

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



General Certificate of Secondary Education
Foundation Tier and Higher Tier
June 2011

Science A
Unit Biology B1a (Human Biology)
Biology
Unit Biology B1a (Human Biology)

BLY1AP
F&H

Tuesday 28 June 2011 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 'Biology Unit 1a' 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.

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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 **FIVE**.

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

Drugs have different uses.

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

- A** statins
- B** painkillers
- C** heroin and cocaine
- D** tobacco and alcohol

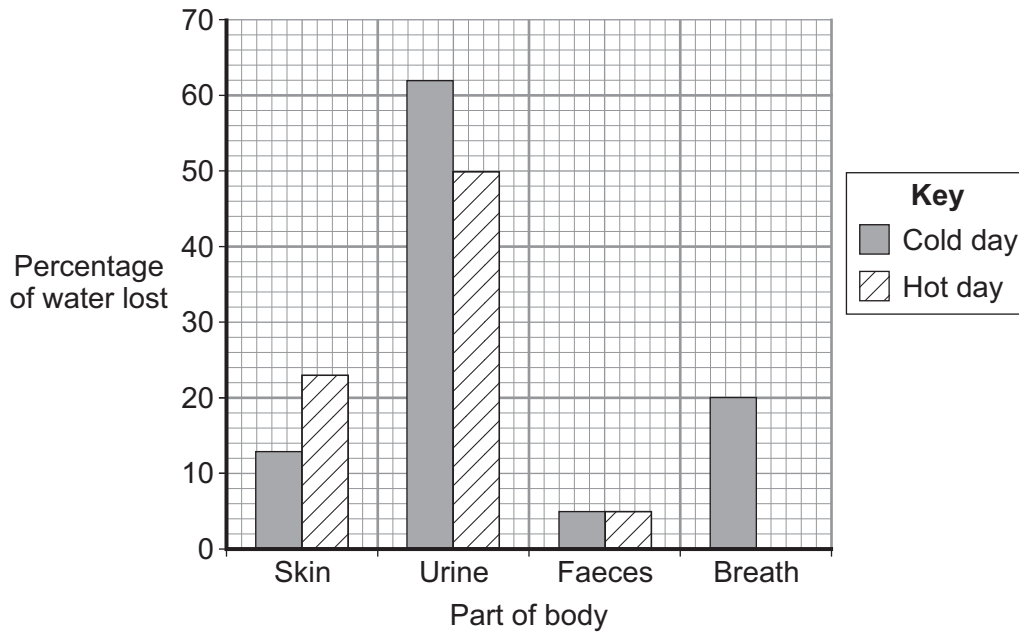
1	legal and recreational drugs
2	very addictive drugs
3	used to lower blood cholesterol levels
4	used to relieve disease symptoms

QUESTION TWO

The bar chart shows the percentages of water lost from different parts of a man's body on a cold day and on a hot day.

The bar for the percentage of water lost in breath on a hot day has **not** been plotted.

The man's total water loss on each day was 1000 cm^3 .



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

- A** 12
B 13
C 22
D 62

1	the percentage of water lost through the skin on a cold day
2	the difference in the percentages of water lost in the urine on a cold day and on a hot day
3	the highest percentage of water lost
4	the percentage of water lost in breath on a hot day

Turn over ►

QUESTION THREE

Drugs must be safe for people to use.

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

- A** if the drugs have any side effects
- B** the best dose for the drug
- C** if the drug is toxic
- D** if the effect of the drug is only psychological

New drugs may be tested on animals in a laboratory to find out . . . **1**

The drugs are tested on a few humans to find out . . . **2**

Placebos are given to some patients to find out . . . **3**

The drugs are tested on large numbers of humans to find out . . . **4**

QUESTION FOUR

Semmelweiss did research that saved the lives of thousands of mothers and their babies.

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

- A** experiment
- B** hypothesis
- C** observation
- D** result

1	He noticed that in one ward many mothers were dying.
2	He had an idea that doctors might be carrying disease to the mothers.
3	He asked the doctors to wash their hands before treating mothers.
4	The death rate of mothers was reduced.

QUESTION FIVE

This question is about human organs.

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

- A** kidney
- B** liver
- C** ovary
- D** pituitary gland

	Function
1	produces cholesterol
2	produces FSH
3	produces oestrogen
4	produces urine

Turn over for the next question

Turn over ►

Section TwoQuestions **SIX** to **NINE**.

Each of these questions has four parts.

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

QUESTION SIX

This question is about the effect of obesity on health and life expectancy.

6A Which of these diseases is linked to obesity?

- 1 measles
- 2 heart disease
- 3 lung cancer
- 4 leprosy

A study was carried out to see if there was a link between waist size and early death.

