Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

General Certificate of Secondary Education
June 2009

SCIENCE A **BLY1AP**
Unit Biology B1a (Human Biology)

BIOLOGY
Unit Biology B1a (Human Biology)

Monday 22 June 2009 Morning Session

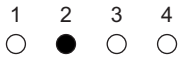
For this paper you must have:
- a black ball-point pen
- an objective test answer sheet.

You may use a calculator.

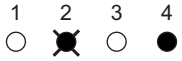
Time allowed: 30 minutes

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.

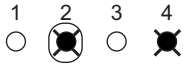
Instructions for recording answers
- Use a **black ball-point pen**.
- For each answer **completely fill in the circle** as shown:



- 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**.

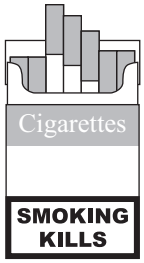
Use **each** answer only **once**.

Mark your choices on the answer sheet.

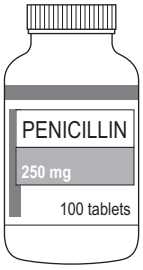
QUESTION ONE

The diagrams show four different drugs.

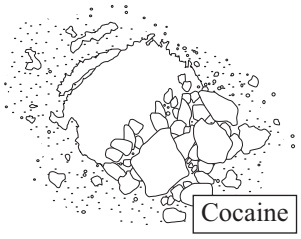
1



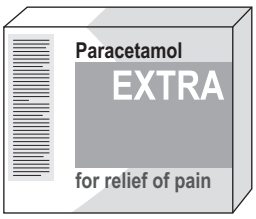
2



3



4



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

A kills bacteria

B linked to lung disease

C an addictive, illegal drug

D relieves some disease symptoms

QUESTION TWO

The picture shows a girl cooking some pasta sauce.

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

A has receptors that are sensitive to the smell of the pasta sauce

B has receptors that would detect heat if the girl touched the pan

C has receptors that are sensitive to the taste of the pasta sauce

D has receptors that enable the girl to read the recipe for the pasta sauce

1	eye
2	nose
3	skin
4	tongue

QUESTION THREE

Water leaves your body from several organs.

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

A glands

B kidneys

C lungs

D skin

When you breathe out, water vapour leaves your . . . **1** . . . .

When you sweat, water leaves the surface of your . . . **2** . . . .

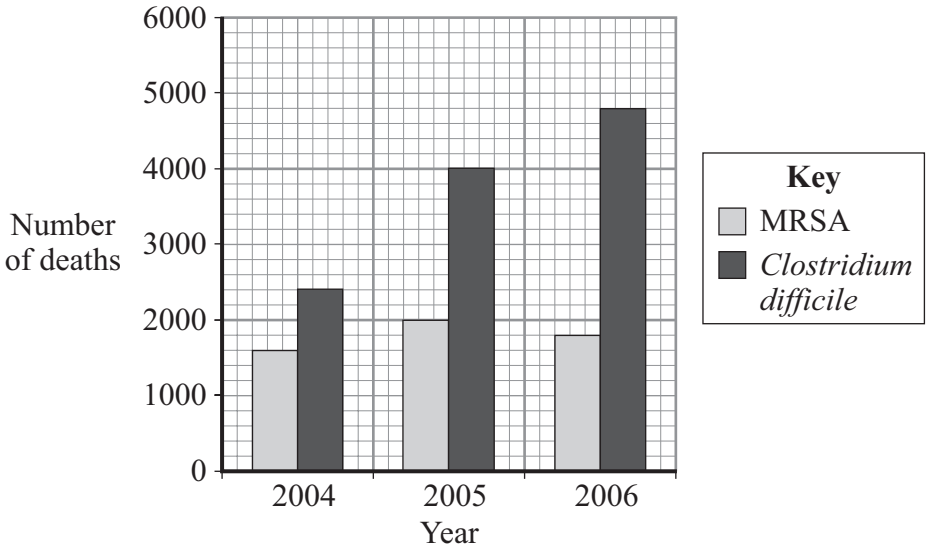
Water is lost in urine produced by the . . . **3** . . . .

