Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

General Certificate of Secondary Education
Foundation Tier and Higher Tier
June 2012

Science A

Unit Biology B1a (Human Biology)

Biology

Unit Biology B1a (Human Biology)

BLY1AP

F&H

Friday 22 June 2012 Afternoon Session

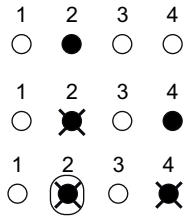
For this paper you must have:
- a black ball-point pen
- an objective test answer sheet.

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**.

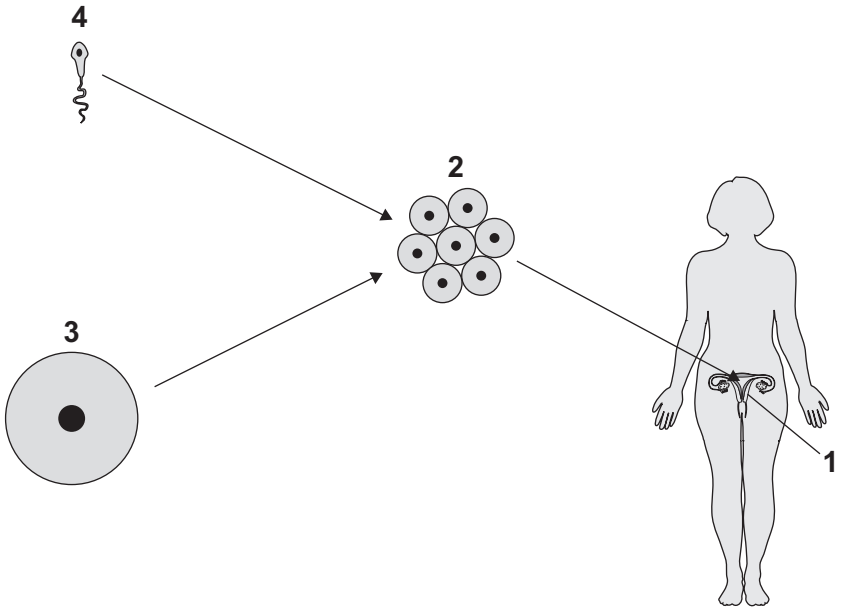
In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1**–**4**.

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

Mark your choices on the answer sheet.

QUESTION ONE

The diagram shows IVF (in vitro fertilisation).



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

A embryo

B egg

C sperm

D womb (uterus)

QUESTION TWO

Many different factors affect our health.

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

A arthritis

B diabetes

C high blood pressure

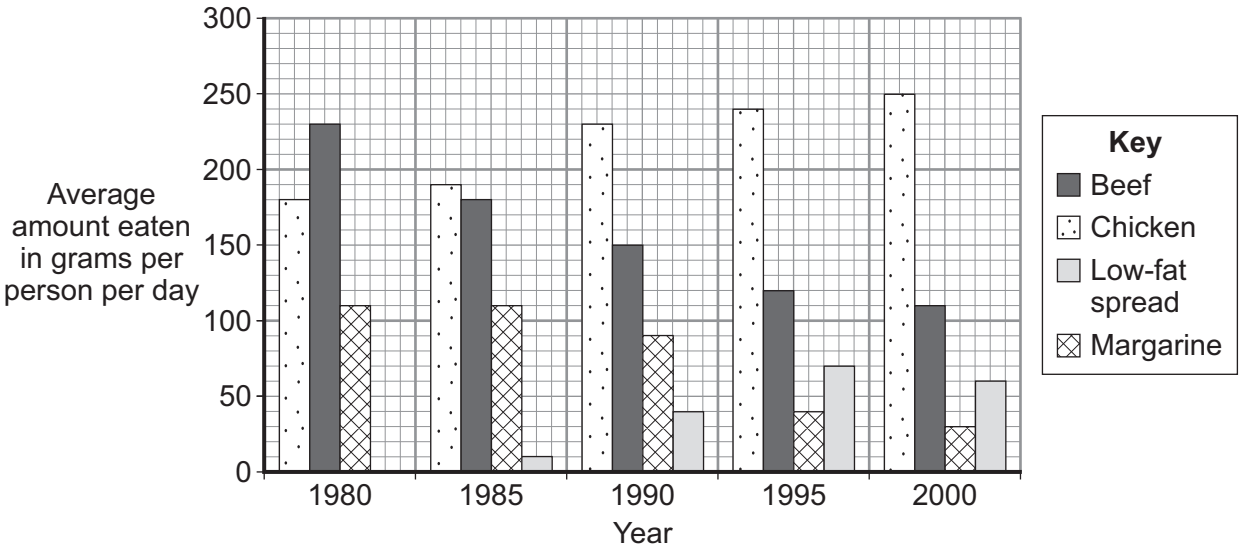
D irregular periods in women

	Information
1	may be caused when a person does not have enough food
2	one symptom is high blood sugar
3	may be caused when a person has too much salt in their diet
4	one symptom is worn joints

Turn over for the next question

QUESTION THREE

The bar chart shows changes in diets between 1980 and 2000.



