NOTICE TO INVIGILATORS

General Certificate of Secondary Education
November 2007

SCIENCE A **BLY1A**
Unit Biology B1a (Human Biology)

BIOLOGY
Unit Biology B1a (Human Biology)

Thursday 22 November 2007 Morning Session

Instructions to Invigilators

A typographical error has been found in the above question paper.

If candidates bring this error to the attention of invigilators, the candidates should be informed of the following correction.

HIGHER TIER, Page 17, Question Three, 3D, response 3

The sixth word '… women …' should read '… woman …'

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Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

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SCIENCE A **BLY1A**
Unit Biology B1a (Human Biology)

BIOLOGY
Unit Biology B1a (Human Biology)

Thursday 22 November 2007 Morning Session

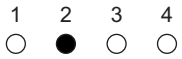
For this paper you must have:
- a black ball-point pen
- an objective test answer sheet.

You may use a calculator.

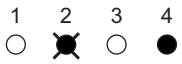
Time allowed: 30 minutes

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.

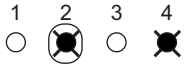
Instructions for recording answers
- Use a **black ball-point pen**.
- For each answer **completely fill in the circle** as shown:



- 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 basketball player.

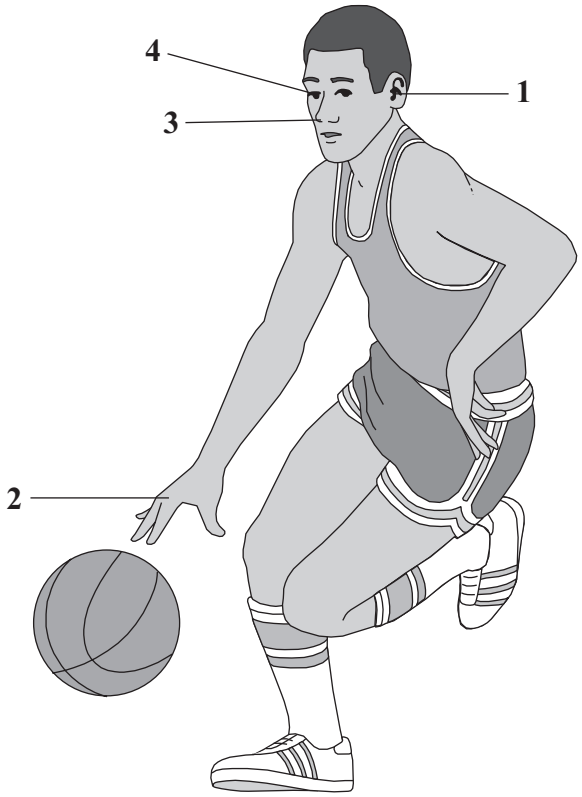
Match statements, **A**, **B**, **C** and **D**, with the labels **1–4** on the drawing.

A contains receptors that allow the player to hear the spectators

B contains receptors that allow the player to see the basket

C contains receptors that allow the player to detect smells in the arena

D contains receptors that allow the player to feel the ball



QUESTION TWO

Some substances can harm the body.

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

A cannabis

B carbon monoxide

C nicotine

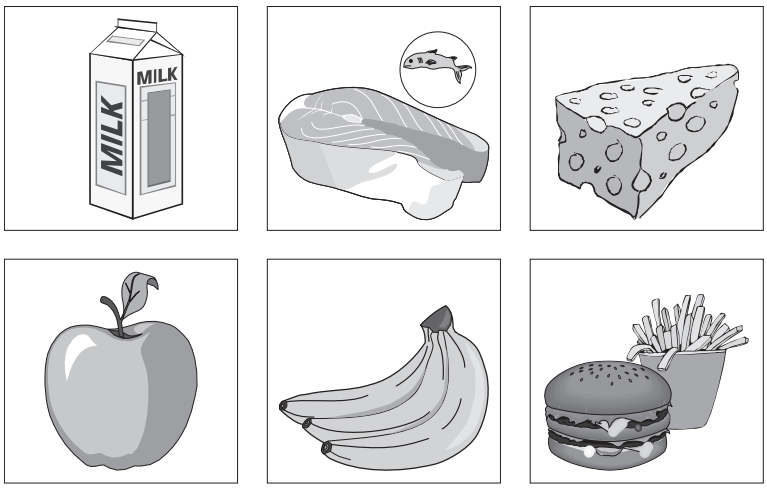
D thalidomide

	Information
1	may be linked to addiction to hard drugs
2	the addictive substance in cigarette smoke
3	drug which caused many children to be born with deformed limbs
4	deprives a fetus of oxygen, causing low birth mass

Turn over for the next question

QUESTION THREE

This question is about a healthy diet.



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

A better than

B less than

C more than

D the same as

A balanced diet containing fruit and vegetables is . . . **1** . . . a diet of only burger and chips.