The total amount of water lost from the body is controlled by hormones.

Hormones are produced by . . . **4** . . . .

QUESTION FOUR

The graph shows the number of deaths caused by two bacteria, MRSA and *Clostridium difficile*, in 2004, 2005 and 2006.



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

A 200

B 2000

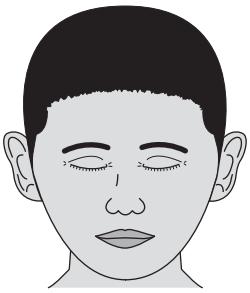
C 4000

D 5200

1	the number of deaths caused by *Clostridium difficile* in 2005
2	the largest number of deaths caused by MRSA in any year
3	the decrease in the number of deaths from MRSA between 2005 and 2006
4	the possible number of deaths caused by *Clostridium difficile* in 2007 if the trend continues

QUESTION FIVE

A small insect flew into this boy's eye, making him blink.



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

A motor neurone

B muscle

C sensory neurone

D synapse

An impulse from a receptor passes to the central nervous system along a . . . **1** . . . .

In the central nervous system, a chemical is released at a . . . **2** . . . .

The impulse then passes from the central nervous system to the eyelid along a . . . **3** . . . .

The blink is caused by the contraction of a . . . **4** . . . in the eyelid.

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

Alcohol is a legal, recreational drug.

6A Most of the people who drink alcohol do so because . . .

1 it is highly addictive.

2 it slows down their reactions.

3 there are no risks involved in drinking it.

4 they like the effect it has on them.

6B Drinking too much alcohol for several years is most likely to cause damage to the . . .

1 blood vessels.

2 heart.

3 liver.

4 lungs.

Blood alcohol content (BAC) is measured by the percentage of alcohol in the blood.

The chart shows how blood alcohol content is related to the effects on the body and to the number of units of alcohol consumed in 1 hour.

Number of units of alcohol consumed in one hour	Effects on the body	Percentage of alcohol in the blood
10	Coma and possible death	Over 0.4
	Unconscious	0.4
9	Cannot walk unassisted. Confused. Vomits	
8	Feels sick and restless	0.3
7	Has serious lack of muscle control	
6	Feels anxious and restless	0.2
5	Has major loss of muscle control Blurred vision	
4		
3	Some loss of balance, reaction speed and muscle control	
2		
1	Feels good, some loss of caution	
	Loss of shyness	0.1
0		0

6C From the data in the table, a person who drank 1 unit of alcohol in one hour would . . .

1 feel good.

2 have blurred vision.

3 feel anxious.

4 need hospital treatment.

6D From the data in the table, what is the highest percentage of alcohol that a person driving a car should have in the blood?

1 0.1

2 0.2

3 0.4

4 0.5

QUESTION SEVEN

Equal portions of four 'healthy option soups' were tested.

The table shows the energy content and some of the nutrients in these portions.

	Tomato soup	Pepper and lime soup	Pea and courgette soup	Sweetcorn soup
Energy in kJ	474	366	730	848
Total fat in g	3.61	1.57	2.14	3.01
Saturated fat in g	0.49	0.12	0.54	0.43
Cholesterol in mg	0	0	0	45.56

7A Which soup contains the most saturated fat?

1 tomato soup

2 pepper and lime soup

3 pea and courgette soup

4 sweetcorn soup

7B Which soup is the best for someone trying to lose weight?

1 tomato soup

2 pepper and lime soup

3 pea and courgette soup

4 sweetcorn soup

7C What sort of variable is the type of soup?