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

A Beef

B Chicken

C Low-fat spread

D Margarine

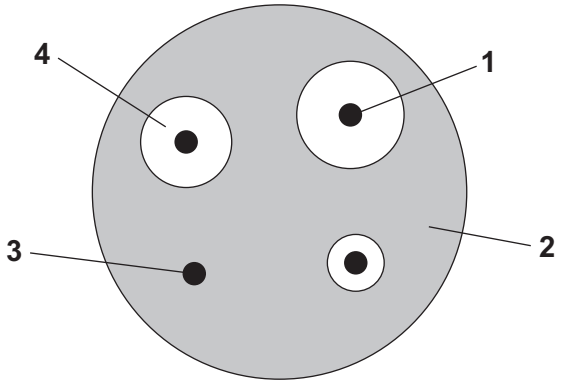
1	average amount of this food eaten increased in each of the years from 1980
2	average amount of this food eaten in 1980 was 110 g per person per day
3	average amount of this food eaten increased then decreased between 1985 and 2000
4	average amount of this food eaten decreased the most between 1980 and 2000

QUESTION FOUR

Scientists investigated the effect of three different antibiotics on one type of bacterium.

- They spread a culture of the bacteria over nutrient jelly in a dish.
- They put three small paper discs, each containing a different antibiotic, on the bacteria.
- They also put a paper disc with no antibiotic on the bacteria.

The diagram shows the appearance of the dish 24 hours later.



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

A living bacteria

B killed bacteria

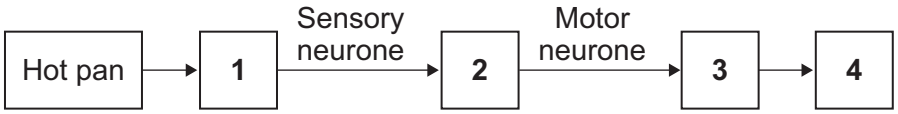
C contains no antibiotic

D contains the most effective antibiotic

Turn over for the next question

QUESTION FIVE

The diagram shows a reflex action.



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

A central nervous system

B muscle

C receptor

D response

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

Most sports drinks contain water, sugar, caffeine and ions.

6A Which part of a sports drink is a source of energy for an athlete?

1 caffeine

2 ions

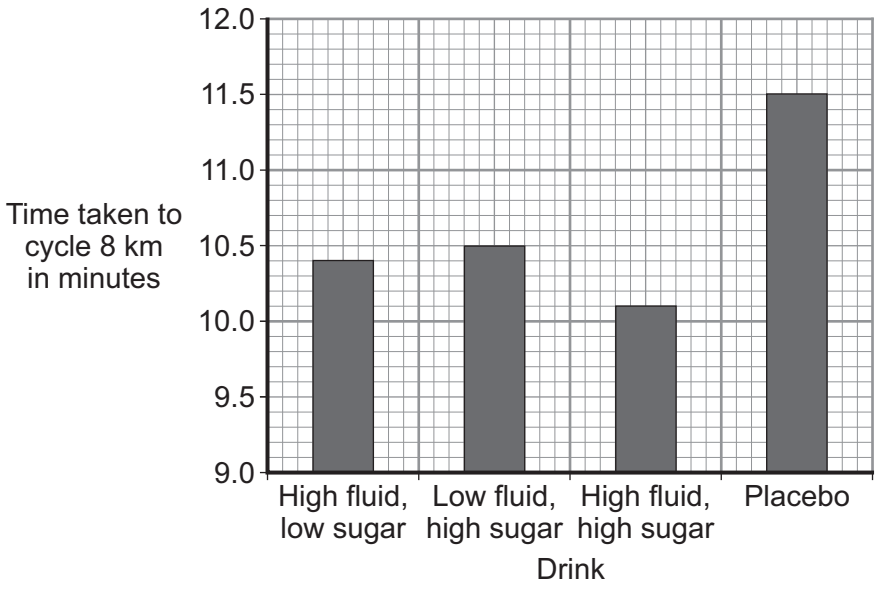
3 sugar

4 water

Four athletes were each given one of the following drinks before cycling:

- high fluid and low sugar drink
- low fluid and high sugar drink
- high fluid and high sugar drink
- a placebo drink.

The graph shows the results.



6B The placebo would contain . . .

1 water, sugar and ions only.

2 water and sugar only.

3 water and ions only.

4 water only.

6C Look at the data for the athlete who drank the high fluid, low sugar drink.

How long did this athlete take to cycle 8 km?

1 10.2 minutes

2 10.4 minutes

3 10.5 minutes

4 10.8 minutes

6D The best drink for the athletes was the . . .

1 high fluid and low sugar drink.

2 low fluid and high sugar drink.

3 high fluid and high sugar drink.

4 placebo drink.

Turn over for the next question

QUESTION SEVEN

Nicotine replacement therapy (NRT) can help people to stop smoking.

7A Nicotine is addictive, because it . . .

1 may cause cancer.

2 is a drug.

3 leads to lack of self control.

4 changes chemical processes in the body.

