Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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

Science A

Unit Biology B1a (Human Biology)

Biology

Unit Biology B1a (Human Biology)

BLY1AP

F&H

Tuesday 15 November 2011 Morning Session

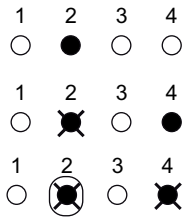
For this paper you must have:
- a black ball-point pen
- an objective test answer sheet.

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.



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 16 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 are used to treat the condition shown in the photograph.

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

A leprosy

B limb abnormalities

C morning sickness

D difficulties in sleeping

The drug thalidomide was first developed to treat . . . **1** . . . .

Thalidomide was also given to pregnant women to treat . . . **2** . . . .

Because many women were given thalidomide, many babies were born with . . . **3** . . . .

Thalidomide is now used to treat . . . **4** . . . .

QUESTION TWO

Infectious diseases make us feel ill.

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

A antibodies

B antibiotics

C toxins

D painkillers

Bacteria make us feel ill because bacteria produce . . . **1** . . . .

To kill bacteria, a doctor might give a patient . . . **2** . . . .

To kill bacteria, our white blood cells produce . . . **3** . . . .

To relieve disease symptoms quickly, a doctor might give a patient . . . **4** . . . .

Turn over for the next question

QUESTION THREE

The table shows the amounts of energy, sugar and salt in 100 cm^3 of some sports drinks.

Drink	Energy in kJ	Sugar in g	Salt in mg
High sport	361	20	0
Hydrate	378	22	63
Quench	427	23	153
Unsweetened orange juice	230	13	5