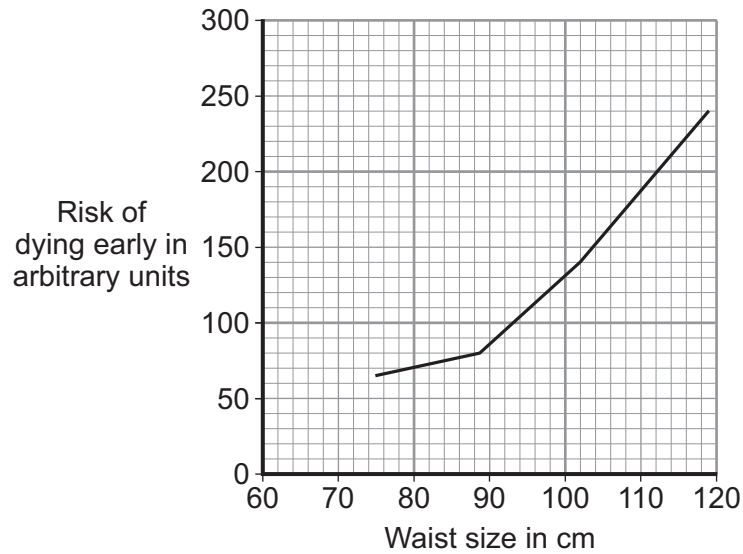
The waist sizes of 200 000 men were checked for ten years. Over the ten years, the men had a normal lifestyle.

7000 of these men died during the study.

6B Which factor was controlled in this study?

- 1 waist size
- 2 diet
- 3 gender
- 4 exercise

The graph shows the results of the study. A risk of 100 means that the person has a normal life expectancy. A risk greater than 100 means that the person has a lower than normal life expectancy.



- 6C** From the graph, what waist size is linked to a normal life expectancy?
- 1 76 cm
 - 2 84 cm
 - 3 93 cm
 - 4 112 cm
- 6D** The graph shows that . . .
- 1 a man with a waist size of 110 cm will die before a man with a waist size of 90 cm.
 - 2 increasing body mass in men increases the risk of dying early.
 - 3 more men have larger waist sizes.
 - 4 increasing waist size in men increases the risk of dying early.

QUESTION SEVEN

Several factors affect the risk of heart disease.

The table shows how different occupations and the risk factors for heart disease are linked.

Risk factor	Percentage of occupational group at risk of heart disease				
	Professional	Semi-professional	Self-employed	Semi-skilled	Unskilled
Smoking	18	22	26	28	35
Less than 30 minutes of exercise per week	28	30	28	30	35
Drinking over 4 units of alcohol per day	34	37	34	36	34
Drinking over 8 units of alcohol on at least one day per week	18	19	18	20	18
High blood pressure	25	27	25	29	28
High total cholesterol	66	65	67	65	60
Being overweight	43	43	38	39	39
Obesity	21	20	27	24	23

7A Which occupational group take least exercise on average?

- 1 professional
- 2 semi-professional
- 3 semi-skilled
- 4 unskilled

7B Which risk factor affects all occupational groups the most?

- 1 smoking
- 2 drinking over 4 units of alcohol per day
- 3 high total cholesterol
- 4 obesity

7C For which risk factor is there the least variation between the different occupational groups?

- 1 smoking
- 2 drinking over 8 units of alcohol on at least one day per week
- 3 high blood pressure
- 4 being overweight

7D To which occupational group would it be best to target an anti-smoking campaign?

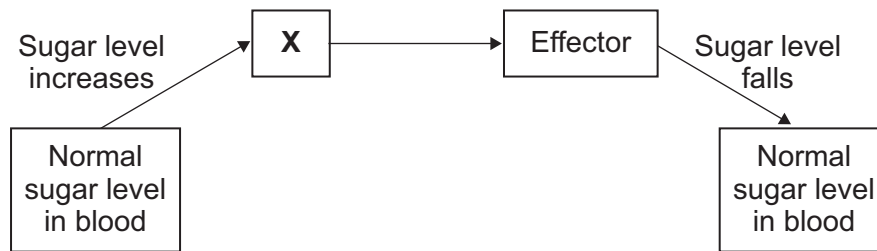
- 1 professional
- 2 semi-professional
- 3 self-employed
- 4 unskilled

Turn over for the next question

Turn over ►

QUESTION EIGHT

The diagram shows what happens to sugar levels in the blood after a meal.



8A Structure **X** is sensitive to increases in blood sugar levels.

Structure **X** is a . . .

- 1 synapse.
- 2 relay neurone.
- 3 motor neurone.
- 4 receptor.

8B Structure **X** sends information to the effector in the blood stream.

This information is sent as . . .

- 1 a hormone.
- 2 an enzyme.
- 3 a synapse.
- 4 a nerve impulse.

8C All effectors are . . .

- 1 glands.
- 2 neurones.
- 3 target organs.
- 4 muscles.

8D Sometimes, the organs controlling blood sugar concentration do not work properly and the sugar levels in the blood stay high.

This condition is called . . .