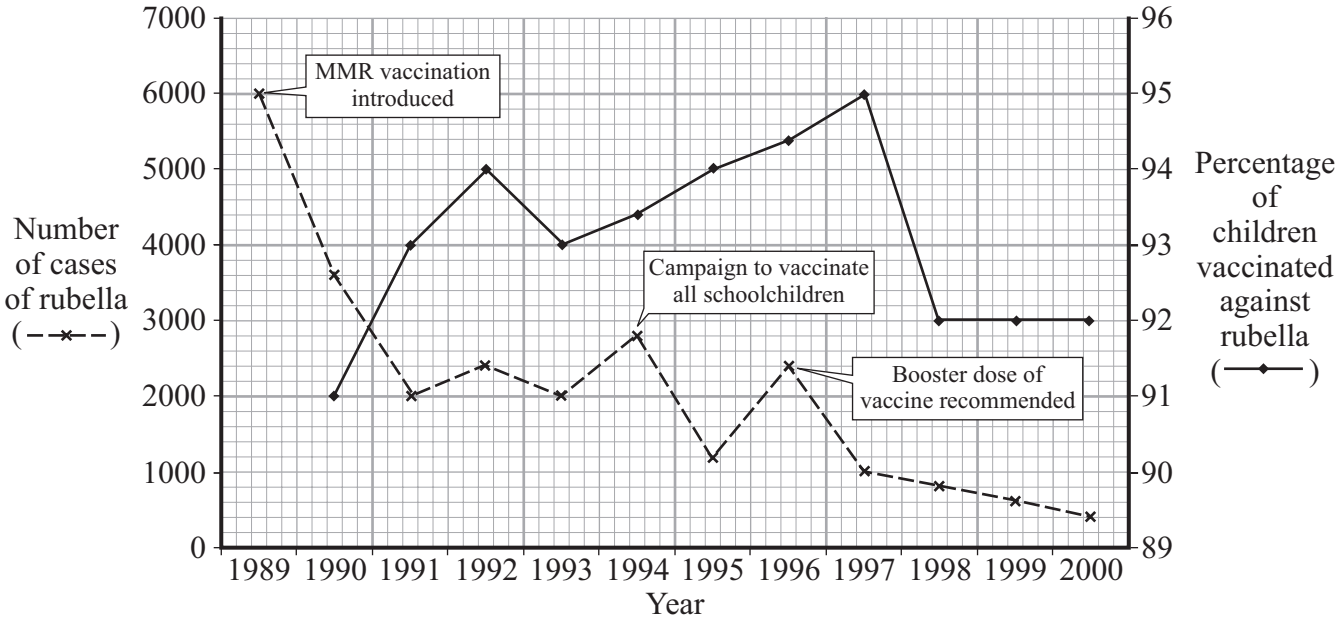
A person loses weight when the energy they take in is . . . **2** . . . the energy they use up.

If you want to remain the same weight, it is important that the energy in the food you eat is . . . **3** . . . the amount of energy you are using.

Exercise helps to reduce an obese person's weight by making sure that the energy they use is . . . **4** . . . the energy they take in.

QUESTION FOUR

The graph shows the effect of the MMR vaccination on the number of cases of rubella in Scotland between 1989 and 2000.



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

A 94

B 95

C 1400

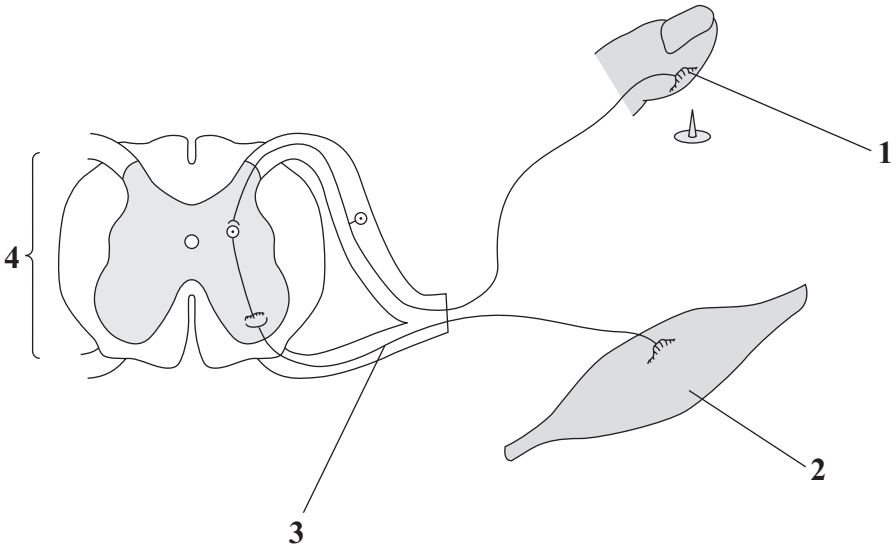
D 6000

1	the number of cases of rubella in the year in which the MMR vaccination was introduced
2	the percentage of children vaccinated against rubella in 1995
3	the highest percentage of children vaccinated against rubella
4	the fall in the number of cases of rubella in the 12 months following the recommendation of a booster dose

QUESTION FIVE

A person puts their finger on a pin. A reflex action causes them to pull their hand away quickly.