Scientists measured the concentration of nicotine in the blood, over 24 hours, for different people who:

- smoked 22 cigarettes per day

or

- chewed NRT gum tablets, each containing 4 mg of nicotine, each hour from 9.00 to 21.00

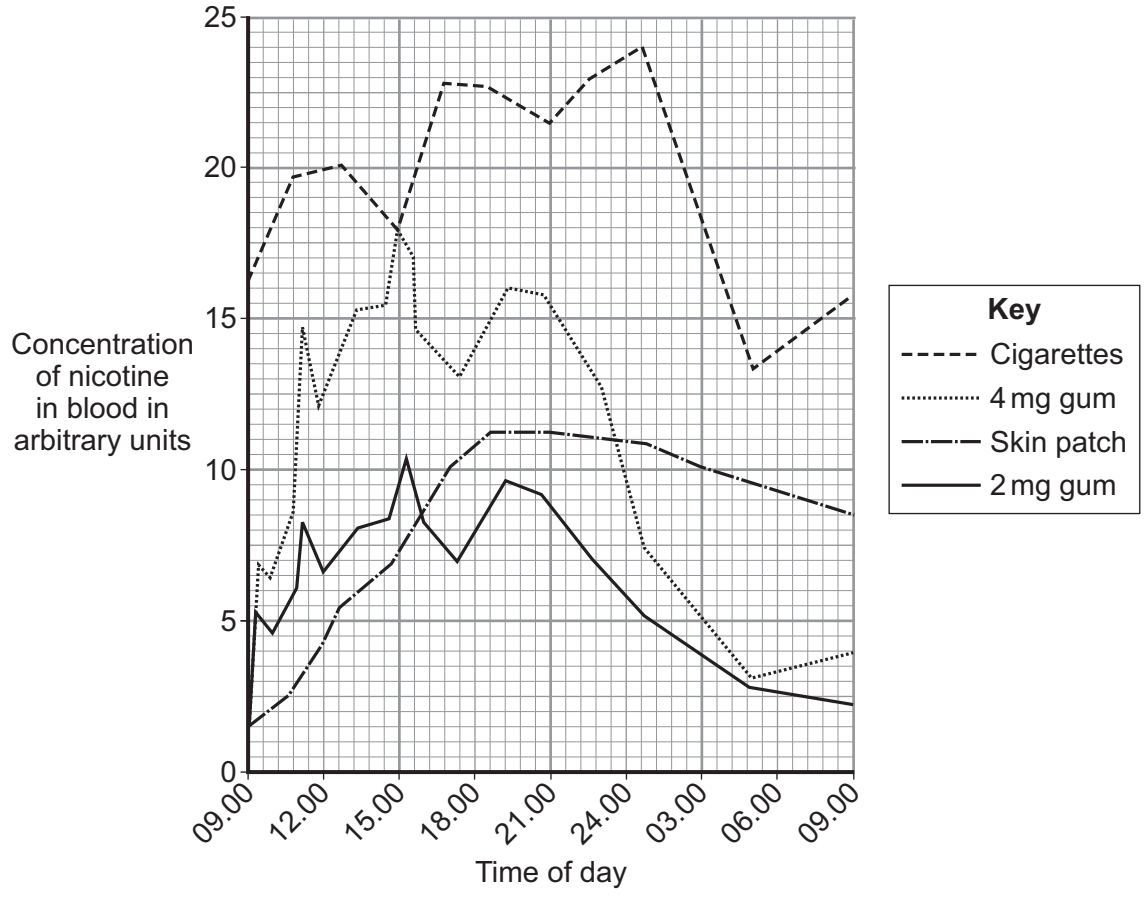
or

- used an NRT skin patch containing 21 mg of nicotine for 24 hours

or

- chewed NRT gum tablets, each containing 2 mg of nicotine, each hour from 9.00 to 21.00.

The graph shows the results.



7B Which people had the highest concentration of nicotine in their blood for most of the day?

The people who . . .

1 smoked cigarettes.

2 used 2 mg NRT gum tablets.

3 used 4 mg NRT gum tablets.

4 used NRT skin patches.

7C It is important to keep nicotine levels constant during the night.

In which group of people did the concentration of nicotine in the blood stay nearly constant for most of the night?

The group of people who . . .

1 smoked cigarettes.

2 used 2 mg NRT gum tablets.

3 used 4 mg NRT gum tablets.

4 used NRT skin patches.

7D A person who is trying to stop smoking needs a high concentration of nicotine in the blood during the day.

From the results in the graph, which of the following would you expect to be most effective in helping a person to stop smoking?

1 gradually smoking fewer cigarettes each day

2 using 2 mg NRT gum tablets

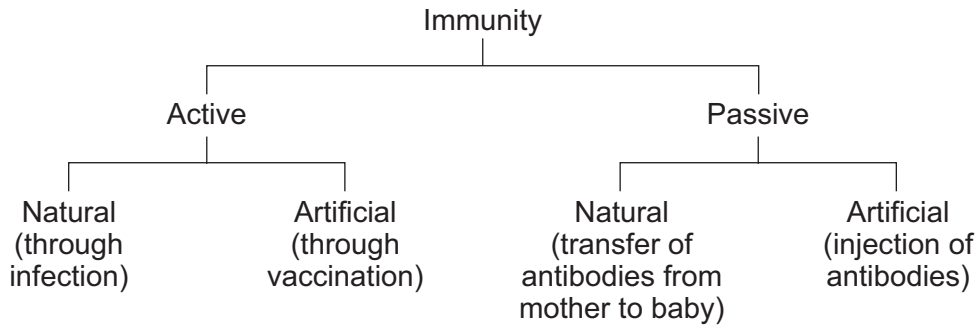
3 using 4 mg NRT gum tablets

4 using NRT skin patches

Turn over for the next question

QUESTION EIGHT

The diagram shows ways in which someone may become immune to a disease.