- 1 arthritis.
- 2 diabetes.
- 3 heart disease.
- 4 rubella.

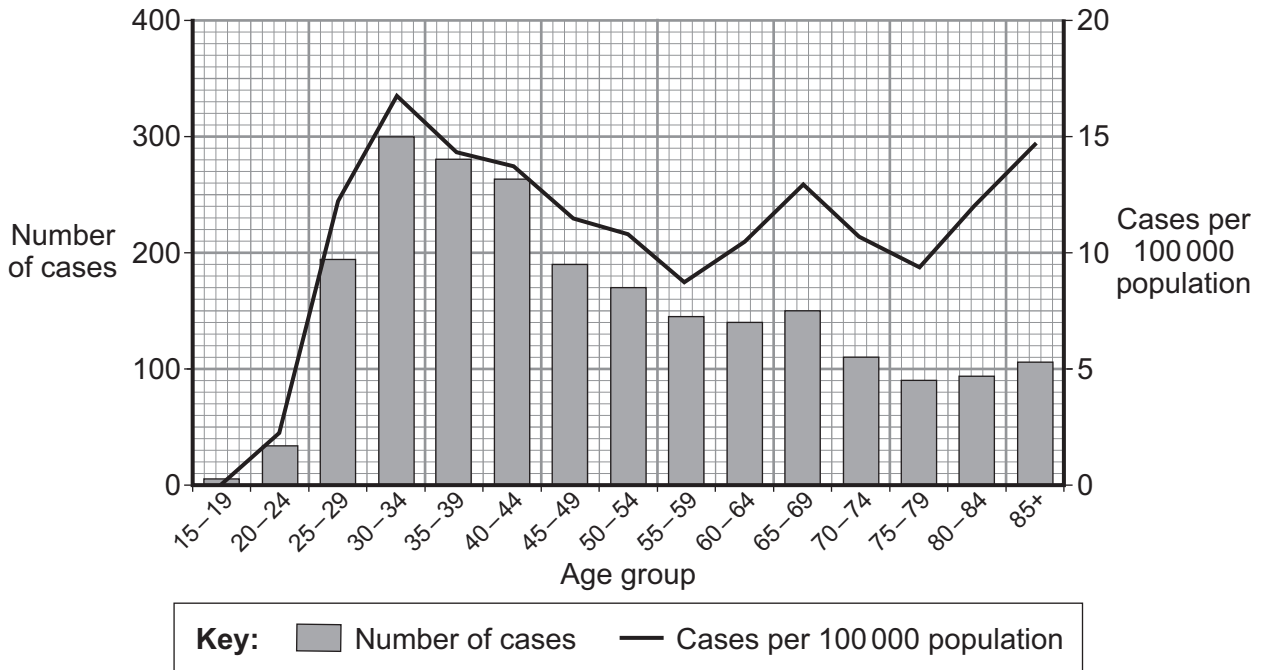
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QUESTION NINE

A virus causes cervical cancer. Sexual intercourse transmits the virus.

The graph shows the number of cases of cervical cancer diagnosed in England in 2005.



9A Which age group had the highest number of cases of cervical cancer?

- 1 15-19
- 2 30-34
- 3 40-44
- 4 85+

9B A city has 500 000 inhabitants.

How many women aged 65-69 would have been diagnosed with cervical cancer in 2005?

- 1 13
- 2 65
- 3 150
- 4 260

-
- 9C** The government has started a programme of vaccination against the cervical cancer virus. The programme starts with the vaccination of 14-year-old girls.

From the information in the graph, what is the reason for starting with this age group?

The girls in this age group . . .

- 1 are used to being vaccinated.
 - 2 get booster doses of other vaccines at school.
 - 3 have mainly not yet started their menstrual cycles.
 - 4 have mainly not yet been infected with the virus.
- 9D** Many parents do not agree with girls of 14 being vaccinated against the cervical cancer virus.

An ethical reason for this would be that the parents . . .

- 1 think vaccination might encourage the girl to have underage sex.
- 2 do not know how the vaccine works.
- 3 are afraid of side-effects.
- 4 cannot afford vaccination.

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

This question is about human organs.

