

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



General Certificate of Secondary Education
Foundation Tier and Higher Tier
November 2010

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

BLY1AP
F&H

Thursday 11 November 2010 Afternoon Session

For this paper you must have:

- a black ball-point pen
 - an objective test answer sheet.
- You may use a calculator.

Time allowed

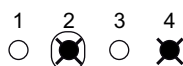
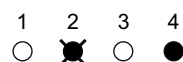
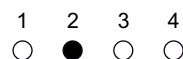
- 30 minutes

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

An unhealthy lifestyle may cause illness.

The table gives information about some conditions that affect the body.

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

- A** arthritis
- B** diabetes
- C** high blood pressure
- D** irregular periods

Information	
1	may be caused by the effect of too much weight on joints
2	may be caused by a diet that is high in sugars
3	may be caused by not enough food in the diet
4	may be caused by too much salt in the diet

QUESTION TWO

We use substances to prevent diseases and to cure diseases.

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

- A** painkiller
- B** penicillin
- C** thalidomide
- D** vaccine

	Information
1	used to cure an infection caused by bacteria
2	used to prevent disease
3	used to help in the treatment of leprosy
4	used to treat symptoms, eg headache

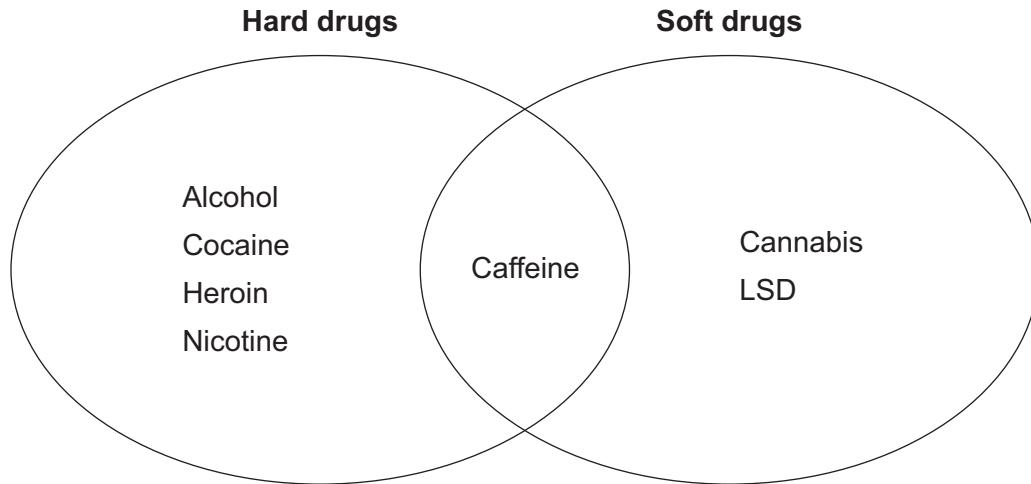
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QUESTION THREE

Recreational drugs may harm the body.

The diagram shows how some drugs can be classified.



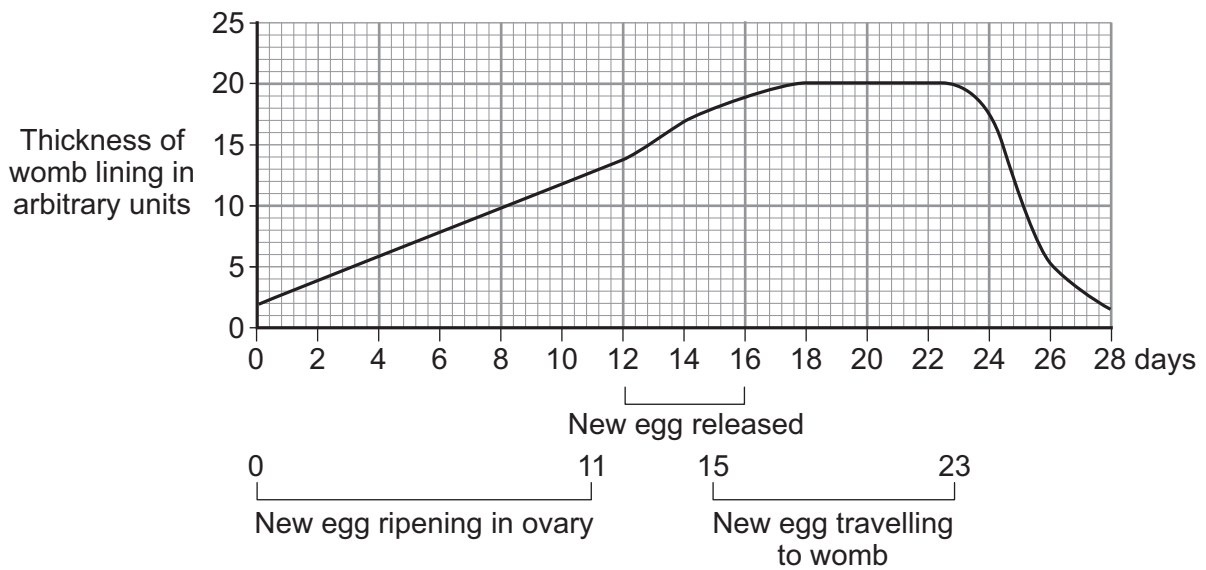
Match drugs, **A**, **B**, **C** and **D**, with the descriptions **1–4** in the table.