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

A High sport

B Hydrate

C Quench

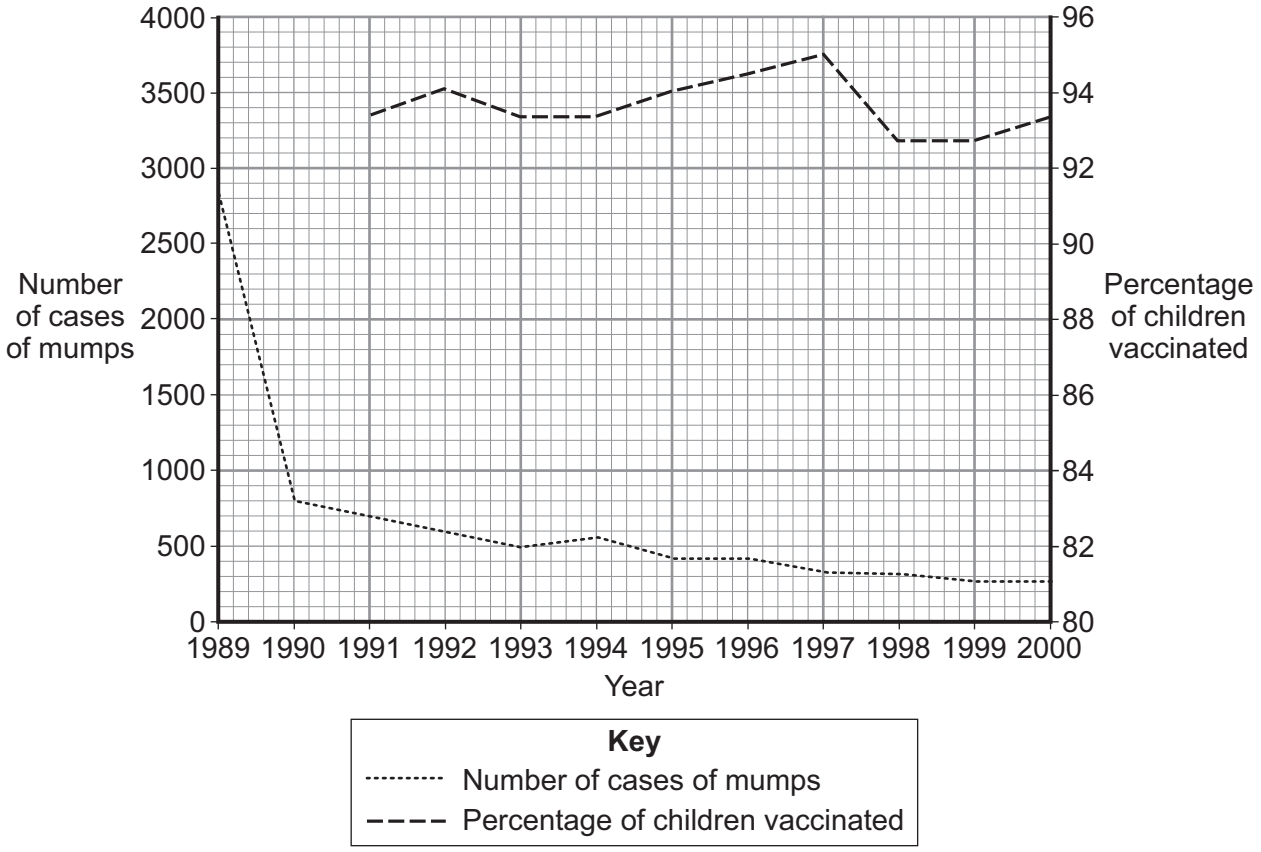
D Unsweetened orange juice

1	contains least energy
2	contains 220 g of sugar per litre
3	is most likely to cause increased body mass
4	is least likely to cause an increase in blood pressure

QUESTION FOUR

The graph shows the number of cases of mumps in Scotland between 1989 and 2000.

The graph also shows the percentage of children vaccinated against mumps.



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

A 1991

B 1994

C 1997

D 2000

1	the year when vaccination started
2	the year when the highest percentage of children were vaccinated
3	the only year when there was an increase in the number of cases of mumps
4	the decrease in the number of cases of mumps between 1989 and 1990

QUESTION FIVE

The flow chart shows how new drugs are tested.

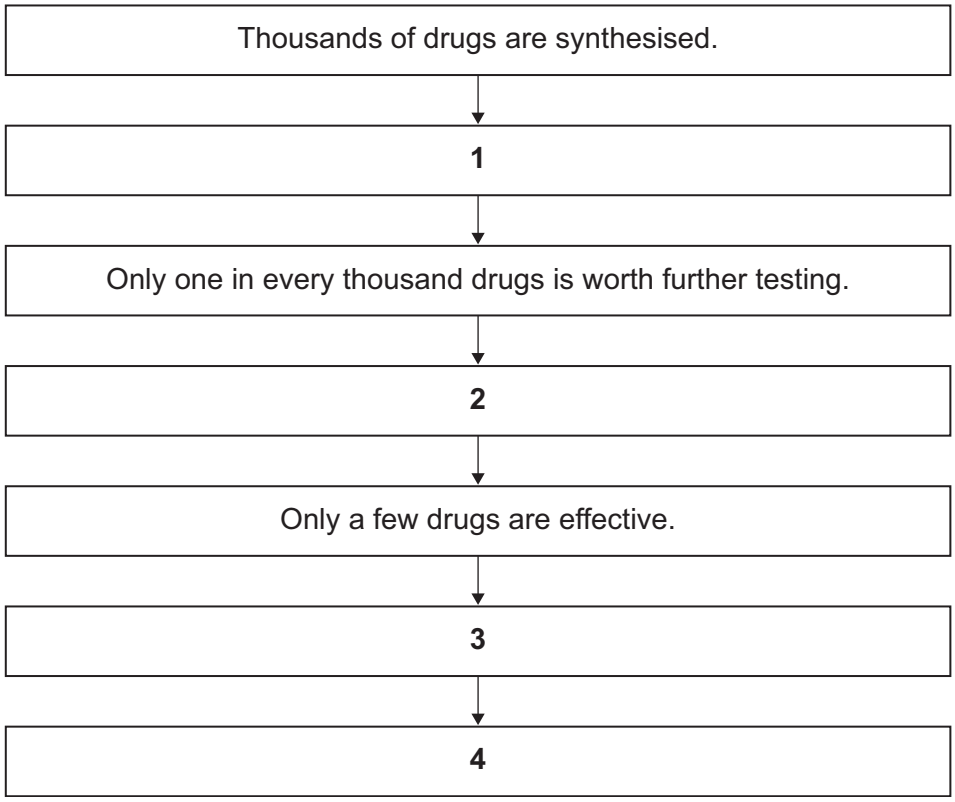
Match statements, **A**, **B**, **C** and **D**, with the stages **1**–**4** in the flow chart.

A Drugs are tested on animals to see if the drugs work.

B Low doses of drugs are tested on volunteers to detect any side effects.

C Drugs are tested on cells to see if the drugs are safe to test on organisms.

D Drugs are tested on patients to find the best dose.



Turn over for the next question

Section Two

Questions **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

A student was walking home after a night out with a group of friends. He stepped out into the road in front of a car. The car brakes made a screeching noise as the car tried to stop. Luckily, the student jumped back onto the pavement without thinking as soon as he was aware of the danger.

6A Which row in the table shows the sense organs that could have detected the car?

	Skin	Eyes	Nose	Tongue	Ears
1	✓	✓			
2		✓	✓	✓	
3	✓			✓	
4		✓			✓

6B The cells that detect changes in the surroundings are called . . .