The diagram shows the structures involved in this reflex action.



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

A muscle

B neurone

C pain receptor

D spinal cord

QUESTION SIX

Read the passage:

> Scientists in America noticed that soldiers who had spent a long time in sunny countries were much less likely to suffer from cancer.
> They suggested that this was due to increased levels of vitamin D. The skin makes vitamin D when exposed to sunlight.
> To investigate this suggestion, the scientists collected data from large numbers of soldiers who had spent many years in sunny countries and compared this with data from large numbers of soldiers who had spent many years in less sunny countries.

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

A a hypothesis

B a survey

C an independent variable

D an observation

	Information
1	high levels of vitamin D might reduce the chances of suffering from some cancers
2	soldiers who spend a lot of time in sunny countries are less likely to suffer from some cancers
3	the number of years spent in sunny countries
4	the collection of data from large numbers of soldiers

Turn over for the next question

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.

QUESTION SEVEN

This question is about alcohol.

7A Which one of the following is **not** caused by drinking alcohol?

1 increased reaction time

2 diabetes

3 liver damage

4 loss of self-control

The table shows the effects of the number of drinks per hour on the percentage of alcohol in the blood for men of different body masses.

Measurements of blood alcohol concentration were collected from a large sample of men.

Number of drinks per hour	Mean percentage of alcohol in blood stream					
	Body mass in kilograms					
	55	60	70	80	90	100
1	0.04	0.03	0.02	0.02	0.02	0.02
2	0.08	0.06	0.05	0.05	0.04	0.04
3	0.11	0.09	0.08	0.07	0.06	0.06
4	0.15	0.12	0.11	0.09	0.08	0.08
5	0.19	0.16	0.13	0.12	0.11	0.09
6	0.23	0.19	0.16	0.14	0.13	0.11
7	0.26	0.22	0.19	0.16	0.15	0.13
8	0.30	0.25	0.21	0.19	0.17	0.15
9	0.34	0.28	0.24	0.21	0.19	0.19

7B What is the likely percentage blood alcohol concentration of a man with a body mass of 100 kilograms who had drunk 6 drinks in one hour?

1 0.08

2 0.09

3 0.11

4 0.13

7C What is the likely percentage blood alcohol concentration of a man with a body mass of 95 kilograms who had drunk 6 drinks in one hour?

1 0.10

2 0.11

3 0.12

4 0.13

7D The data shows that the percentage of alcohol in the blood . . .

1 is affected only by body mass.

2 is affected only by the number of drinks per hour.

3 increases with a larger number of drinks per hour and an increase in body mass.

4 increases with a larger number of drinks per hour and a decrease in body mass.

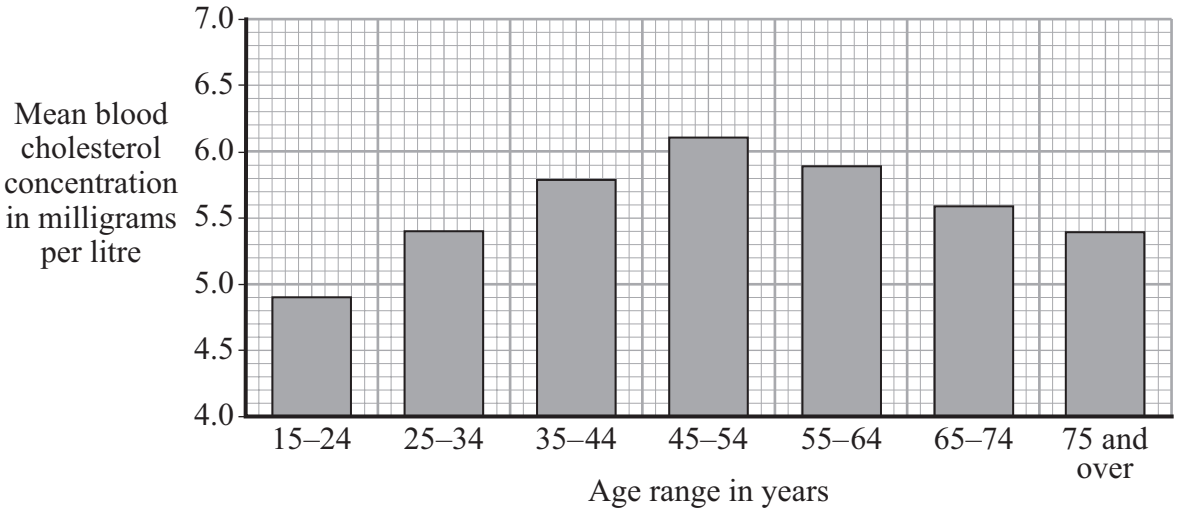
Turn over for the next question

QUESTION EIGHT

A survey was carried out to measure the blood cholesterol concentrations in the blood of women of different ages.

The women had been instructed not to eat for 12 hours before having their blood sample taken.

The results are shown in the bar chart.



8A The concentration of cholesterol in the blood is . . .