- A** alcohol
- B** cocaine
- C** caffeine
- D** cannabis

	Description
1	a drug that is difficult to classify as hard or soft
2	a legal, hard drug
3	an illegal, soft drug
4	an illegal, hard drug

QUESTION FOUR

The graph shows changes in the thickness of the womb lining during a woman's menstrual cycle.



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

- A** 5
- B** 11
- C** 15
- D** 28

1	a day when a new egg could be released
2	the number of days the womb lining takes to break down
3	the number of days the new egg takes to ripen
4	a day when the womb lining is thinnest

Turn over ►

QUESTION FIVE

Our diet affects our health.

Read the passage below.

Before the nineteenth century, many sailors suffered from a disease called scurvy. James Lind, a naval doctor, thought that scurvy may be due to a lack of fresh fruit in the diet. Once the sailors were back on land and eating fresh fruit, the scurvy disappeared.

In an investigation on sailors suffering from scurvy:

- he gave one group a diet including fresh fruit
- he gave the other group the same diet, but with no fresh fruit.

The group given fresh fruit got better, but the other group did not get better.

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

- A** a hypothesis
- B** a control
- C** an observation
- D** a conclusion

1	Some sailors with scurvy were not given fresh fruit to eat.
2	Eating fresh fruit cures scurvy.
3	Sailors with scurvy on the ship got better when they were back on land.
4	Not enough fresh fruit in the diet might cause scurvy.

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

Several factors can affect the metabolic rate in humans.

6A What is *metabolic rate*?

- 1 how fast someone can run
- 2 how much food you eat each day
- 3 how fast the blood flows around the body
- 4 how fast chemical reactions happen in the cells of the body

The table shows the body mass and metabolic rate of five different animals.

Animal	Mass in kg	Metabolic rate at rest in arbitrary units
Rabbit	2	7
Sheep	50	100
Dolphin	80	160
Pig	100	50
Cow	400	480

6B One student said: 'The heavier the animal, the higher its metabolic rate at rest.'Which animal does **not** fit this pattern?

- 1 rabbit
- 2 dolphin
- 3 pig
- 4 cow

-
- 6C** Another student suggested: 'The number for metabolic rate is always exactly double the number for mass.'

Which animals fit this suggestion?

- 1 sheep and pig
 - 2 rabbit and cow
 - 3 pig and dolphin
 - 4 sheep and dolphin
- 6D** A third student said: 'The more active an animal is, the higher its metabolic rate, compared to its body mass.'

If this were true, which animal would be the most active?