8A Which way of becoming immune would be achieved by breastfeeding a young child?

1 active, artificial immunity

2 passive, artificial immunity

3 active, natural immunity

4 passive, natural immunity

8B How does a vaccination make someone immune to a disease?

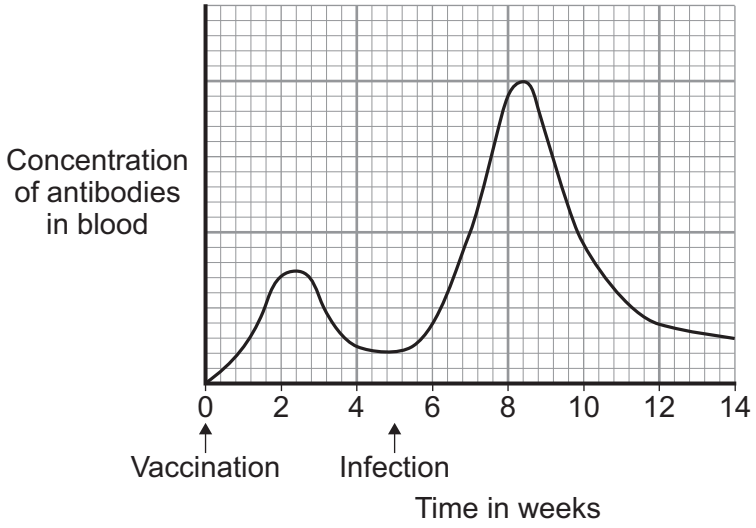
1 White blood cells make the correct antibody for the microorganism.

2 Pathogens produce antitoxins to neutralise poisons from the microorganism.

3 White blood cells produce pathogens to kill the microorganism.

4 Pathogens produce the correct antibody for the microorganism.

The graph shows the concentration of antibodies in the blood after vaccination and after infection with a live microorganism, five weeks later.



8C How does vaccination help the person to become immune to the disease that the microorganism causes?

As a result of vaccination, when there is an infection, antibodies are produced . . .

1 more rapidly and in larger numbers.

2 more slowly and in larger numbers.

3 more rapidly and in smaller numbers.

4 more slowly and in smaller numbers.

8D A few weeks after vaccination with the MMR vaccine, a person is infected with the measles virus.

Which row in the table shows the effect that the measles virus will have on the concentration of antibodies in the person's blood?

	Concentration of measles antibodies	**Concentration of mumps antibodies**	**Concentration of rubella antibodies**
1	increase	increase	increase
2	no change	increase	no change
3	increase	no change	no change
4	no change	increase	increase

QUESTION NINE

Cholesterol affects the health of the heart.

9A Cholesterol is carried around the body by . . .

1 lipoproteins.

2 monounsaturated fats.

3 saturated fats.

4 polyunsaturated fats.

9B Statins lower the concentration of . . .

1 saturated fats in the blood.

2 unsaturated fats in the blood.

3 salt in the blood.

4 cholesterol in the blood.

A company has developed a new drug. The new drug increases the concentration of HDL (high-density lipoprotein) in the blood.

The scientists designed a trial to test this new drug.

- The scientists used 15 000 people.
- Half of the people were given the new drug and a statin.
- The other half were not given the new drug. They were given the same statin.

The new drug increased the concentration of HDL in the blood.
However, there were 80 deaths in the group that took the new drug and the statin, compared with only 50 deaths in the group that took only the statin.

9C What proportion of the group taking **only** the statin died during the trial?

1 0.003

2 0.005

3 0.007

4 0.011

9D In view of the results of the trial, the company should . . .

1 increase the number of people taking part in the trial.

2 stop the trial.

3 increase the dose of the new drug.

4 stop people taking statins.

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**.

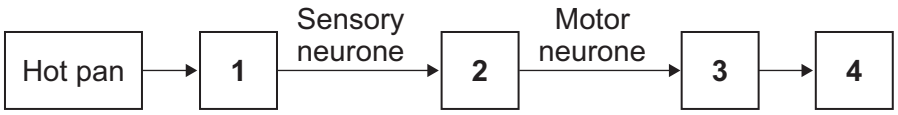
In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1**–**4**.

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

Mark your choices on the answer sheet.

QUESTION ONE

The diagram shows a reflex action.