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

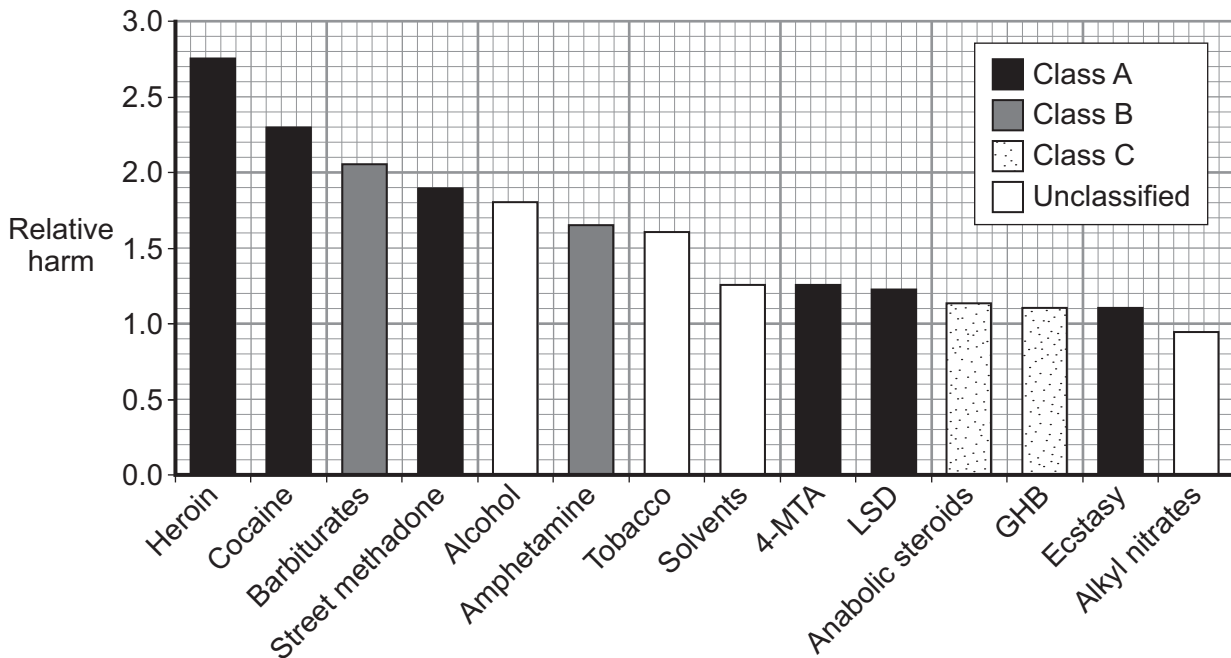
- A** kidney
- B** liver
- C** ovary
- D** pituitary gland

	Function
1	produces cholesterol
2	produces FSH
3	produces oestrogen
4	produces urine

QUESTION TWO

A group of scientists was asked to rate recreational drugs according to the harm that these drugs cause. The scientists used a scale 1–3, with 3 being the most harmful.

The results are shown in the graph.



The government classifies drugs as Class A, Class B, Class C or unclassified.

Class A drugs are the most harmful, and unclassified drugs are the least harmful.

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

- A** alcohol
- B** ecstasy
- C** heroin
- D** tobacco

1	a drug with a relative harm of 1.6
2	a drug that scientists think the government should put into a less harmful class
3	the drug unclassified by the government that scientists think is more harmful than one substance in Class B
4	the most harmful Class A drug

Turn over ►

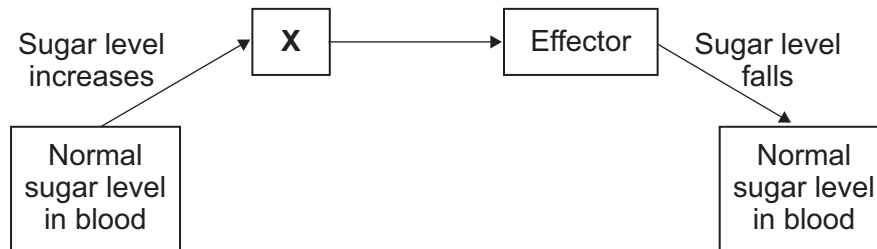
Section TwoQuestions **THREE** to **NINE**.

Each of these questions has four parts.

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

QUESTION THREE

The diagram shows what happens to sugar levels in the blood after a meal.

**3A** Structure **X** is sensitive to increases in blood sugar levels.Structure **X** is a . . .

- 1 synapse.
- 2 relay neurone.
- 3 motor neurone.
- 4 receptor.

3B Structure **X** sends information to the effector in the blood stream.

This information is sent as . . .

- 1 a hormone.
- 2 an enzyme.
- 3 a synapse.
- 4 a nerve impulse.

3C All effectors are . . .

- 1 glands.
- 2 neurones.
- 3 target organs.
- 4 muscles.

3D Sometimes, the organs controlling blood sugar concentration do not work properly and the sugar levels in the blood stay high.

This condition is called . . .

- 1 arthritis.
- 2 diabetes.
- 3 heart disease.
- 4 rubella.