- 1 rabbit
- 2 dolphin
- 3 pig
- 4 cow

Turn over for the next question

Turn over ►

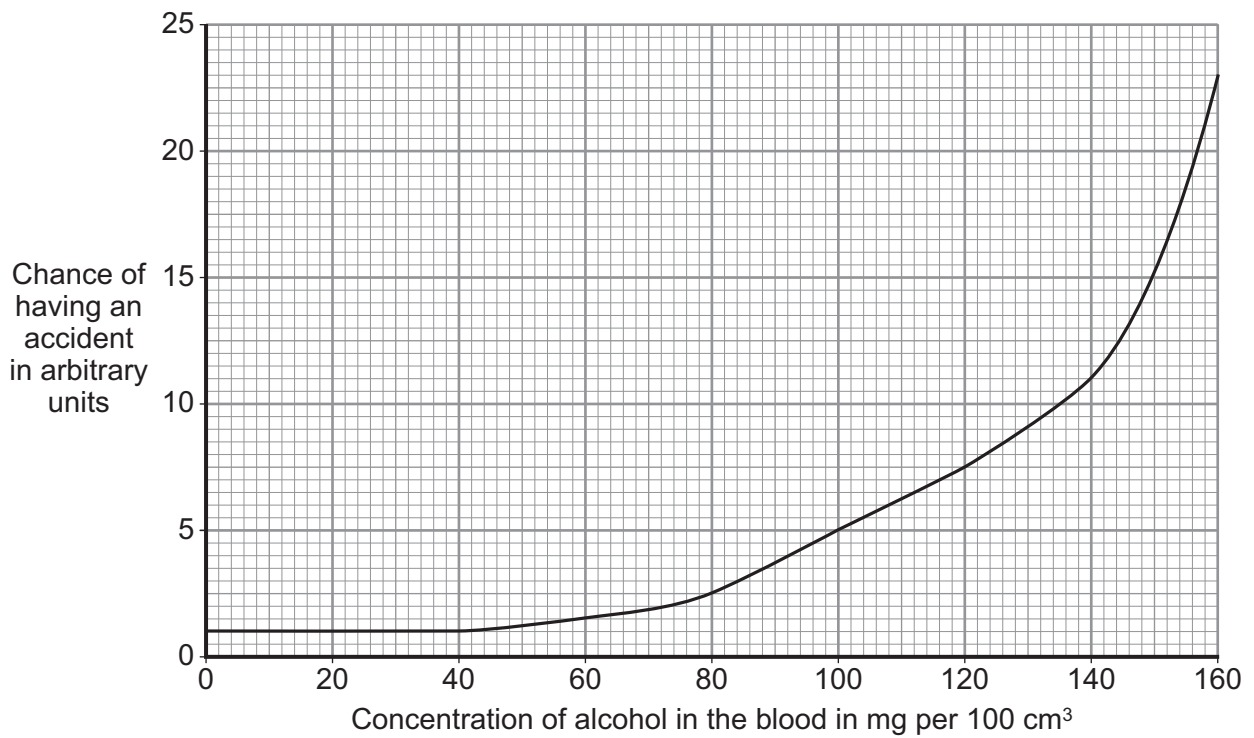
QUESTION SEVEN

The concentration of alcohol in the blood affects the chance of having an accident.

7A Alcohol . . .

- 1 reduces the ability of the blood to carry oxygen.
- 2 damages the heart.
- 3 causes lung disease.
- 4 slows down reactions.

The graph shows the relationship between blood alcohol concentration and the chance of having an accident.



Use information from the graph to answer the following questions.

7B The drink-driving limit in the UK is 80 mg of alcohol per 100 cm³ of blood.

With this amount of alcohol in the blood, the chance of having an accident is increased.

How much is the chance increased?

- 1 unchanged
- 2 2.5 times
- 3 4 times
- 4 5.5 times

7C What is the highest concentration of blood alcohol that would have **no effect** on the chance of having an accident?

- 1 0 mg per 100 cm³
- 2 20 mg per 100 cm³
- 3 40 mg per 100 cm³
- 4 60 mg per 100 cm³

7D Which of the following best describes the relationship between blood alcohol concentration and the chance of having an accident?

- 1 There is no relationship between blood alcohol concentration and the chance of having an accident.
- 2 The higher the blood alcohol concentration, the lower the chance of having an accident.
- 3 The higher the blood alcohol concentration, the higher the chance of having an accident.
- 4 The lower the blood alcohol concentration, the higher the chance of having an accident.

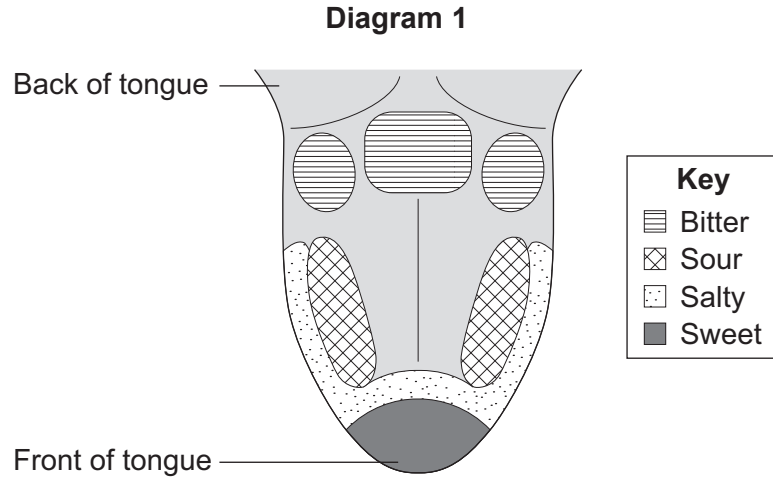
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QUESTION EIGHT

A student found **diagram 1** in a science book.