1 muscles.

2 receptors.

3 stimuli.

4 synapses.

6C Jumping back onto the pavement involved a reflex action.

All reflex actions . . .

1 involve the brain.

2 are rapid and automatic.

3 involve glands.

4 involve hormones.

6D The student's reaction time would have been slower if . . .

1 he had smoked a cigarette earlier.

2 the car had been travelling faster.

3 he had been drinking alcohol.

4 the driver had sounded his horn.

Turn over for the next question

QUESTION SEVEN

The level of cholesterol in the blood may affect a person's health.

7A Which organ in the body makes cholesterol?

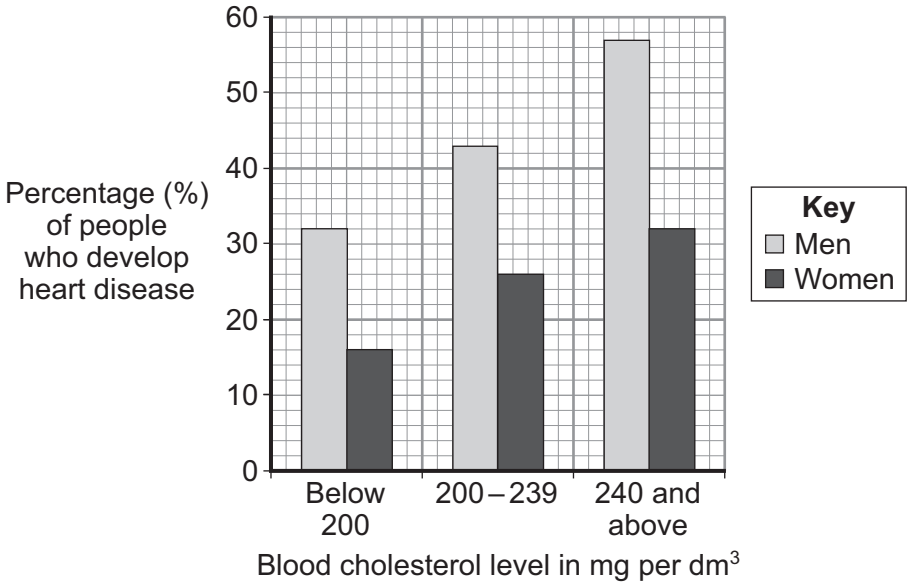
1 heart

2 kidney

3 liver

4 lung

The bar chart shows the relationship between blood cholesterol level and the chance of developing heart disease.



7B What percentage (%) of women with a blood cholesterol level of 220 mg per dm^3 develop heart disease?

1 16 %

2 26 %

3 32 %

4 42 %

7C A man with a blood cholesterol level of 150 mg per dm^3 is more likely to develop heart disease than a woman with the same blood cholesterol level.

How much more likely?

1 1.5 times

2 2 times

3 2.5 times

4 3 times

7D Which conclusion can be made from the graph?

1 People with blood cholesterol levels above 240 mg per dm^3 will all develop heart disease.

2 People with blood cholesterol levels above 240 mg per dm^3 will not develop heart disease.

3 There is no link between blood cholesterol level and heart disease.

4 The higher the blood cholesterol level, the greater the chance of developing heart disease.

Turn over for the next question

QUESTION EIGHT

In countries where yoghurt has been part of the diet for centuries, many people live to be 90 or even 100 years old.

A teacher asked a class to test the hypothesis that the bacteria in yoghurt improve the health of elderly people.

The students carried out the following investigation in two groups.

Group 1: Fifteen students asked their grandparents to drink 500 cm^3 of milk and eat 150 g of natural yoghurt every day for six weeks.

Group 2: Fifteen other students asked their grandparents to drink 500 cm^3 of milk every day for six weeks as a control.

After the six weeks, both sets of grandparents completed a questionnaire and the students recorded the results.

8A The experiment was not well planned because the students did not control . . .

1 the amount of milk.

2 the amount of yoghurt.

3 the age of the grandparents.

4 the length of time.

The table shows the results of the investigation.

	Group 1	**Group 2**
Number of grandparents	56	60
Number of grandparents who had heart problems	1	1
Number of grandparents who developed colds or flu	2	6
Number of grandparents who developed stomach upsets	7	10

8B Look at the data for the grandparents who were given yoghurt.

What fraction had stomach upsets during the investigation?

1 $\frac{1}{28}$

2 $\frac{1}{10}$

3 $\frac{1}{8}$

4 $\frac{1}{4}$

8C The reliability of the investigation could have been improved by . . .