1 categoric

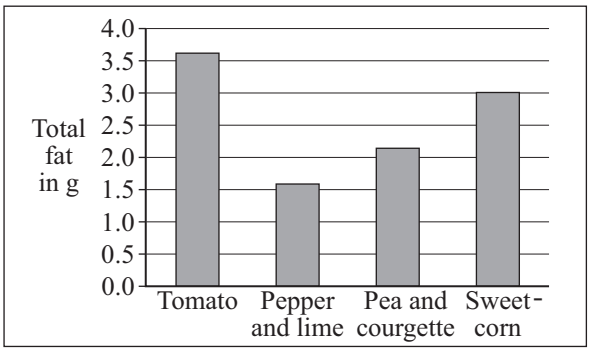
2 continuous

3 control

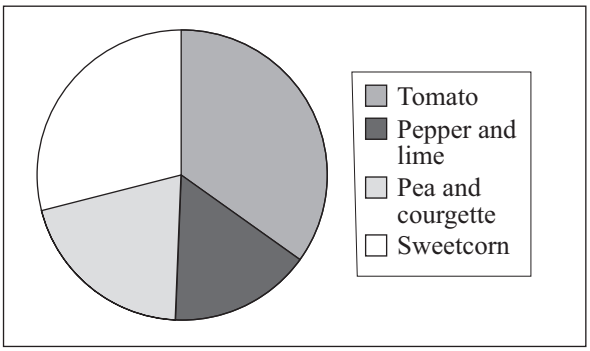
4 discrete

7D Which one of these is the best way of displaying the data about the total amount of fat in the different soups?

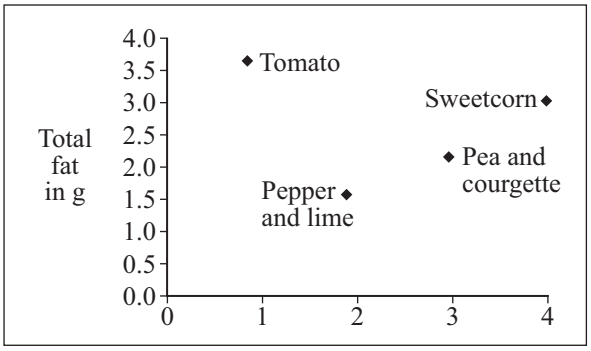
1



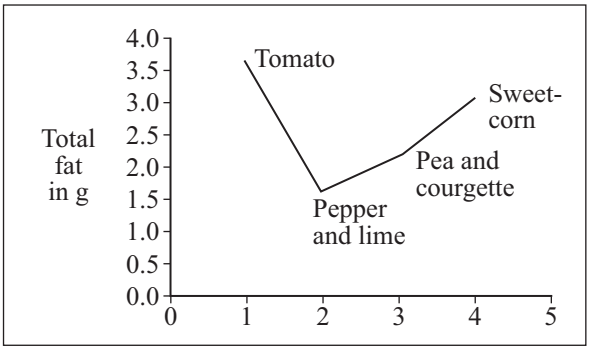
2



3



4



Turn over for the next question

QUESTION EIGHT

Recovery heart rate is the heart rate measured one minute after exercise. The lower the heart rate after this minute, the fitter a person is.

A class of students investigated the relationship between recovery heart rate and body mass:

- they measured the mass of each student
- each student stepped onto and off a low stool for 3 minutes at a rate of 22 complete step-ups per minute
- on completing the exercise, the students counted their heart rate, starting one minute after the exercise.

8A What was the dependent variable in this investigation?