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

A central nervous system

B muscle

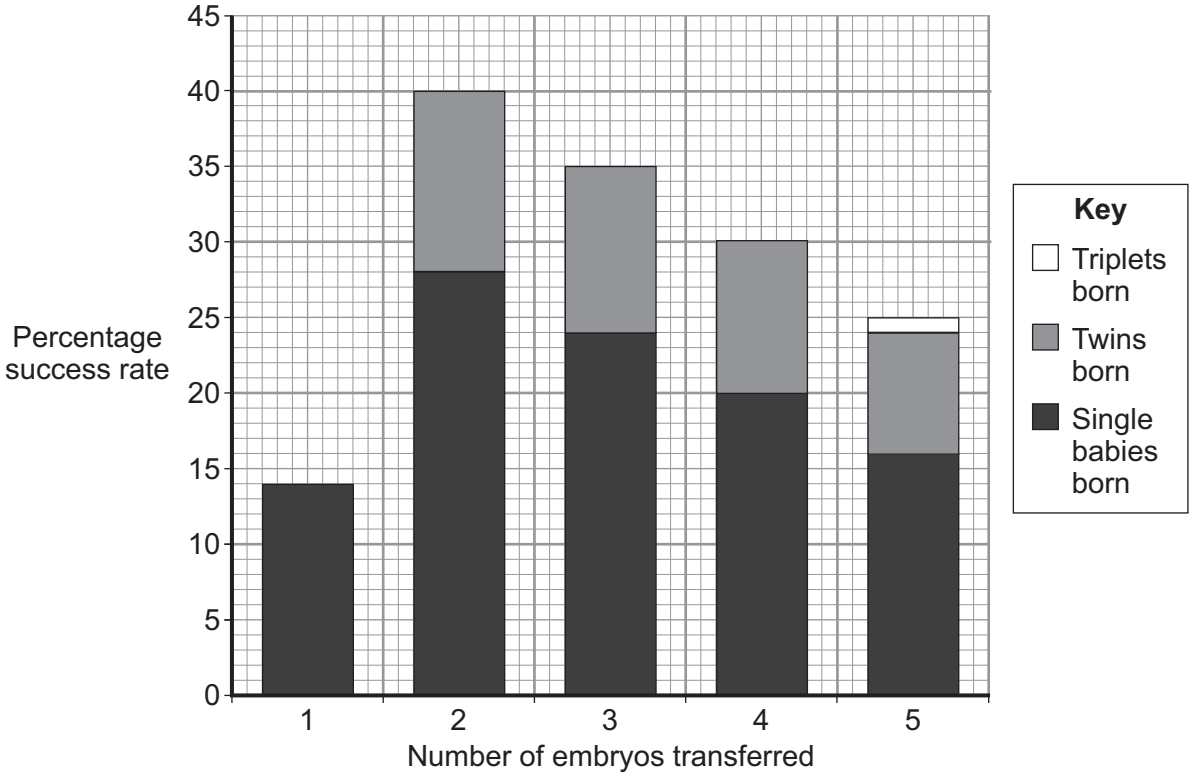
C receptor

D response

QUESTION TWO

In vitro fertilisation (IVF) treatment helps women to become pregnant.

The bar chart shows the percentage success rate for IVF when different numbers of embryos are transferred into the mother.



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

A 10

B 12

C 14

D 40

1	the maximum percentage success rate
2	the decrease in percentage success rate between the transfer of two embryos and the transfer of four embryos
3	the percentage of twins that are born when two embryos are transferred
4	the percentage success rate when one embryo is transferred

Section Two

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

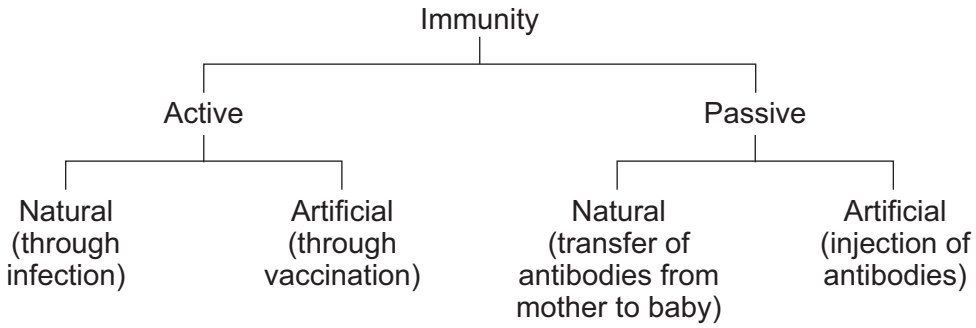
Each of these questions has four parts.

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

Mark your choices on the answer sheet.

QUESTION THREE

The diagram shows ways in which someone may become immune to a disease.



3A Which way of becoming immune would be achieved by breastfeeding a young child?

1 active, artificial immunity

2 passive, artificial immunity

3 active, natural immunity

4 passive, natural immunity

3B How does a vaccination make someone immune to a disease?