1 using yoghurt containing fruit.

2 using a larger number of grandparents.

3 giving the grandparents larger amounts of yoghurt.

4 weighing the grandparents at the start of the experiment.

8D Which conclusion can be made from the results of the investigation?

1 There is a definite link between eating yoghurt and health in grandparents.

2 There is a definite link between drinking milk and health in grandparents.

3 There is not enough evidence to link yoghurt and health in grandparents.

4 Eating yoghurt prevents stomach upsets in grandparents.

Turn over for the next question

QUESTION NINE

Some infections can be treated with antibiotics.

9A Virus infections cannot be treated with antibiotics because . . .

1 viruses live inside body cells.

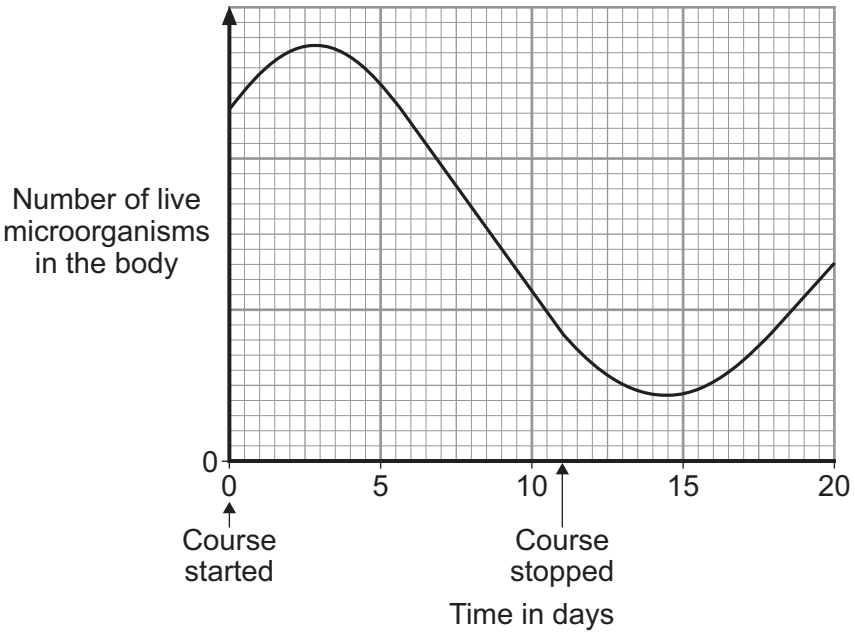
2 viruses are too small.

3 viruses have thick coats.

4 viruses are resistant.

Antibiotic tablets may be prescribed by a doctor. Patients are always told to finish the course of tablets, even though they may be feeling better.

The graph shows what happens to the number of live microorganisms in the body when someone does not finish a course of antibiotic tablets.



9B How many more days would the patient have needed to take the antibiotics to kill all the microorganisms in the body?

1 3

2 11

3 14

4 20

9C After starting a course of antibiotics, a patient might feel more ill for two or three days.

Why?

1 Microorganisms are still multiplying in the body.

2 Antibiotics always cause side effects which make patients feel unwell.

3 Antibiotics do not kill microorganisms, antibiotics only relieve the symptoms.

4 The course of antibiotics was not completed.

9D Some microorganisms have become resistant to antibiotics.

An antibiotic-resistant population of a microorganism results from . . .

1 patients not completing their course of antibiotics.

2 toxins.

3 natural selection.

4 not enough people being vaccinated.

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

The flow chart shows how new drugs are tested.

Match statements, **A**, **B**, **C** and **D**, with the stages **1**–**4** in the flow chart.