1 a categoric variable.

2 a continuous variable.

3 a discrete variable.

4 an ordered variable.

8B What is the difference in the mean concentration of cholesterol in the blood between a woman in the age range 25–34 and a woman in the age range 55–64?

1 0.4 milligrams per litre

2 0.5 milligrams per litre

3 0.6 milligrams per litre

4 5.0 milligrams per litre

8C The women were instructed not to eat for 12 hours before the blood sample was taken.

What is the reason for this?

1 It is risky taking blood samples when blood cholesterol concentrations are high.

2 Blood samples can only be taken when all the cholesterol in food has been absorbed into the blood.

3 All the cholesterol in the body will be excreted.

4 To reduce any effects on the blood samples of food eaten recently.

8D Which one of the following would have been the best way to choose the women taking part in the trial?

1 ask randomly selected women whether they would like to take part in the trial

2 record the data collected when women ask to have their cholesterol concentration measured

3 send a questionnaire to every woman in a certain postal district

4 secretly collect data from blood samples taken for other reasons

Turn over for the next question

QUESTION NINE

This question is about obesity.

9A Which one of the following diseases is linked to obesity?

1 arthritis

2 brain damage

3 deficiency disease

4 lung cancer

9B One way to prevent obesity is to increase the amount of exercise that people take.

Exercise helps to prevent obesity mainly because . . .

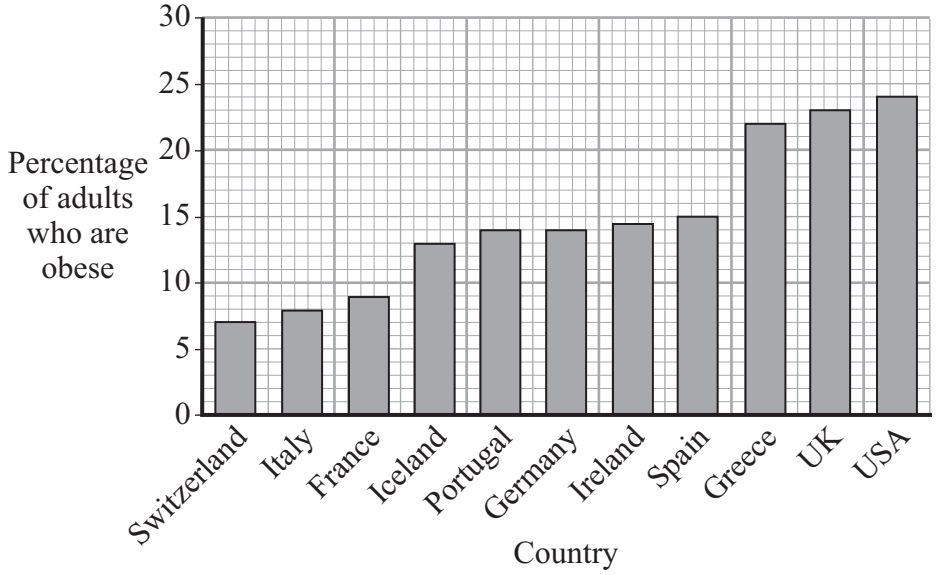
1 exercise increases the metabolic rate.

2 exercise decreases the amount of muscle in the body.

3 people have less time to eat when they are exercising.

4 people who exercise are usually fitter than those who do not.

A manufacturer of slimming foods carried out a telephone survey in 11 countries to find the percentage of the population who are obese.
The results of the telephone survey of 5000 people are shown in the bar chart.



9C The information in the bar chart shows that . . .

1 people in Greece have a healthier diet than people in Ireland.

2 obesity levels are rising in all countries.

3 whether or not you are obese depends directly on where you live in the world.

4 obesity levels in the USA are three times those in Italy.

9D The information in the bar chart may be biased.

This is because . . .

1 it only considers a few countries.

2 it was gathered by a manufacturer of slimming foods.

3 the total number of people in the survey was small.

4 the survey was carried out to find the percentage of obese people, not the actual number.

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

Read the passage:

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> They suggested that this was due to increased levels of vitamin D. The skin makes vitamin D when exposed to sunlight.
> To investigate this suggestion, the scientists collected data from large numbers of soldiers who had spent many years in sunny countries and compared this with data from large numbers of soldiers who had spent many years in less sunny countries.

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

A a hypothesis

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	Information
1	high levels of vitamin D might reduce the chances of suffering from some cancers
2	soldiers who spend a lot of time in sunny countries are less likely to suffer from some cancers
3	the number of years spent in sunny countries
4	the collection of data from large numbers of soldiers

QUESTION TWO

This question is about substances in the diet.

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

A LDLs

B polyunsaturated fats

C salt

D sugar

	Information
1	found in large amounts in the blood of diabetics
2	may cause heart disease
3	may lead to high blood pressure
4	may help to lower cholesterol levels

Turn over for the next question

SECTION TWO

Questions **THREE** to **NINE**.

Each of these questions has four parts.