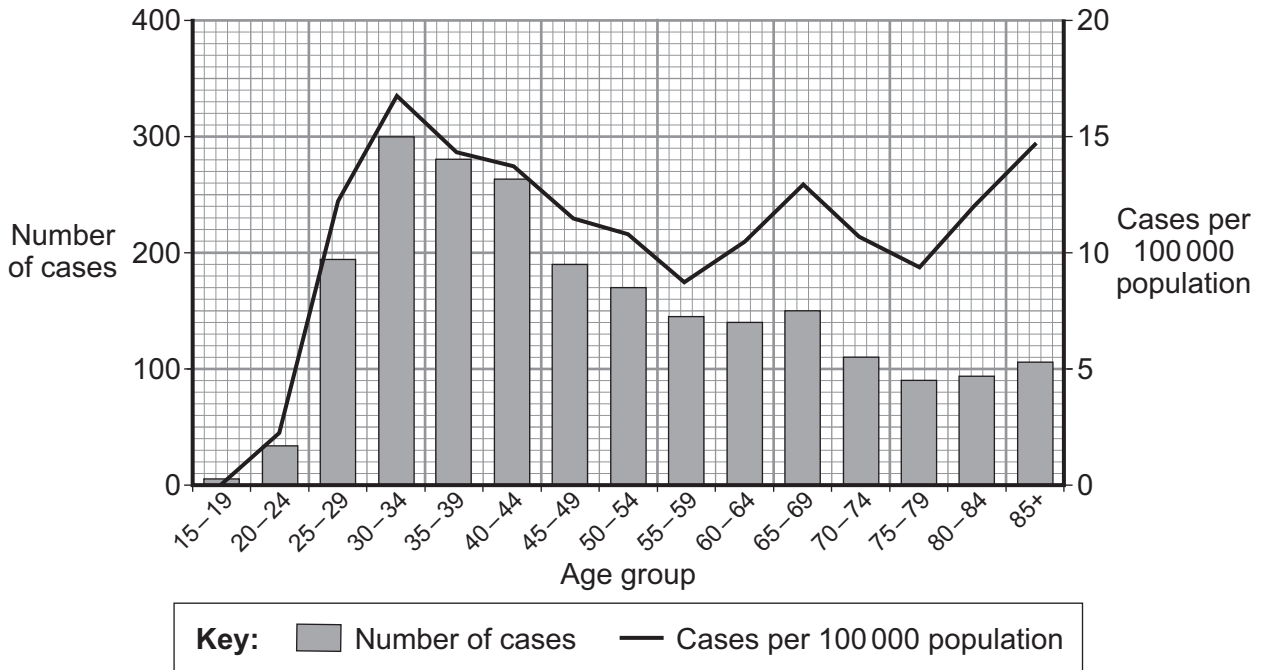
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Turn over ►

QUESTION FOUR

A virus causes cervical cancer. Sexual intercourse transmits the virus.

The graph shows the number of cases of cervical cancer diagnosed in England in 2005.



4A Which age group had the highest number of cases of cervical cancer?

- 1 15-19
- 2 30-34
- 3 40-44
- 4 85+

4B A city has 500 000 inhabitants.

How many women aged 65-69 would have been diagnosed with cervical cancer in 2005?

- 1 13
- 2 65
- 3 150
- 4 260

-
- 4C** The government has started a programme of vaccination against the cervical cancer virus. The programme starts with the vaccination of 14-year-old girls.

From the information in the graph, what is the reason for starting with this age group?

The girls in this age group . . .

- 1 are used to being vaccinated.
 - 2 get booster doses of other vaccines at school.
 - 3 have mainly not yet started their menstrual cycles.
 - 4 have mainly not yet been infected with the virus.
- 4D** Many parents do not agree with girls of 14 being vaccinated against the cervical cancer virus.

An ethical reason for this would be that the parents . . .

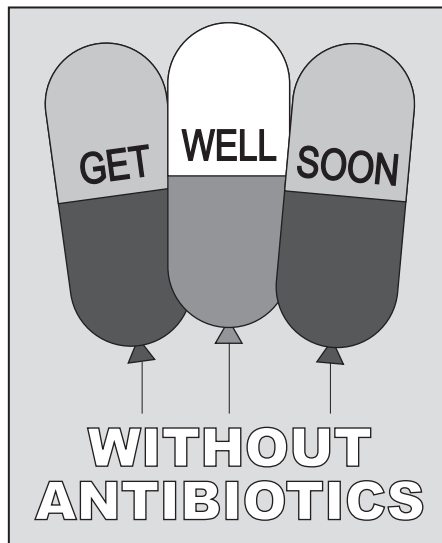
- 1 think vaccination might encourage the girl to have underage sex.
- 2 do not know how the vaccine works.
- 3 are afraid of side-effects.
- 4 cannot afford vaccination.

Turn over for the next question

Turn over ►

QUESTION FIVE

The poster is part of a campaign to reduce the amount of antibiotics used.



5A Antibiotics kill . . .

- 1 bacteria only.
- 2 viruses only.
- 3 both bacteria and viruses.
- 4 all types of pathogen.

5B Overuse of antibiotics . . .

- 1 causes bacteria to mutate.
- 2 causes bacteria to become resistant to antibiotics.
- 3 increases the rate of development of antibiotic-resistant strains of bacteria.
- 4 decreases the risk of epidemics and pandemics occurring.