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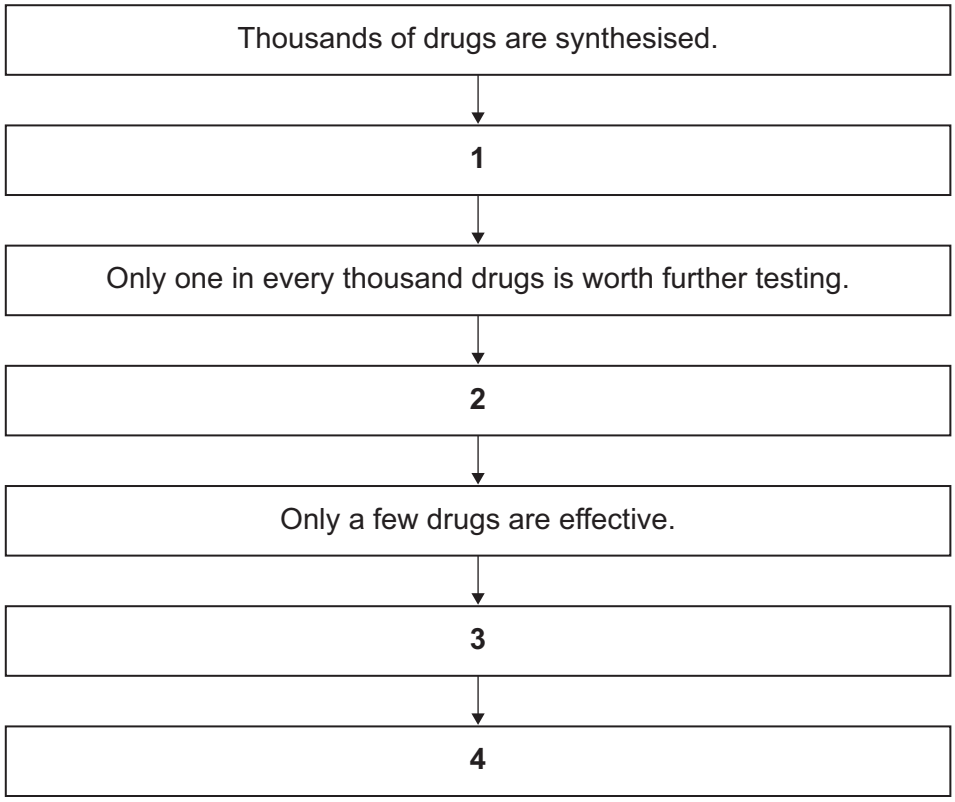
D Drugs are tested on patients to find the best dose.



QUESTION TWO

Our weight depends on:

- inherited factors
- the amount of exercise we take
- our diet.

If our energy intake is less than 3300 kJ a day, we slowly use muscle tissue rather than fat to get our energy.

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

A higher muscle to fat ratio

B obesity

C reduced cholesterol levels, decrease in weight

D very low metabolic rate, muscle loss

1	regular exercise	2800 kJ per day, low fat diet
2	regular exercise	high energy, low fat diet
3	very little exercise	2800 kJ per day, low fat diet
4	very little exercise	high energy, high fat diet

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

In countries where yoghurt has been part of the diet for centuries, many people live to be 90 or even 100 years old.

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Turn over for the next question

QUESTION FOUR

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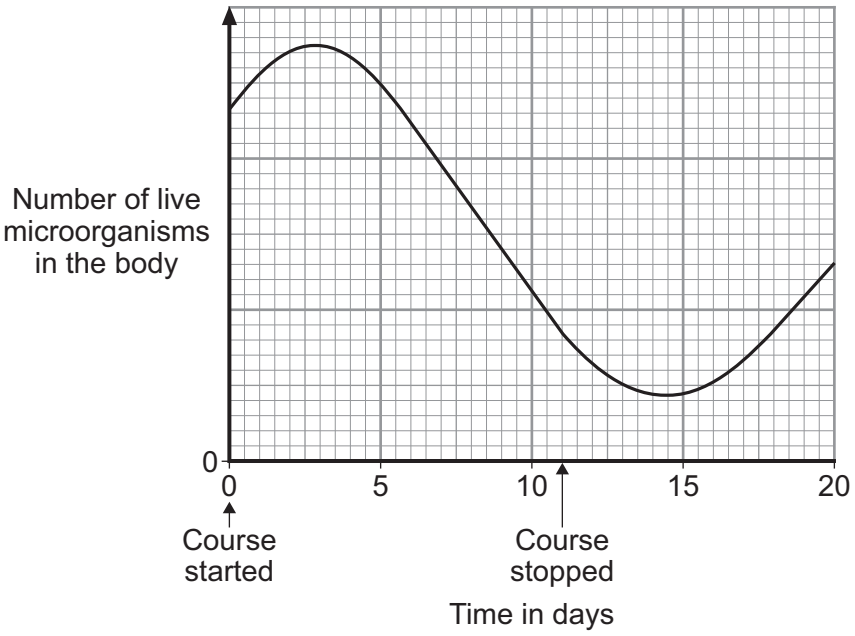
The graph shows what happens to the number of live microorganisms in the body when someone does not finish a course of antibiotic tablets.



4B How many more days would the patient have needed to take the antibiotics to kill all the microorganisms in the body?

1 3

2 11

3 14

4 20

4C After starting a course of antibiotics, a patient might feel more ill for a few days.

Why?

1 Microorganisms are still multiplying in the body.

2 Antibiotics always cause side effects which make patients feel unwell.

3 Antibiotics do not kill microorganisms, antibiotics only relieve the symptoms.

4 The course of antibiotics was not completed.

4D Some microorganisms have become resistant to antibiotics.