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

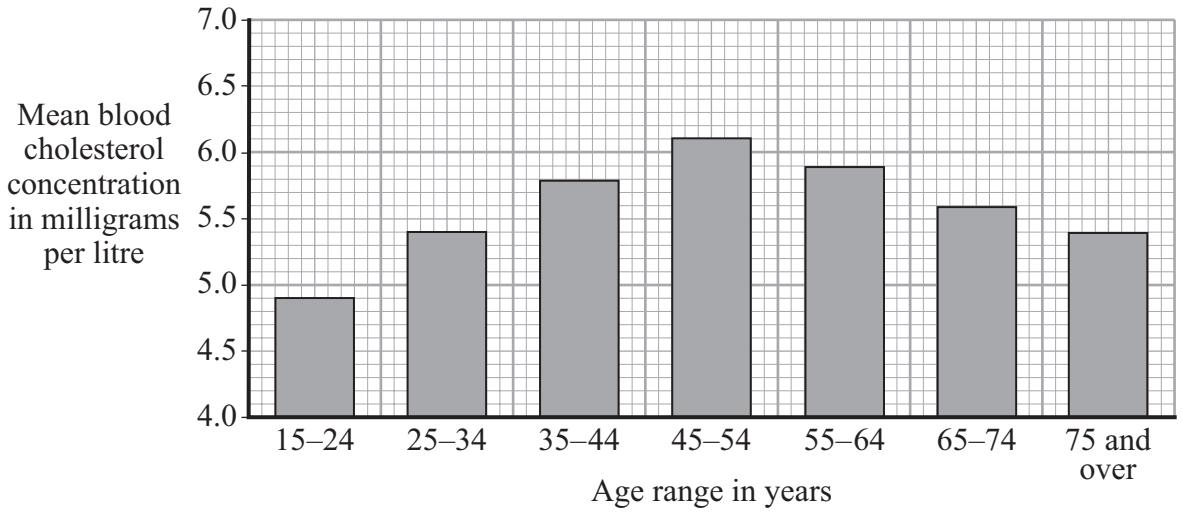
Mark your choices on the answer sheet.

QUESTION THREE

A survey was carried out to measure the blood cholesterol concentrations in the blood of women of different ages.

The women had been instructed not to eat for 12 hours before having their blood sample taken.

The results are shown in the bar chart.



3A The concentration of cholesterol in the blood is . . .

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3D Which one of the following would have been the best way to choose the women taking part in the trial?

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Turn over for the next question

QUESTION FOUR

This question is about obesity.

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2 brain damage

3 deficiency disease

4 lung cancer

4B One way to prevent obesity is to increase the amount of exercise that people take.

Exercise helps to prevent obesity mainly because . . .

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2 exercise decreases the amount of muscle in the body.

3 people have less time to eat when they are exercising.

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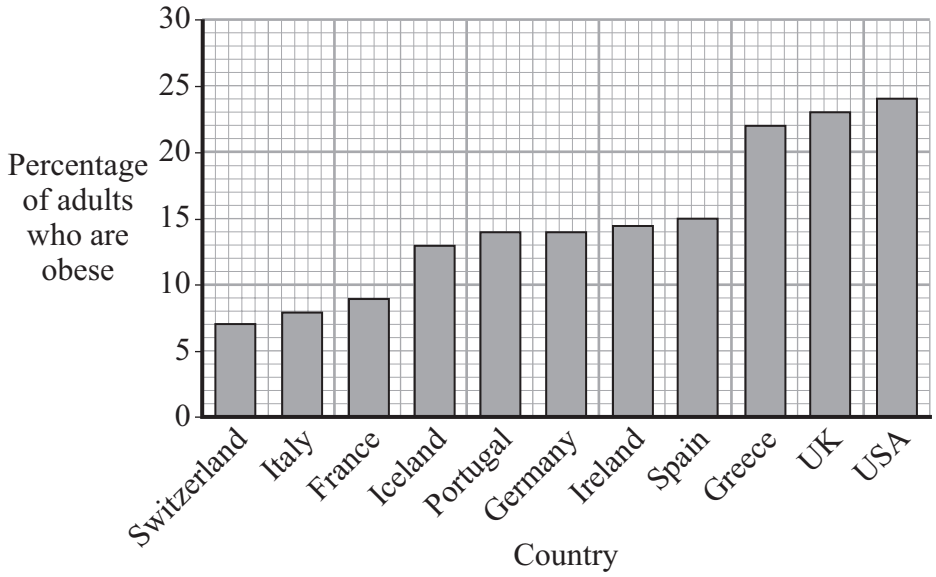

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2 obesity levels are rising in all countries.

3 whether or not you are obese depends directly on where you live in the world.

4 obesity levels in the USA are three times those in Italy.

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This is because . . .

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2 it was gathered by a manufacturer of slimming foods.

3 the total number of people in the survey was small.

4 the survey was carried out to find the percentage of obese people, not the actual number.

Turn over for the next question

QUESTION FIVE

This question is about drugs.

5A Alcohol and cocaine . . .

1 are both legal drugs.