5C A new strain of bacterium might not be recognised by . . .

- 1 antibodies.
- 2 antitoxins.
- 3 painkillers.
- 4 vaccines.

- 5D** The proportion of antibiotic-resistant bacteria in a population increases because of . . .
- 1 addiction.
 - 2 immunity.
 - 3 mutation.
 - 4 natural selection.

Turn over for the next question

Turn over ►

QUESTION SIX

Sometimes, athletes train in hot countries. The athletes need to get used to hot conditions.

In an investigation:

- eight athletes did three different physical exercises before starting to train in hot conditions
- the sweat from the athletes was analysed after each exercise
- the athletes trained in hot conditions for ten days
- the athletes repeated the three different exercises that they had done before training in hot conditions
- the athletes' sweat was analysed after each exercise.

6A The athletes were told that it did not matter if they ate a lot of salt (containing sodium ions) during the 10 days of training in hot conditions.

The athletes could eat a lot of salt because the excess sodium ions . . .

- 1 are removed by sweating.
- 2 are removed by the kidneys.
- 3 cannot be carried by the blood.
- 4 cannot enter the blood.

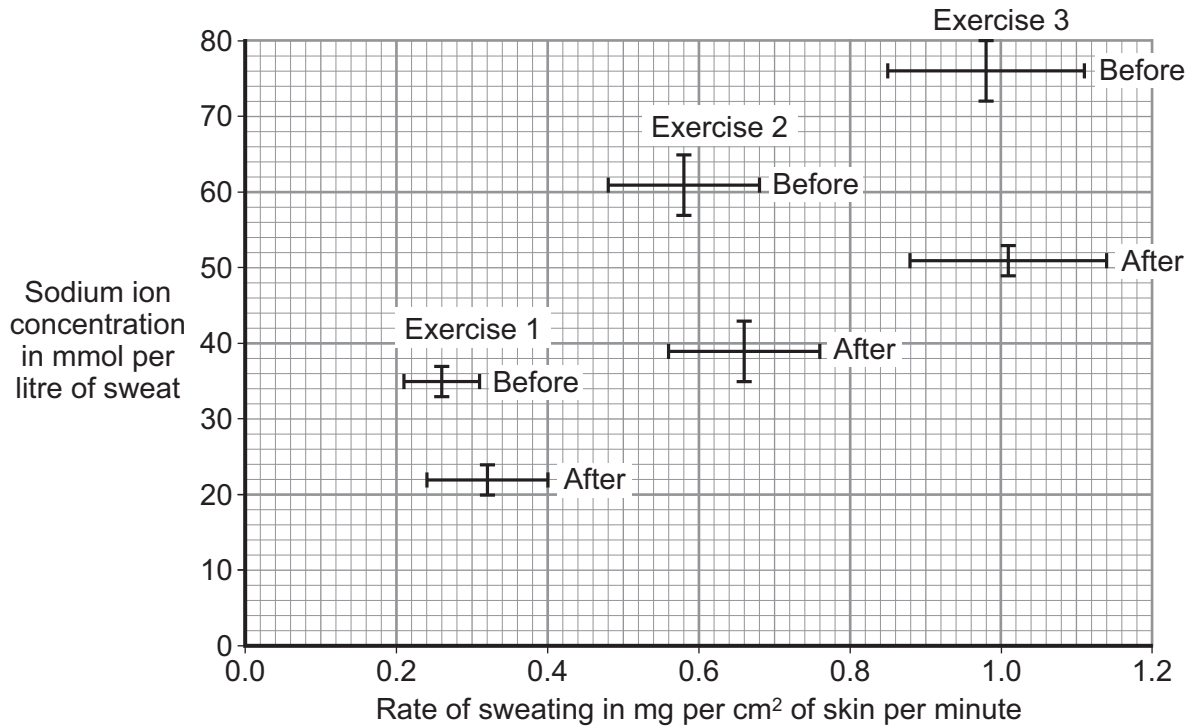
6B The athletes were told that they must not go without sodium ions in their diet because . . .

- 1 the athletes would lack the energy to carry out their exercises.
- 2 the athletes' blood would become too concentrated.
- 3 the athletes' body cells would not work efficiently.
- 4 the athletes' blood pressure would increase.

The graph below shows the results of the investigation for each of the three exercises before and after 10 days of training in hot conditions.

The bars at each plot show:

- the range of the rate of sweating (horizontal bar)
- the range of the concentration of sodium ions in the sweat (vertical bar).



6C The data suggests that for each of the three physical exercises after 10 days of training in hot conditions, . . .

- 1 there was a large difference in the sodium ion concentration but not in the rate of sweating.
- 2 there was a large difference in the rate of sweating but not in the sodium ion concentration.
- 3 there was a large difference in the sodium ion concentration and a large difference in the rate of sweating.
- 4 there was no difference in the sodium ion concentration and no difference in the rate of sweating.

6D The best conclusion from the graph is that . . .