An antibiotic-resistant population of a microorganism results from . . .

1 patients not completing their course of antibiotics.

2 toxins.

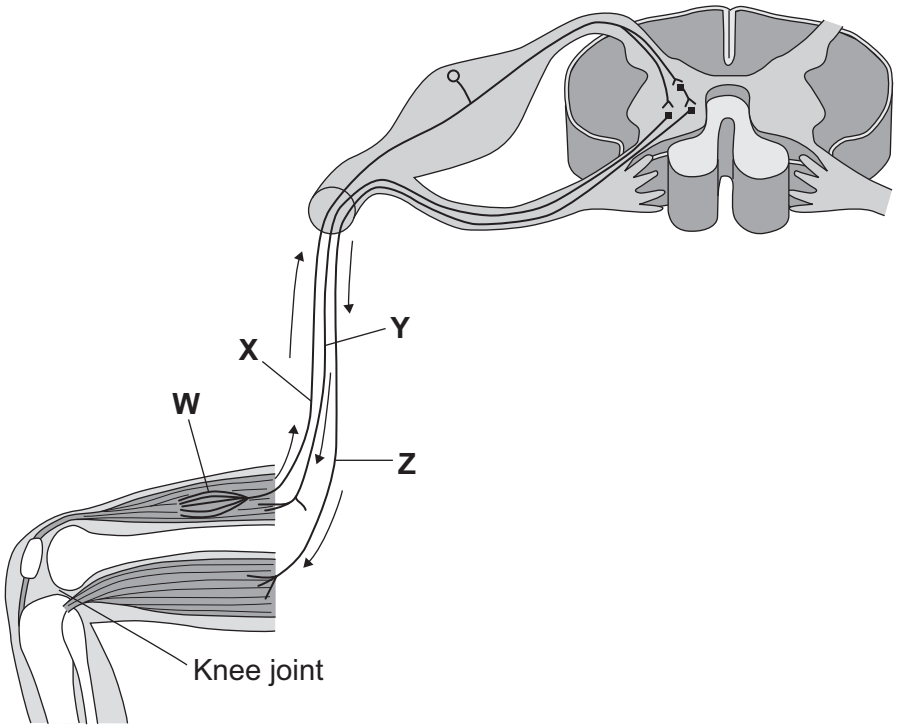
3 natural selection.

4 not enough people being vaccinated.

Turn over for the next question

QUESTION FIVE

The diagram shows a reflex action involving muscles in the leg.



The arrows show the direction of nerve impulses.

5A Structure **W** detects stretch in the muscle.

Structure **W** is called . . .

1 an effector.

2 a receptor.

3 a sensory neurone.

4 a synapse.

5B Structure **X** is . . .

1 an effector.

2 a relay neurone.

3 a sensory neurone.

4 a synapse.

The two muscles in the diagram are usually contracted to a small extent. Structures **Y** and **Z** are both motor neurones.

- Impulses from structure **Y** stimulate muscle contraction.
- Impulses from structure **Z** inhibit muscle contraction.

5C Which of the following is most likely to cause the leg to straighten at the knee joint?

1 impulses passing only along neurone **Y**

2 impulses passing only along neurone **Z**

3 impulses passing along both neurone **Y** and neurone **Z**

4 no impulses passing along neurones **Y** and **Z**

5D When the leg has straightened at the knee joint, . . .

1 impulses will move along **X** only.

2 impulses will move along **Y** only.

3 impulses will move along **X** and **Y** but not along **Z**.

4 no impulses will move along **X** or **Y** or **Z**.

Turn over for the next question

QUESTION SIX

Diabetes is linked to body mass index (BMI).

BMI is calculated using the formula:

$$\text{BMI} = \frac{\text{mass (in kg)}}{\text{height}^2 \text{ (in m}^2\text{)}}$$

A 15 year old girl is 1.61 metres tall, with a mass of 58 kg.

6A Use the formula to calculate her BMI.

Her BMI is . . .