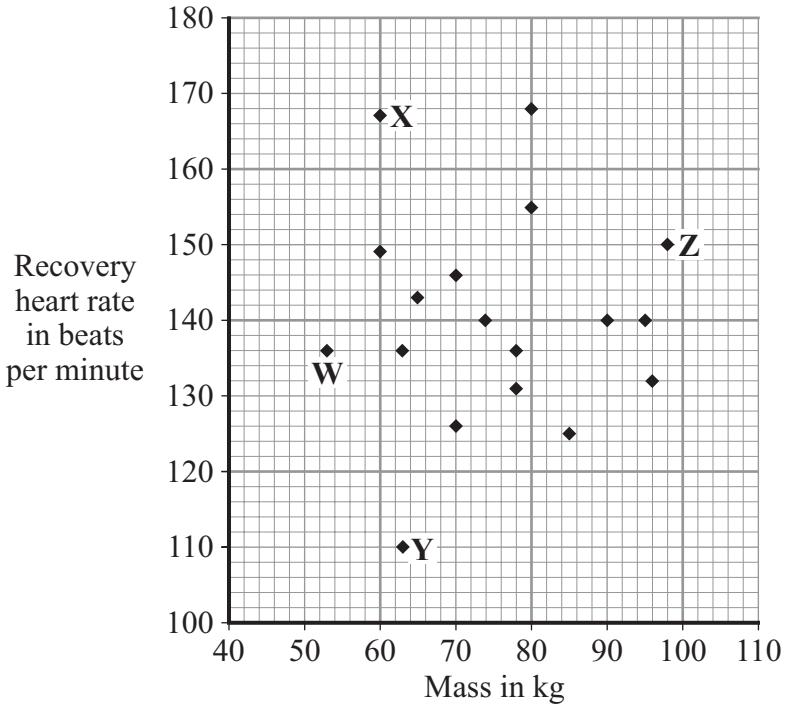
1 the mass of each student

2 the number of step-ups per minute

3 the length of the exercise period

4 the recovery heart rate of each student

The scattergram shows the results of the investigation.



8B Which was the fittest student?

1 **W**

2 **X**

3 **Y**

4 **Z**

8C The scattergram shows that . . .

1 the greater the body mass, the higher the recovery heart rate.

2 the lower the body mass, the higher the recovery heart rate.

3 there is no association between body mass and recovery heart rate.

4 exercise reduces recovery heart rate.

8D Which one of the following factors would have the greatest effect on the results of the investigation?

1 the proportion of muscle to fat in each student's body

2 the amount of sweat produced by each student during exercise

3 the change in the breathing rate of each student during exercise

4 the time of day of exercise

Turn over for the next question

QUESTION NINE

Vaccination helps to protect us from disease.

Vaccination may cause a reaction, such as a rash, in the person who is vaccinated.

The table shows the reported number of reactions to vaccination in the UK in one year.

Vaccine	Type of vaccination	Total number of reactions reported	Number of severe reactions
Measles	Single	414	61
Mumps	Single	54	19
Rubella	Single	685	100
MMR	Triple	20974	2586

9A Which vaccine caused the highest proportion of severe reactions, when compared with the number of reactions reported?

1 measles

2 mumps

3 rubella

4 MMR

9B To calculate the percentage of people who had reactions to the vaccines, you would also need to know . . .

1 the number of vaccinations of each type given.

2 the age of each person vaccinated.

3 whether those people given one of the single vaccinations had previously been given one of the other single vaccinations.

4 the total population of the UK.

The table shows the percentage of children vaccinated against some diseases in the UK.

Year	Percentage of children vaccinated			
	Polio	**Whooping cough**	**Flu**	**Measles, mumps, rubella (MMR)**
1996 – 1997	96	94	95	92
1997 – 1998	96	94	95	91
1998 – 1999	95	94	95	88
1999 – 2000	95	94	94	88
2000 – 2001	94	94	94	87
2001 – 2002	94	93	93	84
2002 – 2003	93	93	93	82
2003 – 2004	94	93	93	80
2004 – 2005	93	93	93	81
2005 – 2006	94	94	94	84

9C For which disease was the percentage of children vaccinated most stable between 1996 and 2006?

1 polio

2 whooping cough

3 flu

4 measles, mumps and rubella

9D It is important that the percentage of people in the population who have been vaccinated is high.

This is because . . .

1 it reduces the chance of epidemics.

2 fewer people may suffer side effects from the vaccine.

3 there is less chance that resistant strains of pathogen will develop.

4 antibodies will be produced quickly if the live pathogen is caught.

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**.

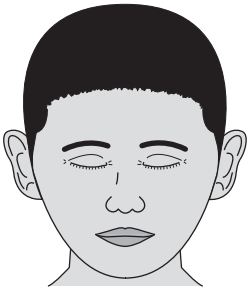
In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1–4**.

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

Mark your choices on the answer sheet.

QUESTION ONE

A small insect flew into this boy's eye, making him blink.



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

A motor neurone

B muscle

C sensory neurone

D synapse

An impulse from a receptor passes to the central nervous system along a . . . **1** . . . .

In the central nervous system, a chemical is released at a . . . **2** . . . .