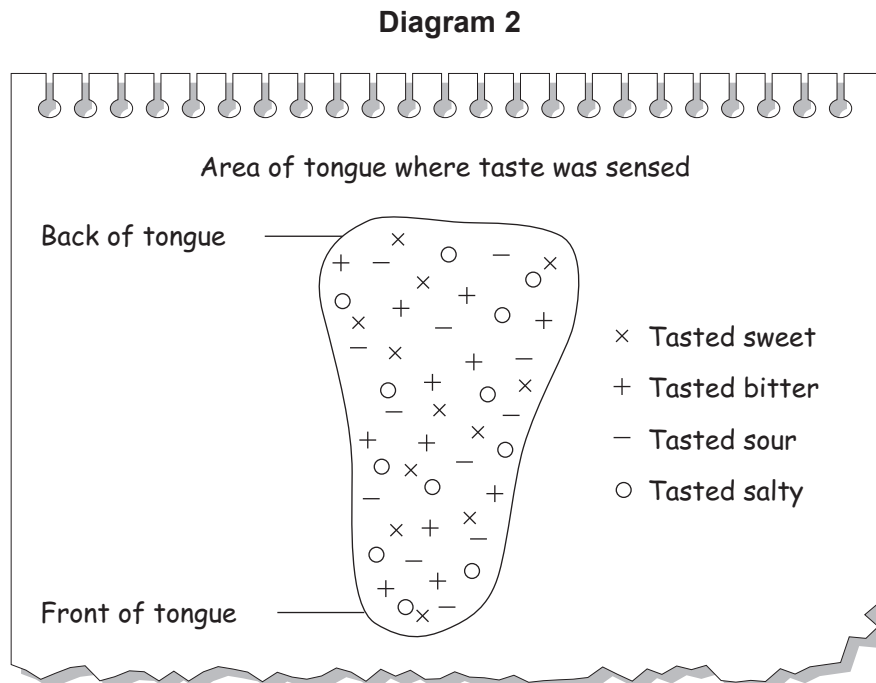
Diagram 1 shows how different areas of the tongue are sensitive to different tastes.



The student decided to find out if the book was correct.

She tested three people.

- She put a small drop of a sweet-tasting liquid on different parts of each person's tongue.
- She recorded each part of the tongue where the sweet-tasting liquid could be tasted.
- This was repeated for the other tastes.
- Her results are shown in **diagram 2**.



8A The cells in the tongue that sense the different tastes are called . . .

- 1 stimuli.
- 2 effectors.
- 3 receptors.
- 4 synapses.

8B These results would have been more reliable if . . .

- 1 a teacher had carried out the investigation.
- 2 more than three students had been tested.
- 3 more concentrated solutions had been used.
- 4 more areas of the tongue had been tested.

8C The best description of the student's results is that . . .

- 1 bitter tastes are sensed at the back of the tongue.
- 2 there are areas of the tongue where particular tastes are grouped.
- 3 sour tastes are always sensed at the sides of the tongue.
- 4 there are no definite areas of the tongue for sensing particular tastes.

8D The information about the tongue in the science book . . .

- 1 is not supported by the student's data.
- 2 must be correct.
- 3 proves that the student's data is not valid.
- 4 proves that the student's method is wrong.

QUESTION NINE

A virus causes influenza (flu).

Older people are much more likely to die from flu than younger people. The government offers flu vaccination to people aged over 65.

9A Flu vaccine contains . . .

- 1 antibodies.
- 2 antitoxins.
- 3 weakened virus.
- 4 white blood cells.

9B After the vaccination, people are immune to flu because their bodies . . .

- 1 destroy the flu virus in the vaccine.
- 2 produce antibodies against the flu virus.
- 3 produce antibiotics against the flu virus.
- 4 produce white blood cells to ingest the flu virus.

9C Every year, scientists develop a vaccine for several strains of the flu virus. They choose the strains that they think are most likely to be around in winter. Some older people get vaccinated but later die from flu.

The most likely reason for these deaths among older people is that . . .

- 1 they had not taken antibiotics.
- 2 they had suffered with flu last winter.
- 3 they were allergic to the vaccine.
- 4 there are many different strains of flu virus.

9D People in a doctor's surgery made the comments below.

Which of these comments would be a valid reason for someone **not** to have the flu vaccination?

- 1 'I don't like injections.'
- 2 'I have a bad reaction to vaccines.'
- 3 'I never get flu anyway.'
- 4 'I've heard that my children might get flu from me if I have the 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

Our diet affects our health.

Read the passage below.

Before the nineteenth century, many sailors suffered from a disease called scurvy. James Lind, a naval doctor, thought that scurvy may be due to a lack of fresh fruit in the diet. Once the sailors were back on land and eating fresh fruit, the scurvy disappeared.

In an investigation on sailors suffering from scurvy:

- he gave one group a diet including fresh fruit
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The group given fresh fruit got better, but the other group did not get better.

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

- A** a hypothesis
- B** a control
- C** an observation
- D** a conclusion

1	Some sailors with scurvy were not given fresh fruit to eat.
2	Eating fresh fruit cures scurvy.
3	Sailors with scurvy on the ship got better when they were back on land.
4	Not enough fresh fruit in the diet might cause scurvy.

QUESTION TWO

Smoking damages your health.

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

A carbon monoxide

B carcinogen

C nicotine

D oxygen

1	the addictive substance in tobacco smoke
2	a cancer-causing chemical in tobacco smoke
3	reduces the birth mass in babies
4	a fetus needs this substance

Turn over for the next question

Turn over ►

Section Two

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

Each of these questions has four parts.