1 0.04

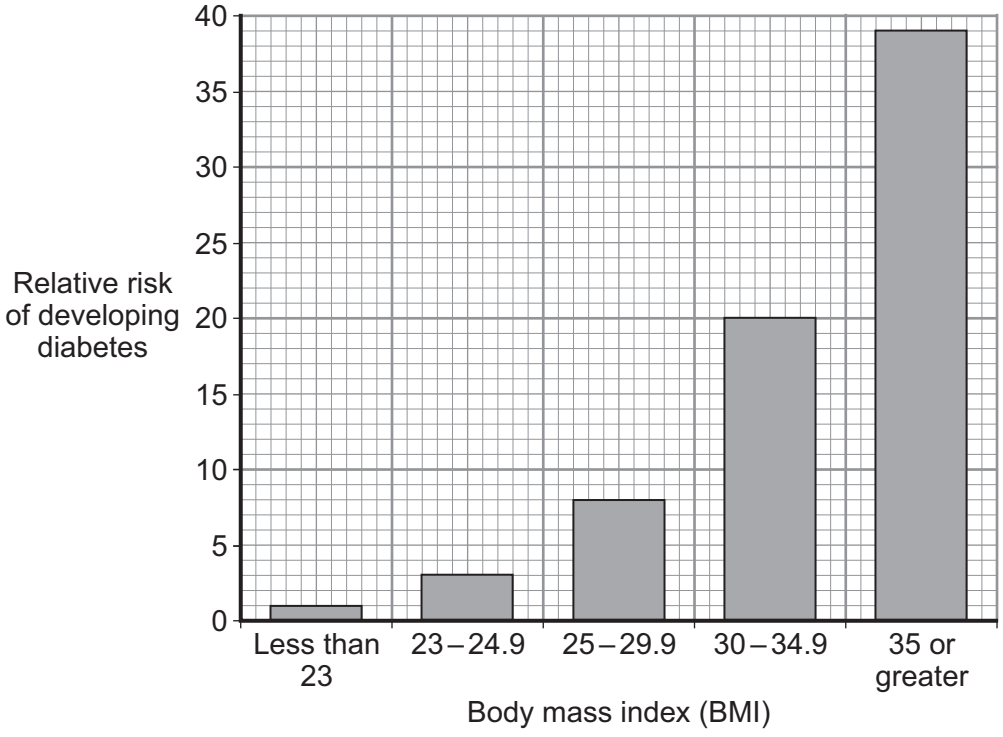
2 18.0

3 22.4

4 36.0

The bar chart shows the link between BMI and the relative risk of developing diabetes.

A relative risk of 1 is the normal risk of developing diabetes.



6B One conclusion that can be made from this bar chart is that . . .

1 heavy people usually develop diabetes.

2 an increase in BMI from 24 to 25 increases the risk of developing diabetes by three times.

3 a person with a BMI of 36 will develop diabetes.

4 a person with a BMI of 20 might develop diabetes.

6C An athlete has a BMI of 32. However, her risk of developing diabetes is likely to be less than 20 times the normal risk.

The most likely reason for this is that she . . .

1 is very short.

2 is fit and healthy.

3 has a lot of muscle compared to fat.

4 has a high metabolic rate.

6D A doctor saw a person with a BMI of 35. The doctor advised the person to take statins. Statins affect the levels of LDL and HDL in the blood.

For a healthy heart there should be . . .

1 high levels of LDL and HDL.

2 a high level of LDL and a low level of HDL.

3 a high level of HDL and a low level of LDL.

4 low levels of LDL and HDL.

Turn over for the next question

QUESTION SEVEN

In vitro fertilisation (IVF) is used to treat infertility.

7A IVF involves using . . .

1 FSH to stimulate the maturation of eggs and LH to stimulate egg release.

2 LH to stimulate the maturation of eggs and FSH to stimulate egg release.

3 FSH to stimulate the maturation of eggs and oestrogen to stimulate egg release.

4 LH to stimulate the maturation of eggs and oestrogen to stimulate egg release.

The table shows the percentage success rate of fertility treatment and the percentage of multiple births in relation to the age of the woman.

	Age of woman				
	Younger than 35	35–37	38–39	40–42	42+
Percentage of fertility treatments resulting in live births	28.2	23.6	18.3	10.6	3.2
Multiple births as a percentage of these live births	28.4	23.1	18.5	12.4	3.7

7B 16 000 women aged below 35 were given fertility treatment.

How many multiple births were recorded from these women?

1 451

2 454

3 1281

4 4512

7C The evidence in the table is from survey results from 85 clinics from all over England.

The evidence should be given as results from individual clinics because . . .

1 individual clinics may not have recorded some of their failures.

2 it is important to identify the more successful clinics.

3 older people tend to have fewer multiple births.

4 the success rate falls with increased age of the mother.

7D The National Institute for Clinical Excellence has suggested rules for deciding who should be allowed fertility treatment.

Which of the following is an acceptable reason to refuse a woman fertility treatment?

1 The couple have been trying to start a family for only three years.

2 The woman has already had one unsuccessful attempt at treatment.

3 The woman is 48 years old.

4 The couple are not married.

Turn over for the next question

QUESTION EIGHT

Doctors disagree about whether children should be given the MMR vaccine or whether children should be vaccinated against the three diseases separately.