The impulse then passes from the central nervous system to the eyelid along a . . . **3** . . . .

The blink is caused by the contraction of a . . . **4** . . . in the eyelid.

QUESTION TWO

Bacteria and viruses cause disease in the human body.

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

A antibodies

B antitoxins

C pathogens

D toxins

Organisms that cause disease are called . . . **1** . . . .

To neutralise poisons, white cells produce . . . **2** . . . .

Bacteria make us feel unwell by producing . . . **3** . . . .

To kill bacteria, white cells produce . . . **4** . . . .

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

Recovery heart rate is the heart rate measured one minute after exercise. The lower the heart rate after this minute, the fitter a person is.

A class of students investigated the relationship between recovery heart rate and body mass:

- they measured the mass of each student
- each student stepped onto and off a low stool for 3 minutes at a rate of 22 complete step-ups per minute
- on completing the exercise, the students counted their heart rate, starting one minute after the exercise.

3A What was the dependent variable in this investigation?

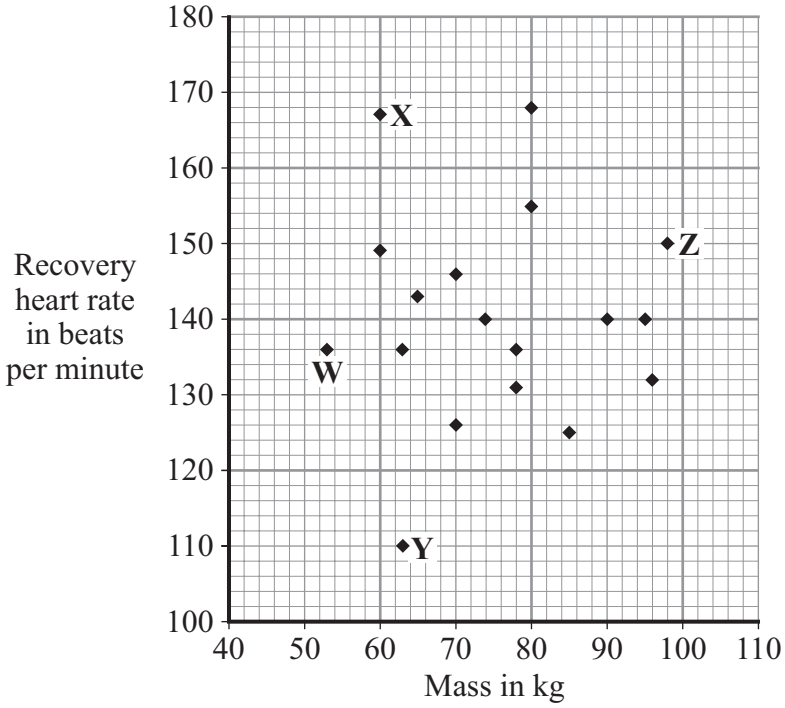
1 the mass of each student

2 the number of step-ups per minute

3 the length of the exercise period

4 the recovery heart rate of each student

The scattergram shows the results of the investigation.



3B Which was the fittest student?

1 **W**

2 **X**

3 **Y**

4 **Z**

3C The scattergram shows that . . .

1 the greater the body mass, the higher the recovery heart rate.

2 the lower the body mass, the higher the recovery heart rate.

3 there is no association between body mass and recovery heart rate.

4 exercise reduces recovery heart rate.

3D Which one of the following factors would have the greatest effect on the results of the investigation?

1 the proportion of muscle to fat in each student's body

2 the amount of sweat produced by each student during exercise

3 the change in the breathing rate of each student during exercise

4 the time of day of exercise

QUESTION FOUR

Vaccination helps to protect us from disease.

Vaccination may cause a reaction, such as a rash, in the person who is vaccinated.

The table shows the reported number of reactions to vaccination in the UK in one year.

Vaccine	Type of vaccination	Total number of reactions reported	Number of severe reactions
Measles	Single	414	61
Mumps	Single	54	19
Rubella	Single	685	100
MMR	Triple	20 974	2586

4A Which vaccine caused the highest proportion of severe reactions, when compared with the number of reactions reported?