1 White blood cells make the correct antibody for the microorganism.

2 Pathogens produce antitoxins to neutralise poisons from the microorganism.

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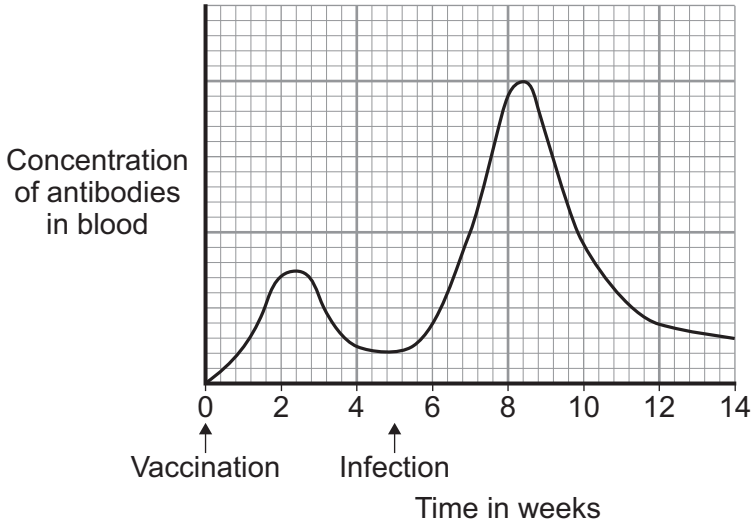
4 Pathogens produce the correct antibody for the microorganism.

The graph shows the concentration of antibodies in the blood after vaccination and after infection with a live microorganism, five weeks later.



3C How does vaccination help the person to become immune to the disease that the microorganism causes?

As a result of vaccination, when there is an infection, antibodies are produced . . .

1 more rapidly and in larger numbers.

2 more slowly and in larger numbers.

3 more rapidly and in smaller numbers.

4 more slowly and in smaller numbers.

3D A few weeks after vaccination with the MMR vaccine, a person is infected with the measles virus.

Which row in the table shows the effect that the measles virus will have on the concentration of antibodies in the person's blood?

	Concentration of measles antibodies	**Concentration of mumps antibodies**	**Concentration of rubella antibodies**
1	increase	increase	increase
2	no change	increase	no change
3	increase	no change	no change
4	no change	increase	increase

QUESTION FOUR

Cholesterol affects the health of the heart.

4A Cholesterol is carried around the body by . . .

1 lipoproteins.

2 monounsaturated fats.

3 saturated fats.

4 polyunsaturated fats.

4B Statins lower the concentration of . . .

1 saturated fats in the blood.

2 unsaturated fats in the blood.

3 salt in the blood.

4 cholesterol in the blood.

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- The scientists used 15 000 people.
- Half of the people were given the new drug and a statin.
- The other half were not given the new drug. They were given the same statin.

The new drug increased the concentration of HDL in the blood.
However, there were 80 deaths in the group that took the new drug and the statin, compared with only 50 deaths in the group that took only the statin.

4C What proportion of the group taking **only** the statin died during the trial?

1 0.003

2 0.005

3 0.007

4 0.011

4D In view of the results of the trial, the company should . . .

1 increase the number of people taking part in the trial.

2 stop the trial.

3 increase the dose of the new drug.

4 stop people taking statins.

Turn over for the next question

QUESTION FIVE

Exercise causes changes inside the body.

5A When we exercise, we start to sweat.

This happens to . . .

1 release excess water from the body.

2 maintain the correct concentration of ions in the blood.

3 maintain the concentration of sugar in the blood.

4 maintain the correct body temperature.

5B In making up for the loss of sweat during exercise, . . .

1 cells absorb more water.

2 more water is exhaled through the lungs.

3 the urine produced by the kidneys is more concentrated.

4 the pores in the skin close.

5C Exercise can help people to control their body mass.

This is because people who exercise regularly . . .

1 need less food.

2 have a higher metabolic rate.

3 carry less mass as water.

4 are less likely to develop diabetes.

5D The table shows the effect of sweating on the body.

Percentage of body mass lost as sweat	Effect on the body
2	Performance gets worse
4	Muscles do not work as well
5	Heat exhaustion
7	Hallucinations
10	Circulatory problems and heat stroke

If a 70 kilogram man loses 2.8 kg of sweat during a race, what effect will this have on his body?

1 He will get circulatory problems and heat stroke.

2 His muscles will not work as well.

3 He will suffer from heat exhaustion.

4 He will have hallucinations.

Turn over for the next question

QUESTION SIX

Doctors used a double-blind trial to investigate the effect of nicotine on the level of aggression in people.

- The doctors tested 20 volunteers to find their normal level of aggression.
- 14 of the volunteers were smokers and 6 of the volunteers were non-smokers.
- Both the smokers and the non-smokers were given either nicotine or a placebo in a skin patch.
- Three hours later, all the volunteers were tested for their level of aggression.

The table shows the results.

	Contents of skin patch	Level of aggression	
		Before test	After test
Smokers	Placebo	Low	Low
		High	Low
	Nicotine	Low	Low
		High	Low
Non-smokers	Placebo	Low	Low
		High	High
	Nicotine	Low	Low
		High	High

6A Who knew what was in the patches?

1 the volunteers but not the doctors

2 the doctors but not the volunteers

3 both the doctors and the volunteers

4 neither the doctors nor the volunteers

6B One group given the placebo probably believed that the placebo contained nicotine.

Which group?

1 smokers with normally low aggression

2 smokers with normally high aggression

3 non-smokers with normally low aggression

4 non-smokers with normally high aggression

6C The results may be considered to be . . .

1 reliable because the test lasted three hours.

2 unreliable because twenty volunteers were used.

3 precise because aggression was described as ‘high’ or ‘low’.