2 are both used recreationally.

3 do not harm the body.

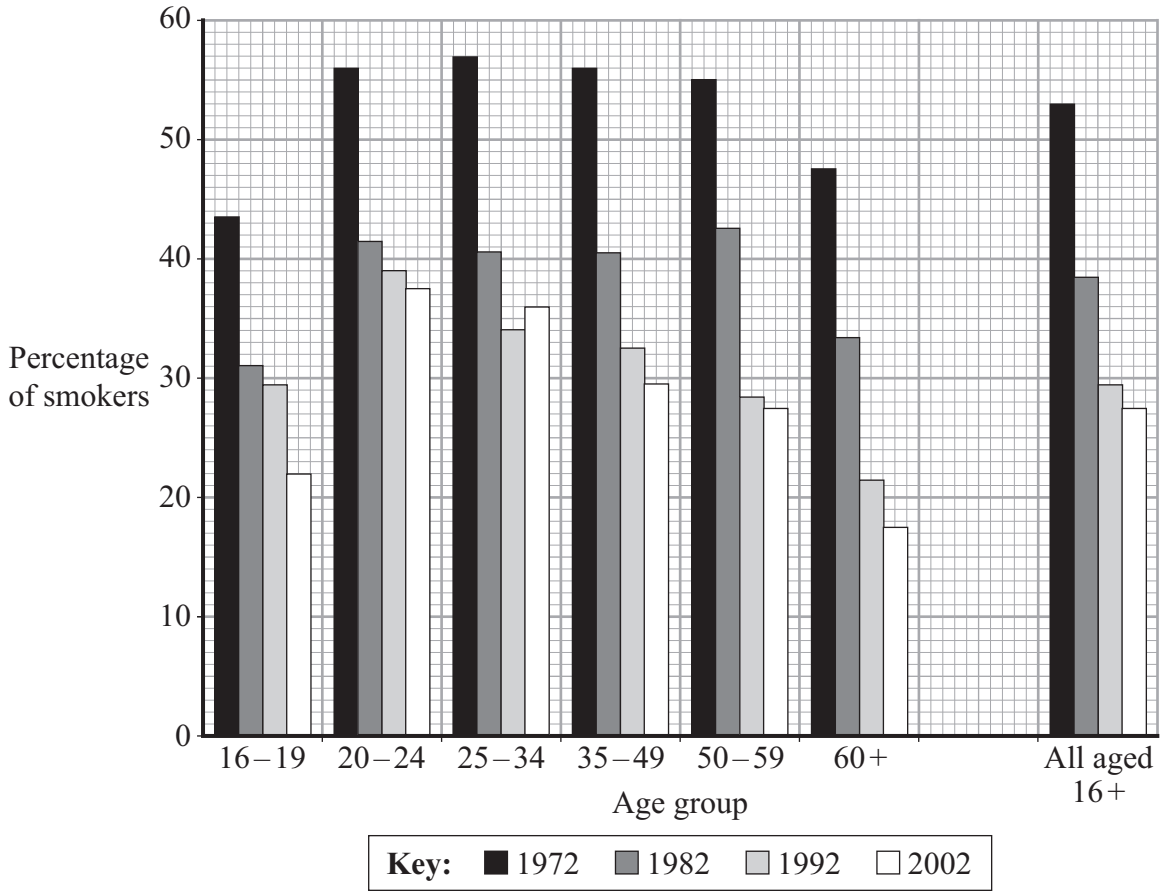
4 are both illegal but used recreationally.

5B Which line in the table is correct about the effect of substances in tobacco smoke on the body?

	Nicotine	**Carbon monoxide**	**Carcinogens**
1	addictive	causes lung cancer	lowers birth mass of babies
2	lowers birth mass of babies	addictive	causes lung cancer
3	addictive	lowers birth mass of babies	causes lung cancer
4	causes lung cancer	lowers birth mass of babies	addictive

Surveys were carried out to find the percentages of males of different ages who were smokers.

The results are shown for surveys taken in 1972, 1982, 1992 and 2002.



5C What percentage of men aged 20–24 did **not** smoke in 1992?

1 37

2 39

3 59

4 61

5D In which age group is the trend in the percentage of smokers not consistently downwards from 1972 to 2002?

1 20–24

2 25–34

3 50–59

4 60+

QUESTION SIX

This question is about hormones and contraception.

6A Which line in the table is correct?

	FSH	Oestrogen
1	secreted by the pituitary gland	stimulates FSH production
2	causes eggs to mature	secreted by the pituitary gland
3	stimulates production of oestrogen	secreted by the ovaries
4	used in oral contraceptives	causes eggs to mature

6B Which of the following is true of the hormone LH?

1 The production of LH is stimulated by FSH.

2 It is produced by the ovary.

3 The production of LH is stimulated by a hormone from the ovaries.

4 It is used in contraceptive pills.

6C There are several types of contraceptive pill available for women.
One type of contraceptive pill contains oestrogen.

What is the effect of this type of contraceptive pill?