1 measles

2 mumps

3 rubella

4 MMR

4B To calculate the percentage of people who had reactions to the vaccines, you would also need to know . . .

1 the number of vaccinations of each type given.

2 the age of each person vaccinated.

3 whether those people given one of the single vaccinations had previously been given one of the other single vaccinations.

4 the total population of the UK.

The table shows the percentage of children vaccinated against some diseases in the UK.

Year	Percentage of children vaccinated			
	Polio	**Whooping cough**	**Flu**	**Measles, mumps, rubella (MMR)**
1996 – 1997	96	94	95	92
1997 – 1998	96	94	95	91
1998 – 1999	95	94	95	88
1999 – 2000	95	94	94	88
2000 – 2001	94	94	94	87
2001 – 2002	94	93	93	84
2002 – 2003	93	93	93	82
2003 – 2004	94	93	93	80
2004 – 2005	93	93	93	81
2005 – 2006	94	94	94	84

4C For which disease was the percentage of children vaccinated most stable between 1996 and 2006?

1 polio

2 whooping cough

3 flu

4 measles, mumps and rubella

4D It is important that the percentage of people in the population who have been vaccinated is high.

This is because . . .

1 it reduces the chance of epidemics.

2 fewer people may suffer side effects from the vaccine.

3 there is less chance that resistant strains of pathogen will develop.

4 antibodies will be produced quickly if the live pathogen is caught.

QUESTION FIVE

Cholesterol affects our health.

5A Cholesterol is produced in the . . .

1 heart.

2 intestines.

3 kidneys.

4 liver.

5B 'Good cholesterol' is the common name for . . .

1 high-density cholesterol.

2 high-density lipoprotein.

3 low-density cholesterol.

4 low-density lipoprotein.

5C It is recommended that to remain healthy the total blood cholesterol concentration of an adult should be less than 100 mg per 100 cm^3 blood. However, a limit of 70 mg per 100 cm^3 is recommended for some people.

The 70 mg per 100 cm^3 limit would be particularly important for a person with a family history of . . .

1 arthritis.

2 cancer.

3 diabetes.

4 heart disease.

5D A patient needs to decrease his total blood cholesterol and to improve the balance between 'good cholesterol' and 'bad cholesterol'.

Which row in the table shows the best combination of diet changes to achieve this?

Combination	Saturated fats	Monounsaturated fats	Polyunsaturated fats
1	decrease	decrease	decrease
2	decrease	increase	increase
3	increase	increase	decrease
4	decrease	decrease	increase

Turn over for the next question

QUESTION SIX

Antibiotics are used to treat many types of infection.

6A Antibiotics kill . . .

1 bacteria only.

2 viruses only.

3 both bacteria and viruses.

4 all types of pathogens.

In recent years there has been a rapid increase in the number of infections in hospitals caused by antibiotic-resistant bacteria such as MRSA.

6B Bacteria such as MRSA have become resistant to antibiotics mainly because of . . .

1 overcrowding in hospitals.

2 lack of hand-hygiene amongst medical staff.

3 use of infected surgical instruments.

4 overuse of antibiotics.

6C Pathogens can be removed from hands by just washing them with soap and water.

The main advantage of this method, in terms of long-term infection control, is that . . .

1 it does not increase the proportion of antibiotic-resistant bacteria.

2 it is cheap.

3 it selectively kills the most dangerous types of bacteria.

4 soap has been used for many years with no resulting side effects.

6D An antibiotic-resistant strain of a bacterium develops as a result of natural selection.

Natural selection means that . . .

1 doctors select which antibiotic to use against the bacterium.

2 only a selection of bacteria can infect the human body.

3 bacteria select the most suitable person to infect.

4 only successful bacteria survive to reproduce.

Turn over for the next question

QUESTION SEVEN

There are many support methods that people can use to help them to stop smoking. Some of them are shown in the table.

The figures given for the success rate of each support method show the extra people who stopped smoking using a support method compared with those who succeeded without support of any kind.