4 valid because volunteers were asked if they smoked or not.

6D One possible conclusion could be that . . .

1 nicotine reduces aggression in smokers.

2 smokers are more aggressive than non-smokers.

3 smokers are less aggressive than non-smokers.

4 nicotine increases aggression in non-smokers.

Turn over for the next question

QUESTION SEVEN

Hormones control the menstrual cycle.

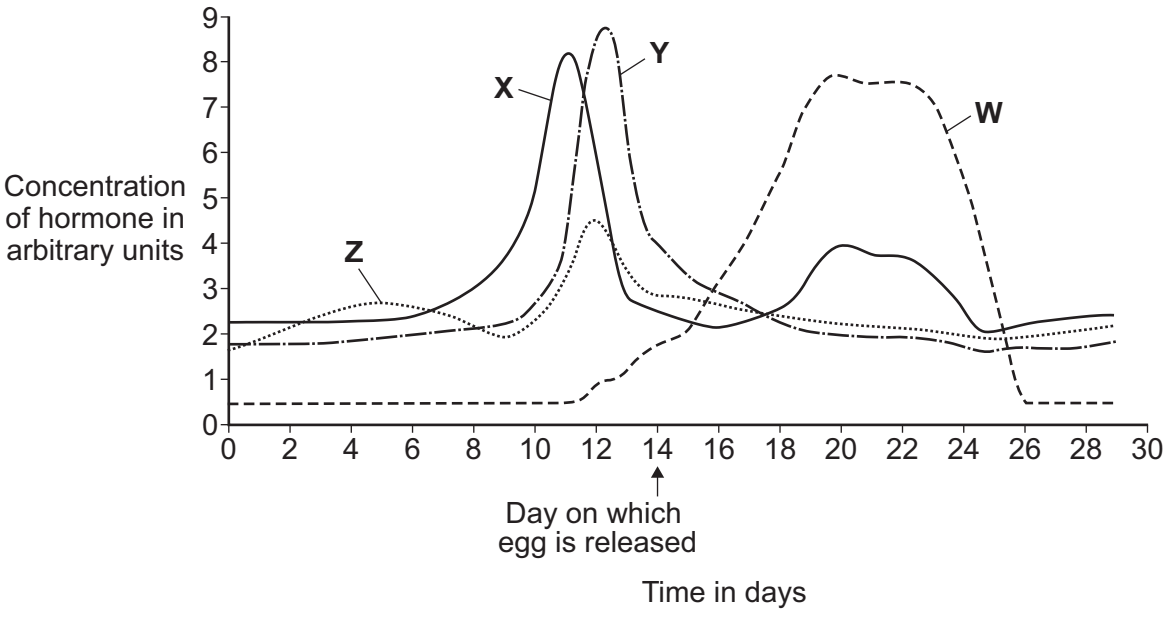
7A Which row of the table shows where oestrogen, FSH and LH are produced?

	Oestrogen	FSH	LH
1	pituitary gland	ovary	ovary
2	ovary	pituitary gland	pituitary gland
3	ovary	ovary	pituitary gland
4	pituitary gland	pituitary gland	ovary

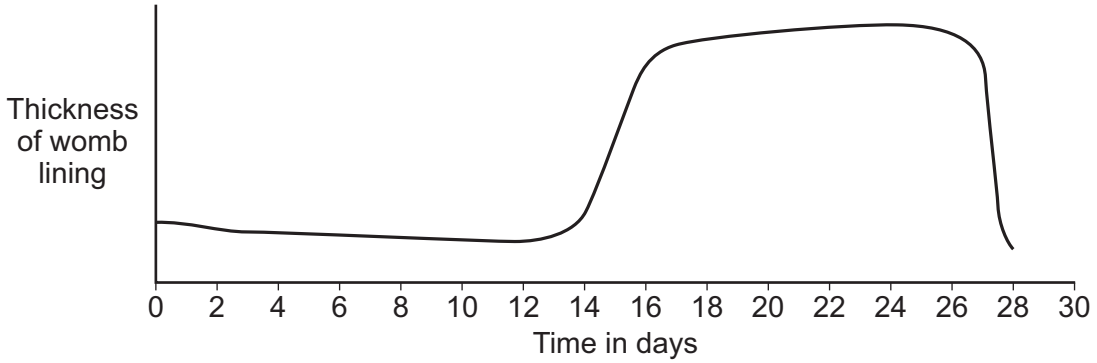
Graph 1 shows how the concentrations of four hormones, **W**, **X**, **Y** and **Z**, change during one menstrual cycle.

Graph 2 shows how the thickness of the womb lining changes during one menstrual cycle.

Graph 1



Graph 2



7B The concentration of which hormone is most closely linked to womb thickness?

1 **W**

2 **X**

3 **Y**

4 **Z**

7C Which hormone is oestrogen?

1 **W**

2 **X**

3 **Y**

4 **Z**

7D The release of an egg from the ovary is stimulated by . . .

1 increasing levels of hormone **W**.

2 low levels of hormone **X**.

3 high levels of hormone **Y**.

4 decreasing levels of hormone **Z**.

Turn over for the next question

QUESTION EIGHT

Overuse of antibiotics is causing problems treating infection.