1 It inhibits the production of FSH.

2 It prevents a fertilised egg from implanting in the womb.

3 It prevents LH production.

4 It reduces the number of eggs released at ovulation.

6D The contraceptive pill has been linked to cervical cancer.
However, it is believed that most cases of cervical cancer are linked to a virus, HPV.
A new vaccine has been produced to combat HPV.

This vaccine . . .

1 will contain dead or weakened HPV viruses.

2 will contain antibodies against the HPV virus.

3 will destroy the HPV virus.

4 will cause the body to produce antibiotics.

Turn over for the next question

QUESTION SEVEN

Some people believe that there is a link between the MMR vaccine and diseases such as autism.

7A What is the MMR vaccine?

1 a vaccine for measles, meningitis and rubella

2 a vaccine for measles, mumps and rubella

3 a vaccine for meningitis, mumps and rubella

4 a vaccine for mumps, measles and rabies

7B When someone is given the MMR vaccine, . . .

1 the white blood cells ingest the pathogens.

2 the white blood cells neutralise the toxins in the vaccine.

3 the white blood cells produce antibodies against the pathogen.

4 the white blood cells reproduce rapidly.

Read the passage.

> A study in Denmark looked at the health of 444 000 children who had received the MMR vaccine and 100 000 children who had not.
>
> The results of the study were published in a medical journal and found no causal link between the MMR vaccine and whether the child suffered from autism.
>
> However, a government spokesman stated that, 'Strongly held beliefs are difficult to change as objective data is not likely to put an end to the controversy.'
>
> A department of health spokeswoman said: 'This large study from Denmark, carried out by independent researchers and published in an internationally respected journal of medicine, adds to the increasing body of research which has found no link between the MMR vaccine and autism.'

7C What is meant by 'no causal link' in this passage?

1 The MMR vaccine does **not** give anyone autism.

2 Children with autism are likely to have had the MMR vaccine.

3 More studies need to be carried out in order to establish whether there is a definite link between the MMR vaccine and autism.

4 People with autism should **not** be given the MMR vaccine.

7D Which part of the study is likely to reduce the influence of bias on the results?

1 544 000 children were studied.

2 The research was independent of the companies which produce the vaccine.

3 The results were published in an internationally respected journal of medicine.

4 Strongly held beliefs are difficult to change, despite new objective data.

Turn over for the next question

QUESTION EIGHT

This question is about reflex actions.

8A Which of the following best describes reflex actions?

1 Each reflex action is coordinated by both the brain and the spinal cord.

2 They always involve the spinal cord.

3 They are rapid, voluntary responses to a stimulus.

4 They involve receptors, effectors and neurones.

8B Which of the following is true of synapses?

1 They are found only in receptor organs.

2 They detect changes in the environment.

3 They transfer impulses from one neurone to another.

4 They transfer nerve impulses along motor neurones.

8C In a reflex pathway, relay neurones . . .

1 pass impulses from effectors to motor neurones.

2 pass impulses from effectors to sensory neurones.

3 pass impulses from receptors to motor neurones.

4 pass impulses from sensory neurones to motor neurones.

8D A person accidentally puts their finger in a flame on a cooker. They quickly pull their hand away.

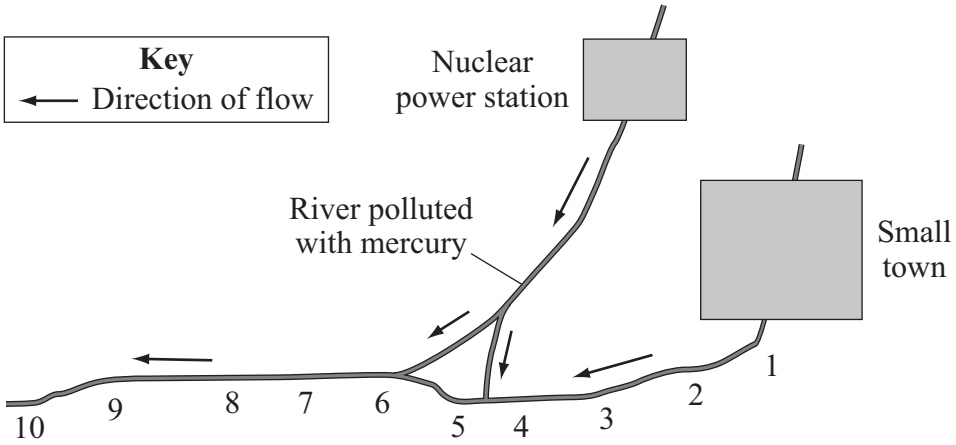
Which line in the table is true of this reflex?