Support method	How it works	Success rate
NRT medication	Gum, nasal spray, patch. Reduces the need to smoke. Prescription not necessary.	Approximately 1 in 5 extra people stopped smoking.
Zyban medication	Prescription-only tablets. Can cause side effects, worst is having fits (chance of 1 in 1000).	Approximately 1 in 10 extra people stopped smoking.
Champix medication	Tablets. Reduces the need to smoke. Available on prescription.	Approximately 1 in 7 extra people stopped smoking after one course. More stopped after two courses.
Face-to-face counselling	Works best with a fully trained adviser.	Approximately 1 in 20 extra people stopped smoking.
Smokers' support group meetings	Smokers help each other with problems, and try not to let the group down.	Approximately 1 in 20 extra people stopped smoking.

7A Which of the following support methods is the least likely to cause any undesirable physical side effects?

1 NRT medication

2 Zyban medication

3 Champix medication

4 Support group meetings

7B Which of the following support methods appears to be the most effective on its own?

1 NRT medication

2 Zyban medication

3 Champix medication

4 Face-to-face counselling

7C Smokers' support group meetings . . .

1 are about as effective at helping people to stop smoking as face-to-face counselling with a trained adviser.

2 are only as effective at helping people to stop smoking as some of the drugs in the table.

3 need to be tried out with non-smoking volunteers before they are made generally available to the public.

4 reduce the physical urge to smoke.

7D Which one of the following is **not** a correct statement about people who have smoked for many years?

1 They are likely to die younger than if they had been a non-smoker.

2 They experience urges to smoke after they have stopped.

3 They have an increased risk of contracting various diseases.

4 They will eventually get lung cancer.

Turn over for the next question

QUESTION EIGHT

Women under the age of about 40 may take oral contraceptives containing oestrogen. However, there are possible side effects after long-term use of oestrogen.

8A The role of oestrogen in the menstrual cycle is to . . .

1 stimulate FSH production and inhibit LH production.

2 inhibit both FSH production and LH production.

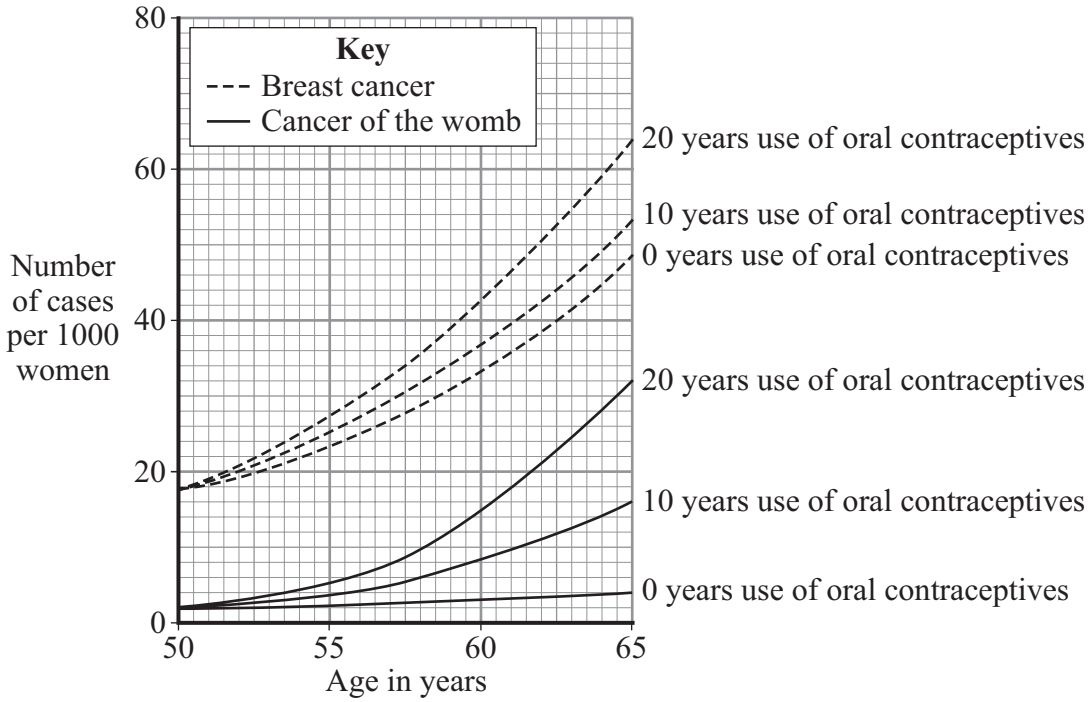
3 inhibit FSH production and stimulate LH production.