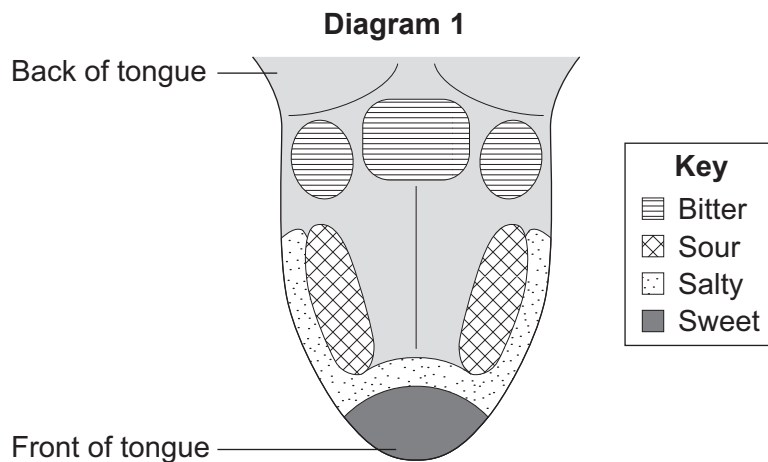
In each part choose only **one** answer.

Mark your choices on the answer sheet.

QUESTION THREE

A student found **diagram 1** in a science book.

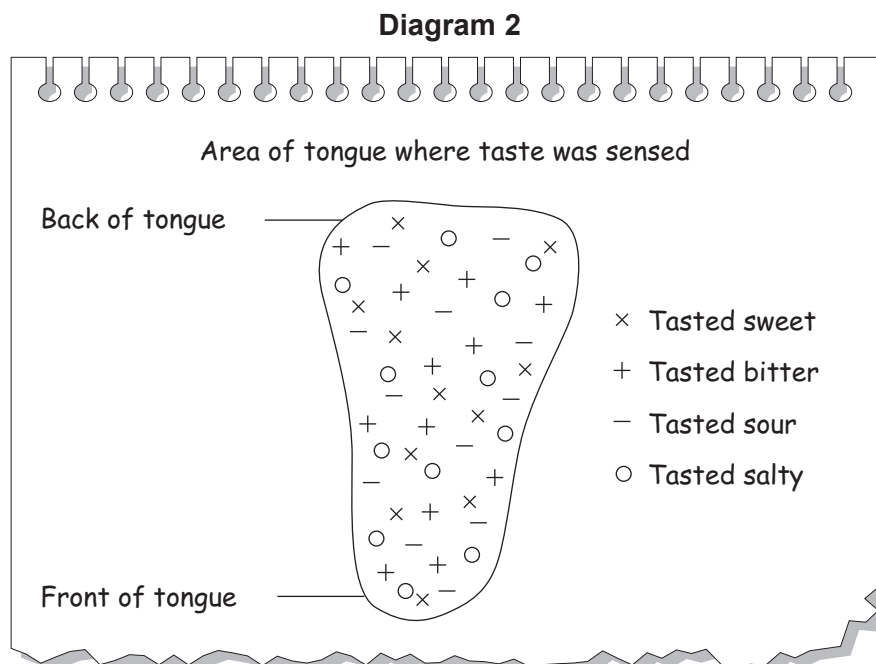
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-
- 3A** The cells in the tongue that sense the different tastes are called . . .
- 1 stimuli.
 - 2 effectors.
 - 3 receptors.
 - 4 synapses.
- 3B** These results would have been more reliable if . . .
- 1 a teacher had carried out the investigation.
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- 3C** The best description of the student's results is that . . .
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QUESTION FOUR

A virus causes influenza (flu).

Older people are much more likely to die from flu than younger people. The government offers flu vaccination to people aged over 65.

4A Flu vaccine contains . . .

- 1 antibodies.
- 2 antitoxins.
- 3 weakened virus.
- 4 white blood cells.

4B After the vaccination, people are immune to flu because their bodies . . .

- 1 destroy the flu virus in the vaccine.
- 2 produce antibodies against the flu virus.
- 3 produce antibiotics against the flu virus.
- 4 produce white blood cells to ingest the flu virus.

4C Every year, scientists develop a vaccine for several strains of the flu virus. They choose the strains that they think are most likely to be around in winter. Some older people get vaccinated but later die from flu.

The most likely reason for these deaths among older people is that . . .

- 1 they had not taken antibiotics.
- 2 they had suffered with flu last winter.
- 3 they were allergic to the vaccine.
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4D People in a doctor's surgery made the comments below.

Which of these comments would be a valid reason for someone not to have the flu vaccination?

