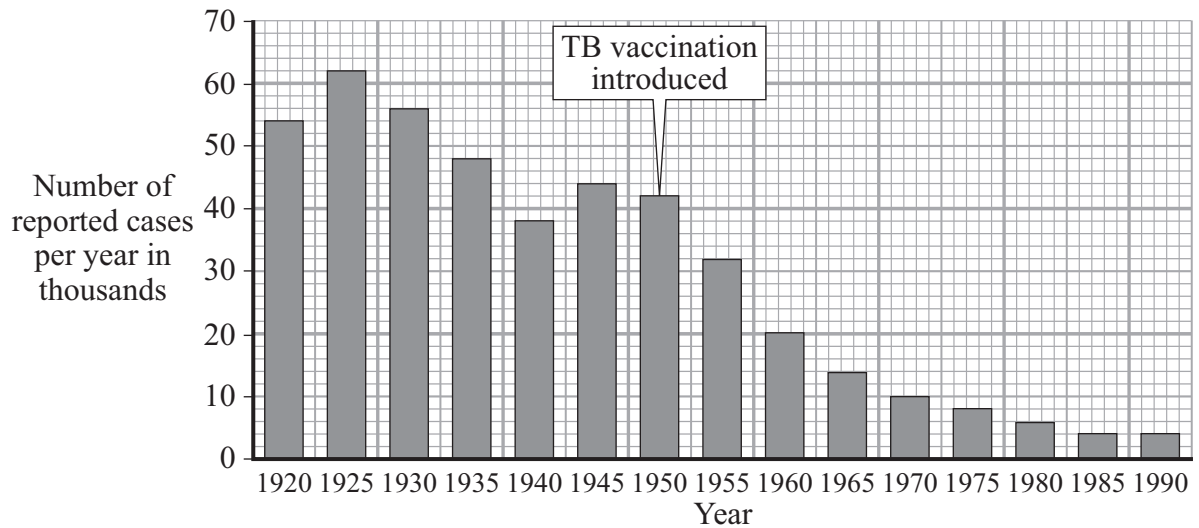
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QUESTION THREE

Tuberculosis (TB) is a disease caused by a bacterium.

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Vaccination may not have been the only reason for this decrease.

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3C The TB vaccination causes . . .

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3D TB is spread by breathing in infected droplets which have been coughed out by infected people.

Which of the following is **least** likely to reduce the spread of TB?

- 1 isolating people with the disease
- 2 vaccinating all adults
- 3 vaccinating all children
- 4 vaccinating people who have the disease

Turn over for the next question

Turn over ►

QUESTION FOUR

Read the passage.

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Vitamin D helps with the absorption of calcium and phosphorus from food and reduces the chances of suffering from rickets.

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4B What explanation did the doctors give for the initial observation?

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- 4C** Which of these groups of people is most likely to provide valid evidence about the effect of vitamin D?
- 1 American army doctors
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 - 4 the spokesman for the leading health store
- 4D** A lack of vitamin D in the diet can lead to any of the following problems **except** . . .
- 1 a deficiency disease.
 - 2 liver problems caused by absorbing too much calcium.
 - 3 malnourishment.
 - 4 rickets.

Turn over for the next question

Turn over ►

QUESTION FIVE

The table shows the relationship between alcohol consumption and the use of other drugs in 18–24 year olds.

Drug	Percentage of alcohol drinkers and non drinkers who also use the drug			
	Binge drinkers	Regular drinkers	Occasional drinkers	Non drinkers
Cannabis	47	30	21	5
Amphetamine	19	9	10	2
Ecstasy	12	7	5	0
Cocaine	8	6	1	0
LSD	4	3	2	0
Crack	1	1	0	0
Heroin	1	1	0	0
Other drugs	8	4	0	0

5A What was the difference between the percentage of binge drinkers and the percentage of occasional drinkers who used cannabis?

- 1 9%
- 2 17%
- 3 21%
- 4 26%

5B In a sample of 33 600 occasional drinkers, how many would have taken cannabis?

- 1 210
- 2 2100
- 3 7056
- 4 10 080

5C What conclusion can be drawn from these data?

- 1 Binge drinking leads to drug taking.
- 2 Drug takers are binge drinkers.
- 3 Drug use increases as alcohol consumption increases.
- 4 All regular drinkers take drugs.