- 1 training in hot conditions increases the concentration of sodium ions in sweat.
- 2 an increase in the rate of sweating reduces the concentration of sodium ions lost in sweat.
- 3 the rate of sweating is decreased by training in hot conditions.
- 4 training in hot conditions reduces the concentration of sodium ions lost in sweat.

Turn over ►

QUESTION SEVEN

A protein called 'C-reactive protein' is found in the blood. High levels of blood C-reactive protein have been linked to heart attacks.

In 2006, a double-blind trial was started to see if a new statin could lower levels of blood C-reactive protein.

7A In the trial, people with low levels of blood cholesterol but high levels of blood C-reactive protein were chosen because . . .

- 1 low levels of blood cholesterol are not linked to heart attacks.
- 2 cholesterol would react with protein.
- 3 statins do not affect people with low levels of blood cholesterol.
- 4 cholesterol is needed for the statins to have an effect.

7B The double-blind trial would have included . . .

- 1 both the patient and the doctor knowing who is getting the placebo.
- 2 the patient, but not the doctor knowing who is getting the placebo.
- 3 the doctor, but not the patient knowing who is getting the placebo.
- 4 neither the patient nor the doctor knowing who is getting the placebo.

7C The trial was planned to last for five years. The trial was stopped after less than 2 years because the risk of heart attack was reduced by 54% in the group given the new statin.

The decision to stop the trial was because . . .

- 1 statins are known to reduce heart attacks and strokes.
- 2 the researchers decided that the drug was not working.
- 3 it was unfair on the people taking the placebo to continue taking part in the trial.
- 4 the scientists ran out of money.

7D The trials were supported financially by the company that produced the drug.

This means that the results . . .

- 1 might be less reliable than if they had been supported by the National Health Service.
- 2 might be less reliable than if they had been supported by a university.
- 3 might be biased.
- 4 should be disregarded even though many patients' lives were saved.

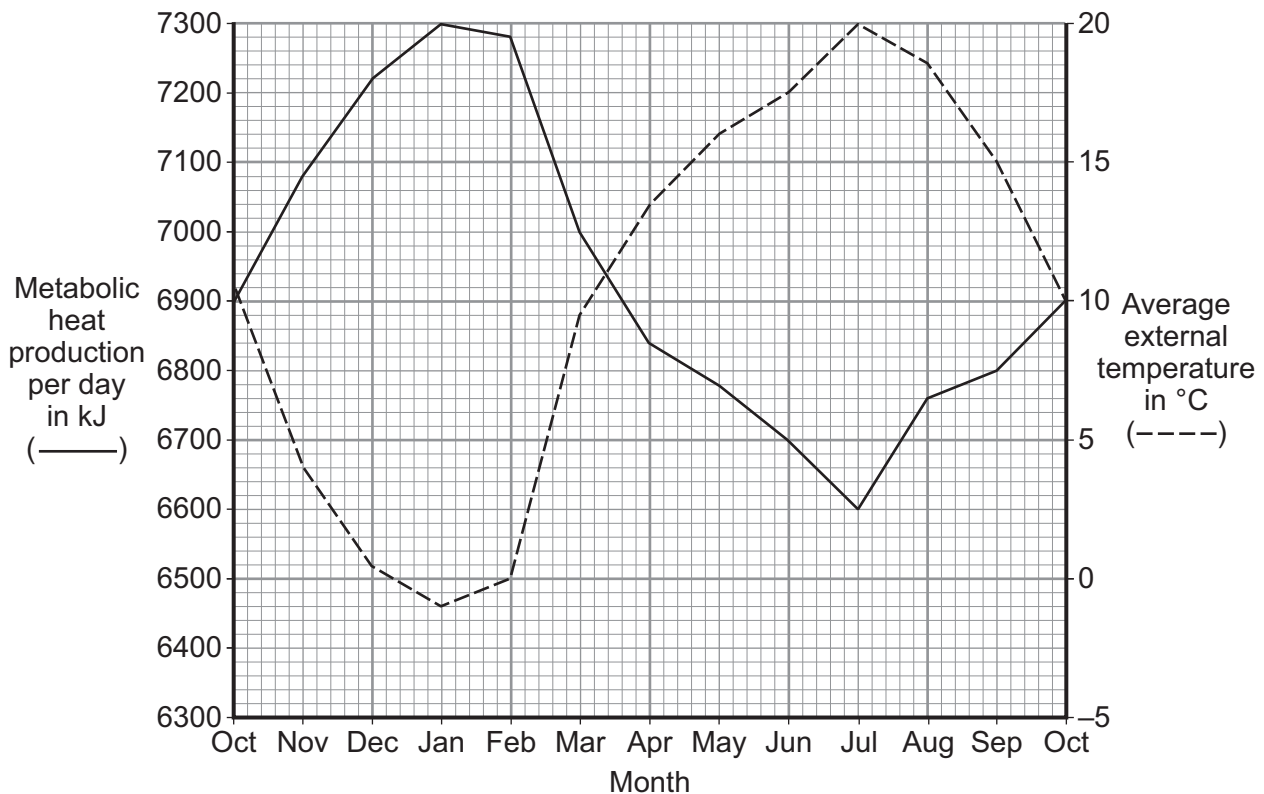
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QUESTION EIGHT

A scientist called Gessler investigated the effect of external temperature on his own metabolic rate. He used the amount of heat produced by his body as a measure of his metabolic rate. He made sure that he kept his daily level of activity the same during his experiment. He calculated the average daily heat production for each month.