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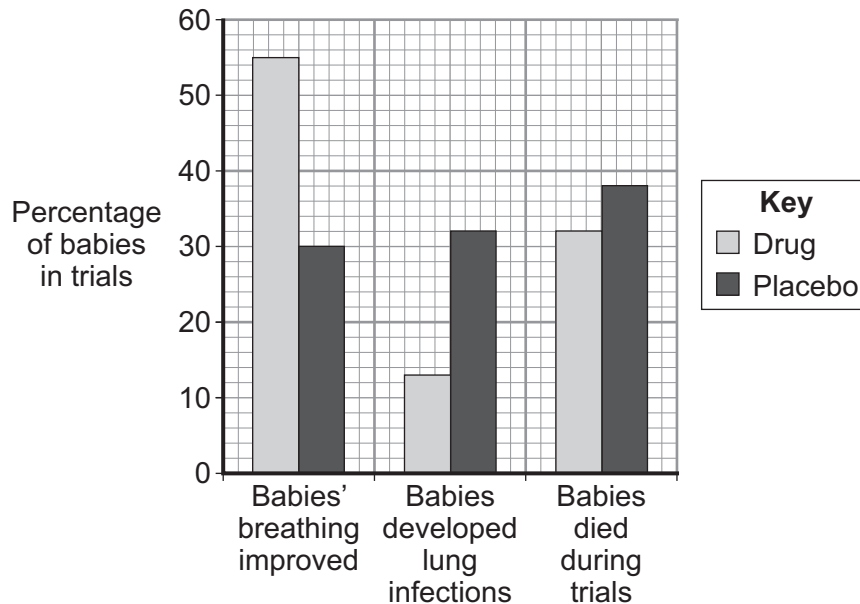
Turn over for the next question

Turn over ►

QUESTION FIVE

Some babies have life-threatening breathing problems. A company developed a new drug to help the babies. The company tested the drug against a placebo on 180 babies.

The results of the trial are shown on the graph.



5A What percentage of the babies given the drug did not show any improvement in breathing?

- 1 16%
- 2 30%
- 3 45%
- 4 55%

5B Many people are against doctors using placebos in drug trials on children.

This is because . . .

- 1 no-one knows which child gets the placebo.
- 2 some children die who might have benefited from the drug.
- 3 it makes the trials more expensive.
- 4 it slows down testing of the drug.

5C Some babies in the trial died, but this did not stop the trial.

The reason for this was that . . .

- 1 the company did not think it was important.
- 2 other babies in the trial developed lung infections.
- 3 the percentage of babies who died was greater for the babies taking the placebo than for the babies taking the drug.
- 4 many of the babies given the placebo were showing improvement in breathing.

5D Why is it important that an independent company also carries out the tests on a new drug?

- 1 The results will be more accurate.
- 2 It is illegal for just one company to test a drug.
- 3 The drug can be put on sale more quickly.
- 4 The results will not be biased.

Turn over for the next question

Turn over ►

QUESTION SIX

Most recreational drugs damage the body.

6A Heroin is addictive because . . .

- 1 heroin produces withdrawal symptoms.
- 2 heroin can change the chemical processes in the body.
- 3 heroin affects the way the body responds to stimuli.
- 4 people taking heroin have a gene that makes them addicted.

6B Most people who are addicted to heroin smoked cannabis before they started using heroin. However, the majority of people who smoke cannabis do not progress to using heroin.

Which is the most valid conclusion from this information?

- 1 There is no link between smoking cannabis and becoming addicted to heroin.
- 2 Regular cannabis smokers are not at any risk of progressing to heroin.
- 3 All heroin addicts have smoked cannabis at some time.
- 4 There may be a link between smoking cannabis and becoming addicted to heroin.

6C An athlete's performance can be affected for several hours after smoking a cigarette.

This is because . . .

- 1 the blood is not carrying enough oxygen.
- 2 there are carcinogens in tobacco smoke.
- 3 reaction times are slower.
- 4 smoking affects self-control.

6D Legal recreational drugs generally cause more ill-health than illegal recreational drugs because . . .

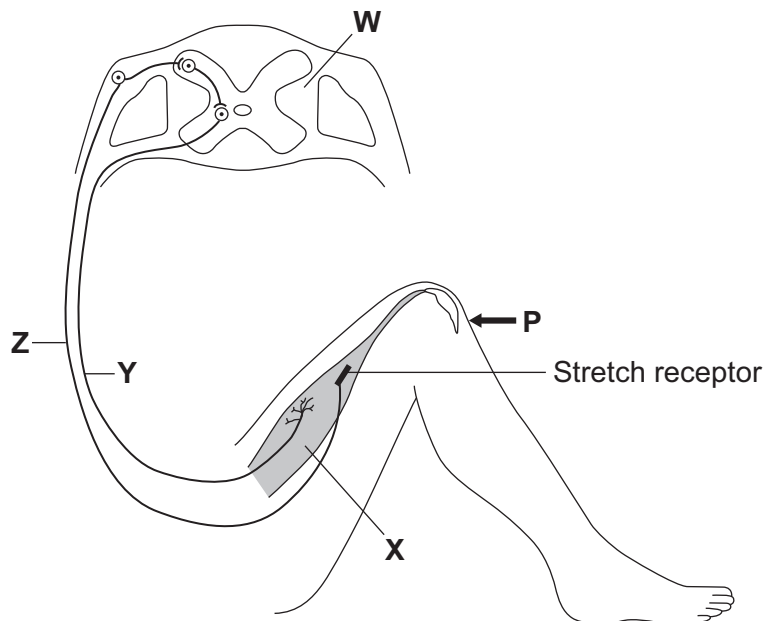
- 1 legal drugs are more harmful.
- 2 illegal drugs are used by fewer people.
- 3 illegal drugs are addictive.
- 4 only a doctor can prescribe legal drugs.