5D Which is the most likely reason for collecting this information?

- 1 to analyse drink and drug abuse in 18–24 year olds
- 2 to find out how many 18–24 year olds do not drink
- 3 to stop cannabis users taking heroin
- 4 to stop occasional drinkers becoming binge drinkers

Turn over for the next question

Turn over ►

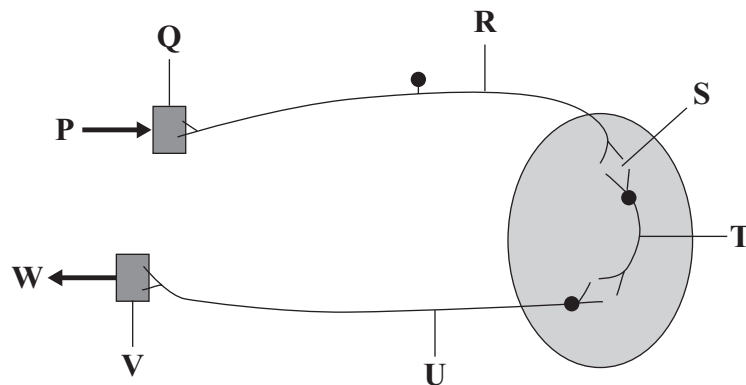
QUESTION SIX

6A If dust gets in our eyes, we blink.

This automatic action is called . . .

- 1 a motor action.
- 2 a reflex action.
- 3 a relay action.
- 4 a stimulus.

The diagram represents this action.



6B Which part of the diagram represents the effector in this action?

- 1 P
- 2 Q
- 3 V
- 4 W

6C Which part of the diagram represents a relay neurone?

- 1 R
- 2 S
- 3 T
- 4 U

6D A chemical is released when impulses are sent . . .

- 1 along **T**.
- 2 from **R** to **Q**.
- 3 from **R** to **T**.
- 4 from **T** to **R**.

Turn over for the next question

Turn over ►

QUESTION SEVEN

Cholesterol is carried around the body as a lipoprotein.

There are two types of lipoproteins, LDL and HDL.

The balance of these two lipoproteins is important for good health.

The table shows the risk to health of having different amounts of HDL and cholesterol in the blood.

HDL concentration in arbitrary units	Total cholesterol concentration in arbitrary units					
	161–170	171–180	181–190	191–200	201–210	211–220
below 21	low	average	average	very high	very high	very high
21–30	low	average	high	high	high	very high
31–35	very low	low	average	average	high	high
36–40	very low	low	low	average	average	high
41–45	very low	very low	low	average	average	average
46–50	very low	very low	low	low	average	average
51–55	very low	very low	very low	low	low	average
56–60	very low	very low	very low	low	low	low
61–65	very low	very low	very low	low	low	low
66–70	very low	very low	very low	very low	low	low
71–75	very low	very low	very low	very low	very low	low

7A A man has a total cholesterol concentration of 195 units and an HDL concentration of 48 units.

What is his health risk due to cholesterol?

- 1 average
- 2 high
- 3 low
- 4 very high

7B What happens to the risk to health as a man's HDL concentration rises from 30 to 75 arbitrary units and his total cholesterol concentration rises from 161 to 220 arbitrary units?

- 1 It changes from low to very high.
- 2 It changes from very high to low.
- 3 It remains the same.
- 4 It changes from very low to very high.

7C Which trend is shown by these data?

- 1 As the HDL concentration increases, the risk to health stays the same.
- 2 As the cholesterol concentration decreases, the risk to health rises.
- 3 As both the cholesterol and HDL concentrations increase, the risk to health falls.
- 4 As the cholesterol level increases and the HDL concentration decreases, the risk to health rises.

7D Which of the following describes the health effects of high concentrations of cholesterol?

- 1 They can affect the nervous system, slowing down reactions.
- 2 They increase the risk of heart attacks.
- 3 They may cause severe limb abnormalities in babies.
- 4 They may reduce the oxygen-carrying capacity of the blood.

Turn over for the next question

Turn over ►

QUESTION EIGHT

The drug thalidomide was developed as a sleeping pill. During its development its effectiveness was tested on volunteers.