The results are shown on the graph.



8A What was the average (mean) daily metabolic heat production in kJ in August?

- 1 6600
- 2 6760
- 3 7140
- 4 9000

8B During which month would you expect Gessler's food consumption to be highest?

- 1 January
- 2 April
- 3 July
- 4 November

8C The graph shows . . .

- 1 no relationship between average external temperature and metabolic rate.
- 2 that metabolic rate is directly proportional to environmental temperature.
- 3 an inverse relationship between metabolic rate and environmental temperature.
- 4 that metabolic rate is affected by a factor other than average external temperature.

8D What would be the effect on Gessler's body mass if his daily energy intake was kept the same throughout the year?

His body mass would . . .

- 1 increase when his metabolic heat production increased.
- 2 stay constant throughout the year.
- 3 decrease in summer and increase in winter.
- 4 decrease in winter and increase in summer.

Turn over for the next question

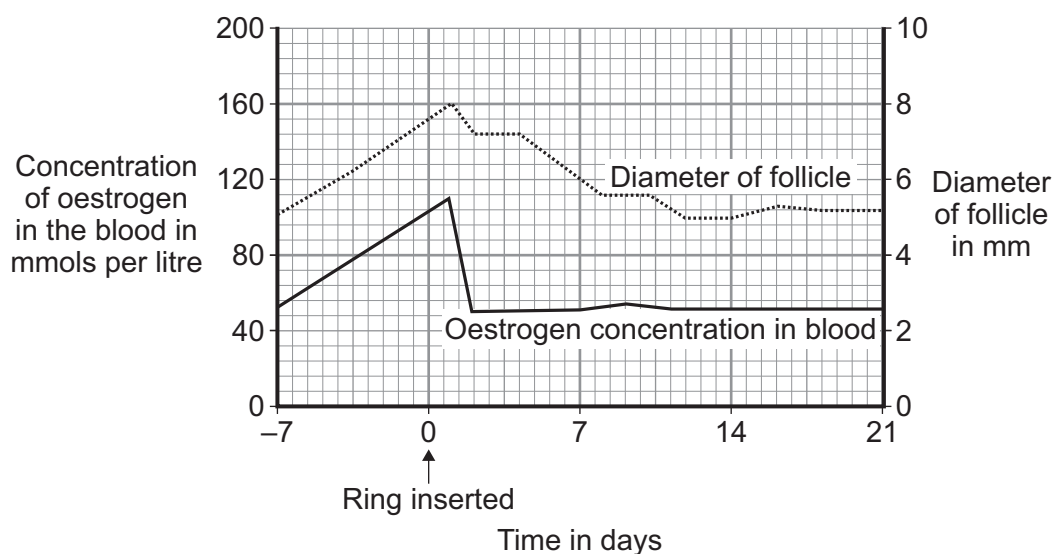
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QUESTION NINE

The ring is a new method of contraception. The ring is inserted into the vagina and releases very low doses of contraceptive hormones for 3 weeks. The woman then removes the ring and inserts a new ring one week later.

A follicle is a spherical structure in the ovary. Inside a follicle, an egg matures. As the egg matures, the follicle enlarges. When the egg is mature, the follicle bursts and releases the egg.

The graph shows the effects of using the ring method.



9A In a normal menstrual cycle, . . .

- 1 FSH stimulates LH production.
- 2 FSH stimulates oestrogen production.
- 3 oestrogen stimulates FSH production.
- 4 oestrogen inhibits LH production.

9B Using information from the graph and your own knowledge, hormones from the ring most probably . . .

- 1 stimulate oestrogen production.
- 2 inhibit LH production.
- 3 inhibit FSH production.
- 4 stimulate the production of both FSH and LH.

9C The ring prevents a woman from becoming pregnant by . . .

- 1 preventing the sperm from entering the womb.
- 2 preventing the thickening of the womb lining.
- 3 preventing eggs from maturing.
- 4 destroying the follicles.

9D The ring has a lower failure rate than most contraceptive pills.

The most probable reason for this is that . . .

- 1 hormones are released from the ring at a fairly constant rate.
- 2 hormones from the ring enter the blood.
- 3 hormones from the ring affect the pituitary gland.
- 4 hormones from the ring affect the womb.

END OF TEST

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