Turn over for the next question

Turn over ►

QUESTION SEVEN

The diagram shows the nervous pathway used to coordinate the knee-jerk reflex. When the person is hit at point **P**, the lower leg is suddenly raised.



7A In this reflex action, the motor neurone is labelled . . .

- 1 W
- 2 X
- 3 Y
- 4 Z

7B In this reflex action, the effector is labelled . . .

- 1 W
- 2 X
- 3 Y
- 4 Z

Read the newspaper article about an accident.

A young man suffered terrible injuries when his motor cycle skidded off the road last night.

The bones around part of his spinal cord were badly crushed and the spinal cord was damaged. The young man is not able to move his legs because of the damage to the spinal cord. He will have to use a wheelchair for the rest of his life.

7C This young man would not be able to raise his foot when he wanted to put on a shoe because . . .

- 1 impulses from receptors in his eyes would not be able to travel to his brain.
- 2 impulses from his brain would not be able to travel to his leg muscle.
- 3 chemicals would be released at synapses in the central nervous system.
- 4 reflex actions would not be able to happen in his legs.

7D The young man can sense some stimuli to his feet.

Which structures in his spinal cord were not damaged in the accident?

- 1 receptors
- 2 sensory neurones
- 3 motor neurones
- 4 effectors

Turn over for the next question

Turn over ►

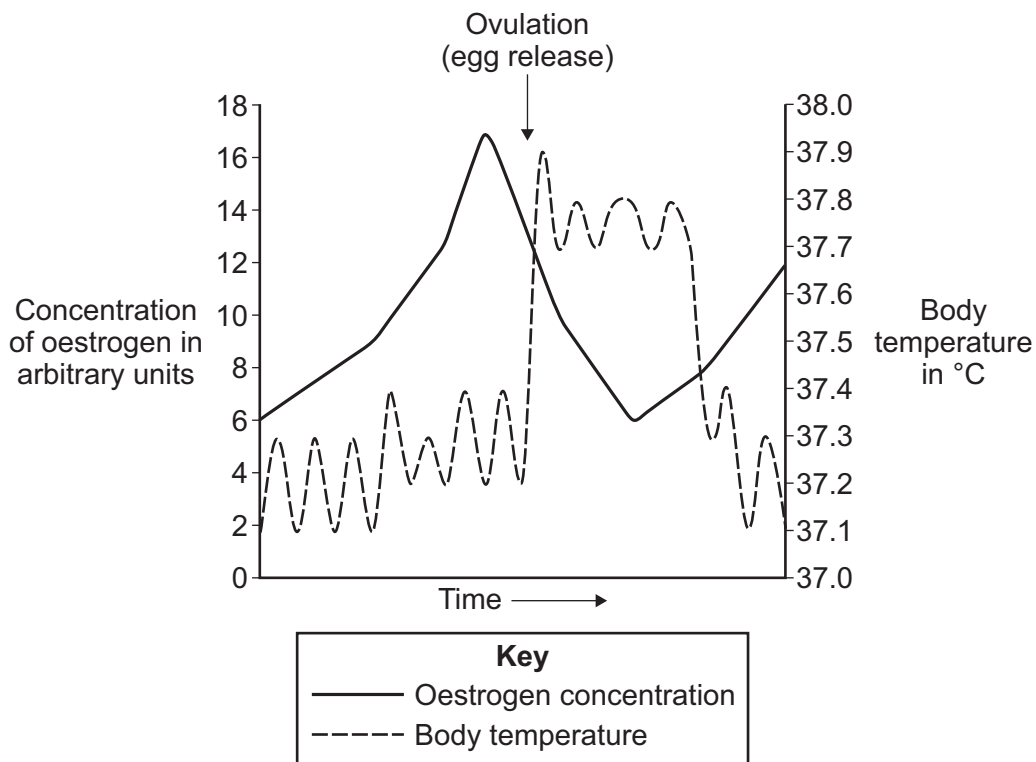
QUESTION EIGHT

Hormones control the menstrual cycle.

8A Which row in the table shows where oestrogen and FSH are produced?

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

The graph shows the changes in the concentration of oestrogen in a woman's blood during part of the menstrual cycle. The graph also shows the changes in her body temperature.