Each method of vaccination needs a booster injection.

MMR vaccination therefore requires two injections.

Vaccinating for the three diseases separately requires six injections.

8A Vaccinating a child to give protection against a particular disease involves . . .

1 causing the child to get the disease so that the child can develop antibodies.

2 injecting dead pathogens or inactive pathogens.

3 injecting the correct antibodies.

4 injecting white blood cells to produce the correct antibodies.

8B Vaccination gives a child protection from later infection by a particular pathogen because . . .

1 the vaccine causes the production of relevant antitoxins.

2 pathogens can no longer enter the body.

3 the body rapidly produces the correct antibodies if infected again.

4 the vaccine is toxic to pathogens entering the body.

8C Which of the following is a valid reason, based on fact, for supporting the use of MMR vaccinations in preference to the three separate vaccinations?

1 By 1995, 90 countries were using MMR vaccinations.

2 MMR vaccinations are compulsory in the USA.

3 Separate vaccinations require six injections with various time intervals; MMR needs only two.

4 Every MMR vaccination results in a severe reaction straight after the injection.

8D Many parents are worried about the perceived risks associated with MMR.

Which of the following facts is most likely to help parents decide to have their children vaccinated with MMR?

1 Child death rates from measles fell by 60 % between 1999 and 2007 following a widespread programme of MMR vaccinations.

2 Some parents have reported reactions which they believe to be related to the MMR vaccine 3 years after it was given to their children.

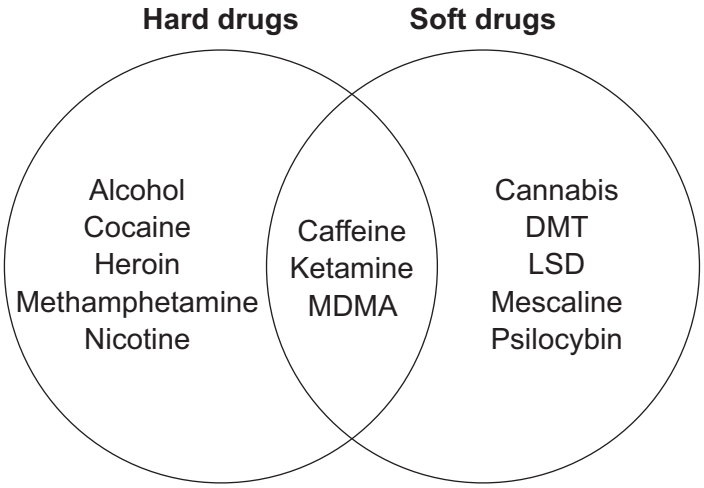
3 Doctors cannot guarantee that an MMR vaccination will give 100 % protection against the three diseases.

4 Swaziland does not use MMR and had no cases of measles reported in 2005.

Turn over for the next question

QUESTION NINE

Most drugs can be classified as hard drugs or soft drugs.
The diagram shows the classification of some different drugs.



9A The diagram shows that . . .

1 hard drugs are legal but soft drugs are illegal.

2 all drugs can be classified as ‘hard’ or ‘soft’.

3 hard drugs are illegal but soft drugs are legal.

4 the classification of drugs depends on more than one factor.

9B People who smoke tobacco may have withdrawal symptoms when they try to give up smoking.

What is the cause of these symptoms?

1 Regular smokers get used to the effects of nicotine so need more nicotine to get the same effect.

2 People who give up smoking often feel sick, may shake and put on weight.

3 Nicotine causes changes in chemical processes of the body.

4 Tobacco smoke contains carcinogenic substances which damage cells in the lungs.

The table shows some of the symptoms of giving up smoking.

Symptom	How long the symptom lasts after giving up smoking
Anxiety	2–4 weeks
Decreased heart rate	More than 10 weeks
Depression	Less than 3 weeks
Increased aggression	4 weeks
Increased appetite	More than 10 weeks
Restless sleep	Less than 1 week
Poor concentration	1 week

9C Which conclusion does the information in the table support?

1 Smoking may help you to lose weight.

2 Smoking makes concentration worse.

3 Smoking makes someone more aggressive.

4 Smoking tends to slow down the heart rate.

9D Which row in the table shows the symptoms that may last for at least three weeks after giving up smoking?

	Symptom				
	Anxiety	**Decreased heart rate**	**Depression**	**Increased aggression**	**Restless sleep**
1	✓		✓	✓	
2		✓		✓	✓
3			✓	✓	✓
4	✓	✓		✓	

END OF TEST

There are no questions printed on this page

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