Two groups of 10 people, **X** and **Y**, were given tablets. The tablets for Group **X** contained thalidomide but the tablets for Group **Y** did not. Neither group knew which type of tablet they were taking.

The time taken for each person to fall asleep before and after taking the tablets was recorded.

The investigation was repeated three times. The mean (average) results for each person are shown in the table.

Group	Mean time taken to fall asleep in minutes										
	Person	1	2	3	4	5	6	7	8	9	10
X with thalidomide	Before taking the tablets	47	39	52	37	40	32	30	28	46	48
	After taking the tablets	27	32	19	17	24	36	14	22	29	31
Y without thalidomide	Before taking the tablets	36	48	52	36	44	34	34	26	44	46
	After taking the tablets	36	49	48	33	45	35	28	24	40	41

8A The mean time taken for Group **Y** to fall asleep was less after taking the tablets than before taking the tablets.

The most likely reason for this was that . . .

- 1 thalidomide is an effective treatment for inability to get to sleep.
- 2 the patients believed that the tablets contained thalidomide.
- 3 the sample size was too small.
- 4 the scientists watching Group **X** were not as observant as those watching Group **Y**.

-
- 8B** Which of the following factors would be the most difficult to control during the investigation?
- 1 the body mass of each person
 - 2 the number of males and females in each group
 - 3 the concentration of thalidomide in the tablets
 - 4 the belief of each person that the drug would work
- 8C** One way in which the information shows that the investigators attempted to achieve reliable results is that . . .
- 1 Group X took a placebo so that comparisons could be made.
 - 2 the investigation was repeated three times.
 - 3 the mean time taken to fall asleep before taking the tablets was the same for each group.
 - 4 the volunteers chosen all had difficulty getting to sleep.
- 8D** Thalidomide was banned after it was found to cause severe limb abnormalities in babies born to women who took the drug during pregnancy.
- Recently, thalidomide has been reintroduced.
- Which of the following diseases is it now used to treat?
- 1 leprosy
 - 2 meningitis
 - 3 rabies
 - 4 rubella

Turn over for the next question

Turn over ►

QUESTION NINE

Cardiovascular disease is a major cause of death. Two drugs which can be used to treat this disease are statins and aspirin.

Read the article.

Statins	Aspirin
<p>Statins are produced by drug companies after carrying out extensive studies on their effectiveness.</p> <p>In these studies, 30 000 patients were monitored over several years. Statins were found to reduce the rate of non-fatal heart attacks by about 30 %.</p> <p>Approximately 0.1 % of the patients suffered serious muscle damage and 0.01 % suffered kidney failure.</p> <p>The cost of treating patients with statins can vary between £150 and £500 per year, depending on the type of heart condition being treated.</p>	<p>Aspirin has been freely available on the market for many years. It was extracted from the bark of willow trees hundreds of years ago and used to treat fever. It is now made artificially.</p> <p>Treatment with aspirin can cost as little as £10 per year. In a study of 1000 patients, aspirin was found to cause bleeding of the stomach in around 0.5 % of patients and there was a slightly increased risk of poor blood clotting.</p> <p>Aspirin was found to reduce the risk of non-fatal heart attacks by 31 %.</p>

9A In the study on statins, how many patients suffered from serious muscle damage?

- 1 3
- 2 30
- 3 300
- 4 3000

9B It is possible that the information about statins is biased.

This is because . . .

- 1 a balanced account of the advantages and disadvantages of statins is not given.
- 2 scientists working for the drug companies have a vested interest in promoting the company.
- 3 there were insufficient patients in the study to come to a firm conclusion.
- 4 the status of the scientists may not be sufficiently high for the results to be accepted.

- 9C** Some health experts suggest that aspirin is a better treatment than statins because . . .
- 1 aspirin has been used for much longer than statins.
 - 2 aspirin has similar effectiveness to statins but is much cheaper.
 - 3 aspirin is more effective than statins in reducing the risk of non-fatal heart attacks.
 - 4 aspirin is less likely to cause side-effects.
- 9D** The risk of suffering from cardiovascular disease can be increased by . . .
- 1 increasing the amount of exercise taken.
 - 2 increasing the amount of LDL-cholesterol in the diet.
 - 3 increasing the amount of polyunsaturated fats in the diet.
 - 4 increasing the amount of non-processed food in the diet.

END OF TEST

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