-
- 8B** By how much does the woman's temperature rise (in °C) when the egg is released?
- 1 0.55
 - 2 0.60
 - 3 0.65
 - 4 0.70
- 8C** What is the relationship between the woman's body temperature and the concentration of oestrogen in her blood?
- 1 A rise in oestrogen concentration causes a rise in temperature.
 - 2 Low oestrogen concentration is linked to high temperatures.
 - 3 There is a link between a fall in oestrogen concentration and a rise in temperature.
 - 4 A high temperature causes a rise in oestrogen concentration.
- 8D** The rise in oestrogen before ovulation will . . .
- 1 inhibit FSH production and stimulate LH production.
 - 2 stimulate FSH production and inhibit LH production.
 - 3 inhibit FSH production and inhibit LH production.
 - 4 stimulate FSH production and stimulate LH production.

Turn over for the next question

Turn over ►

QUESTION NINE

The amount of energy we need depends on age, gender and activity.

9A The table shows the mean energy needed per day by different people.

Person	Mean energy needed per day in kJ	
	Male	Female
6-year old	7 500	7 500
16-year old	13 000	10 000
30-year old office worker	11 000	9 500
30-year old labourer	16 000	13 500
Pregnant woman		10 500

From the data in the table, which of the following has the biggest effect on the amount of energy needed by the body?

- 1 your gender
- 2 pregnancy
- 3 how active you are
- 4 how fit you are

9B Of the following, who needs least food?

People who . . .

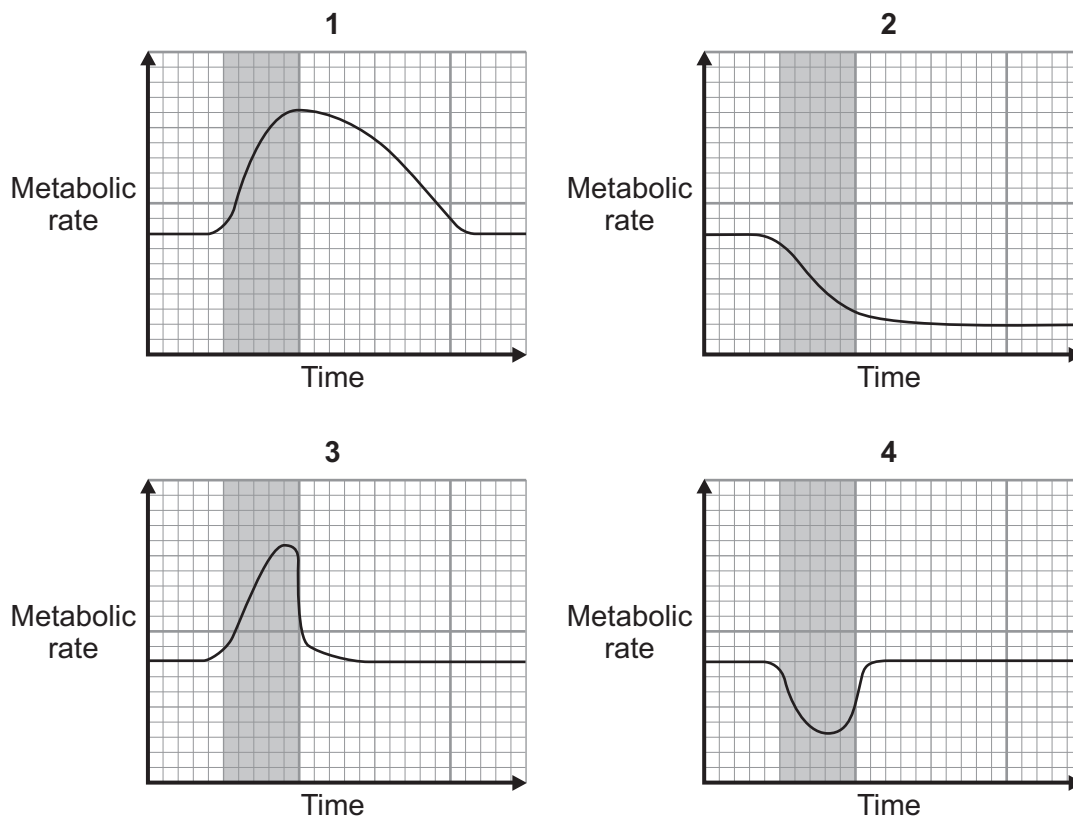
- 1 exercise little and live in cold climates.
- 2 exercise a lot and live in warm climates.
- 3 exercise little and live in warm climates.
- 4 exercise a lot and live in cold climates.

9C Some people take more energy into their body than they use.

Which row in the table shows diseases linked with this?

	Arthritis	Cancer	Diabetes	Rubella	Deficiency diseases
1	✓	✓		✓	
2			✓		✓
3	✓		✓		
4		✓		✓	✓

9D Which graph shows a person's metabolic rate, before, during and after a 20-minute period of exercise?



Key: ■ 20-minute period of exercise

END OF TEST

There are no questions printed on this page