4 stimulate both FSH production and LH production.

8B Which row in the table correctly identifies the organs that produce the hormones controlling the menstrual cycle?

	FSH	**LH**	**Oestrogen**
1	pituitary gland	ovaries	pituitary gland
2	ovaries	pituitary gland	ovaries
3	pituitary gland	ovaries	ovaries
4	pituitary gland	pituitary gland	ovaries

The graph shows some of the effects of taking oestrogen as an oral contraceptive for different lengths of time between the ages of 16 and 40.



8C The graph shows that the use of oestrogen as an oral contraceptive for 20 years may . . .

1 cause an eightfold increase in the percentage of women who develop womb cancer by the age of 65.

2 cause a sixteenfold increase in the percentage of women who develop womb cancer by the age of 65.

3 have no effect on the risk of breast cancer until 54 years of age.

4 reduce the number of unwanted pregnancies.

8D Which one of the following statements **cannot** be deduced from the information in the graph?

1 Oestrogen in oral contraceptives causes cancer.

2 The longer a woman takes oral contraceptives, the greater the risk of certain cancers developing.

3 The older a woman is, the greater the risk of breast cancer developing.

4 Women who have never taken oral contraceptives are very unlikely to develop cancer of the womb.

Turn over for the next question

QUESTION NINE

Read the information about drugs.

Tobacco
About 100 000 people die each year in Britain from tobacco-related illnesses. Among other dangerous substances, tobacco smoke also contains the addictive drug nicotine. Buying tobacco is legal in the UK from the age of 18.

Alcohol
About 28 000 people die each year in England and Wales from alcohol-related illnesses. Alcohol is an addictive substance which is often associated with antisocial behaviour and violent crime. Buying alcohol is legal in the UK from the age of 18.

Cannabis
This is a substance which is smoked, often mixed with tobacco. There are no records of cannabis being directly responsible for any deaths or being responsible for violent crimes. Most experts regard cannabis as much less addictive than tobacco or alcohol, but some users have difficulty giving it up. It does carry some health risks due to inhaling smoke, and may cause long-term mental illness. It is illegal to sell or buy cannabis in the UK.

Hard drugs are addictive and are often linked with violent crime. They may also cause death. Soft drugs are not generally associated with high levels of addiction, violence, crime or death.

9A The information above suggests that . . .

1 smoking cannabis always affects the health of other people around the smoker.

2 smoking cannabis may be physically less harmful than smoking tobacco.

3 it is perfectly safe to use cannabis.

4 giving up smoking cannabis would result in more severe withdrawal symptoms than giving up smoking tobacco.

9B From the information in the passage, which of the following is a true statement?

1 Alcohol and cannabis are hard drugs.

2 Alcohol and tobacco are soft drugs.

3 Cannabis and tobacco are hard drugs.

4 Cannabis is a soft drug.

9C Heroin and cocaine are extremely addictive hard drugs. Most users admit to having smoked cannabis before using these drugs. Research indicates that the majority of cannabis smokers do not progress to these hard drugs.

Which is the most valid conclusion from this information?

1 All users of heroin or cocaine started by using cannabis.

2 Regular users of cannabis are not at risk of progressing to heroin or cocaine use.

3 There is no link between smoking cannabis and addiction to heroin or cocaine.

4 There may be a link between smoking cannabis and addiction to heroin or cocaine.

9D From the information in the passage, what would be the best advice to give to a 17 year-old girl who might be tempted to try cannabis?

1 'Don't smoke cannabis if you are under the influence of alcohol.'

2 'Don't try it, smoke ordinary cigarettes instead.'

3 'If you try it, don't drive while still experiencing its effects.'

4 'Don't try it, it has health risks associated with it.'

END OF TEST

There are no questions printed on this page