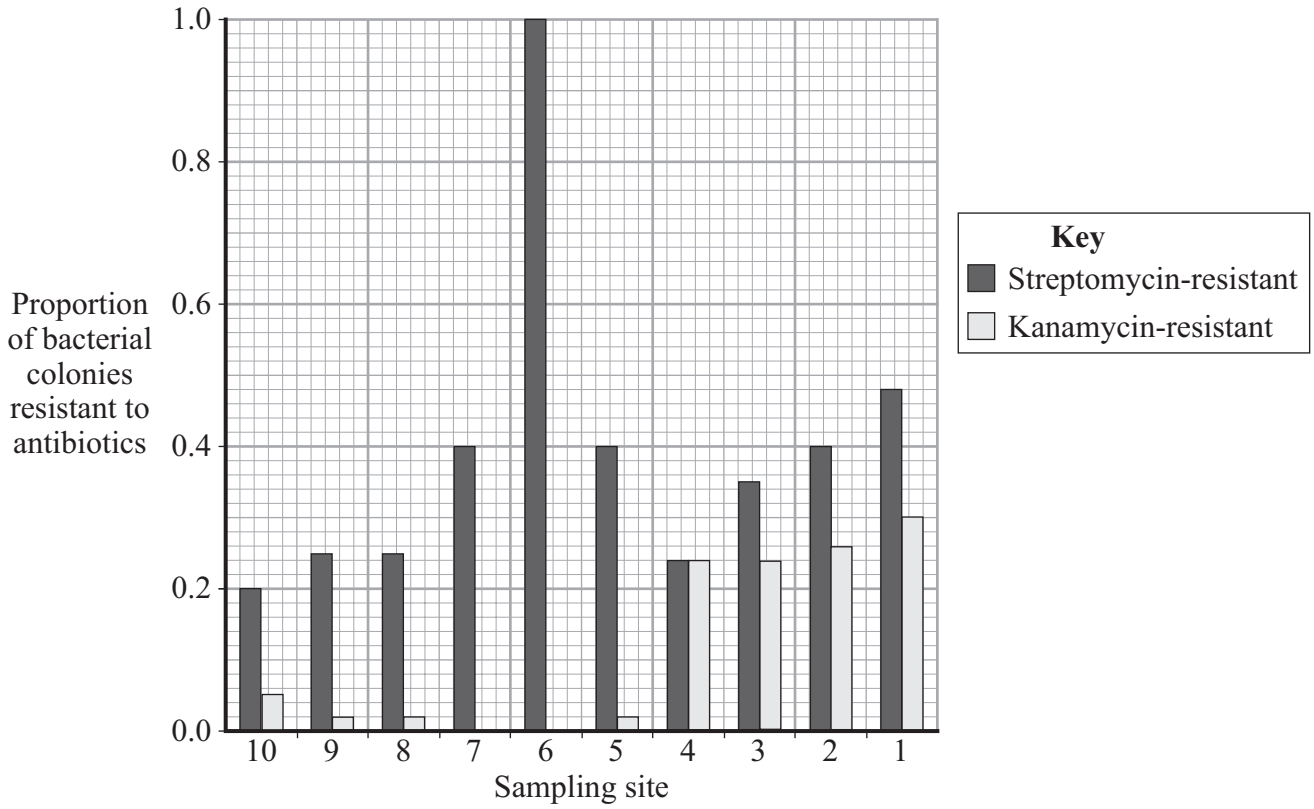
	Sensory neurone	Motor neurone	Effector	Receptor
1	passes from finger to spinal cord	passes from finger muscle to spinal cord	found in finger	found in arm muscle
2	passes from skin to spinal cord	passes from spinal cord to finger muscle	found in finger muscle	found in skin
3	passes from skin to arm muscle	passes from skin to finger muscle	found in arm muscle	found in arm muscle
4	passes from skin to spinal cord	passes from spinal cord to arm muscle	found in arm muscle	found in skin

Turn over for the next question

QUESTION NINE

An investigation was carried out to survey populations of antibiotic-resistant bacteria in a river.
Human sewage enters the river upstream of site 1. Mercury, which is poisonous to some organisms, enters the river from the power station.
Bacterial colonies were cultivated from samples taken at the sites 1 – 10 shown on the diagram.
The bar chart shows the proportions of bacterial colonies that were streptomycin-resistant and kanamycin-resistant in the samples from each site.





9A 60 bacterial colonies grew from the sample taken at sampling site 5.

How many of these colonies were resistant to streptomycin?

1 0.4

2 15

3 24

4 40

9B The ratio of the proportion of streptomycin-resistant colonies to the proportion of kanamycin-resistant colonies is different at each sampling site.

These differences are affected most by . . .

1 the volume of water in the river.

2 the mercury concentration in the water.

3 the antibiotic concentration in the water.

4 the distance downstream from sampling site 1.

9C One possible explanation for the data from sampling sites 5–10 is that . . .

1 streptomycin-resistant bacteria are also resistant to mercury.

2 mercury increases antibiotic resistance in bacteria.

3 kanamycin-resistant bacteria can survive only in water polluted by human sewage.

4 kanamycin-resistant bacteria cannot survive in water containing mercury.

9D An antibiotic-resistant strain of a bacterium is produced by . . .

1 over-prescription of antibiotics.

2 toxins.

3 natural selection.

4 vaccination.

END OF TEST

There are no questions printed on this page

There are no questions printed on this page

There are no questions printed on this page