8A Antibiotics kill . . .

1 all types of pathogen.

2 bacteria and viruses.

3 bacteria only.

4 viruses only.

8B Overuse of antibiotics . . .

1 decreases the risk of epidemics and pandemics.

2 causes bacteria to become resistant to antibiotics.

3 causes bacteria to mutate.

4 increases the rate of development of antibiotic-resistant strains of bacteria.

8C A new strain of bacterium might not be recognised by . . .

1 painkillers.

2 antibodies.

3 vaccines.

4 antitoxins.

8D The populations of antibiotic-resistant strains of bacteria increase because of . . .

1 mutation.

2 addiction.

3 natural selection.

4 immunity.

Turn over for the next question

QUESTION NINE

Some infectious diseases spread rapidly.

9A What is the difference between a pandemic and an epidemic?

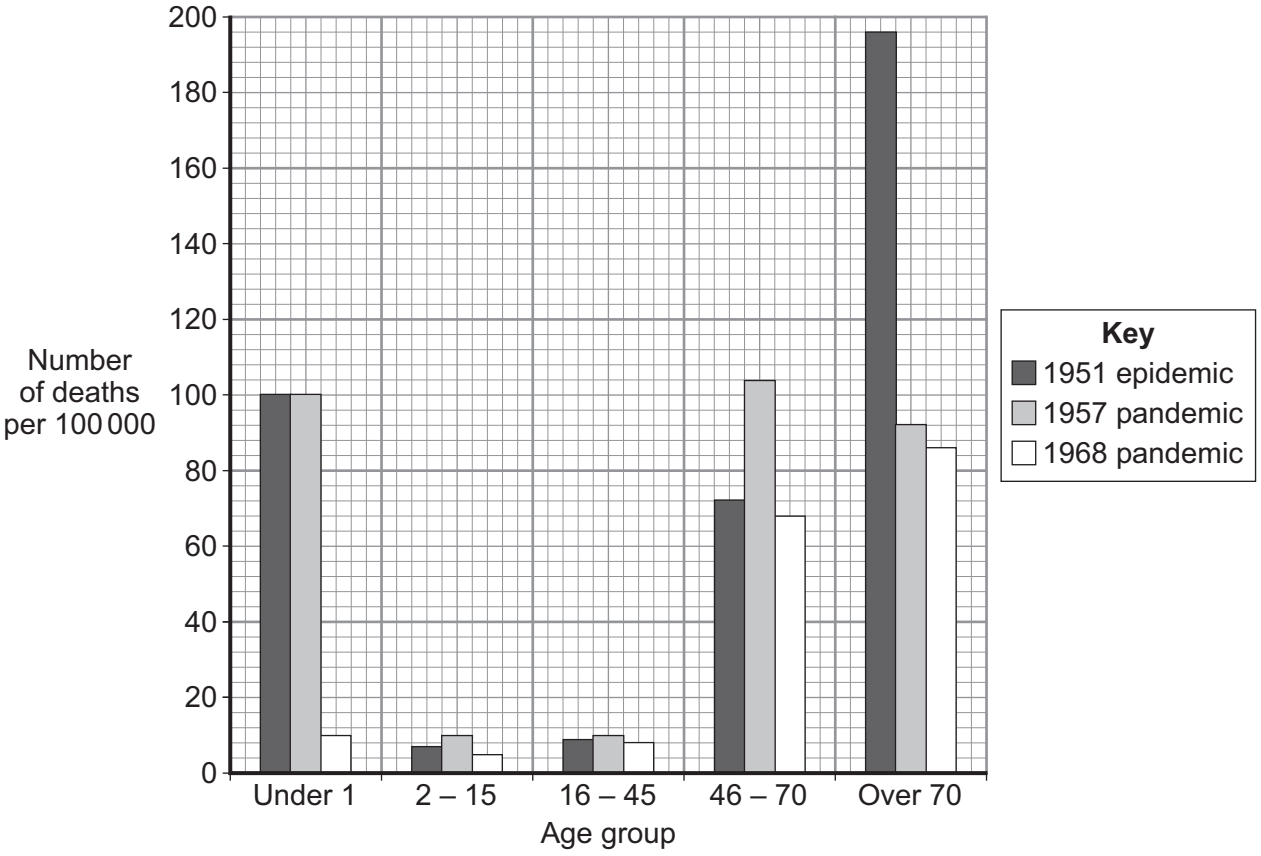
1 An epidemic causes more deaths.

2 Viruses cause a pandemic and bacteria cause an epidemic.

3 A pandemic causes deaths over a wider area.

4 Mutation in viruses or bacteria cause epidemics but do not cause pandemics.

The bar chart shows the number of deaths per 100 000 people, due to influenza, in three different years in the UK.



9B A city had a population of 500 000 in 1957.

What was the approximate number of deaths of people aged 46 to 70 from influenza in the city in the 1957 pandemic?

1 72

2 100

3 380

4 520

9C What conclusion can be drawn from this data?

1 There is no direct link between age and the number of deaths due to influenza.

2 During all three outbreaks there were fewer deaths in the 2 to 15 age range than in the 16 to 45 age range.

3 In each of the three outbreaks, people over 70 had the highest death rate.

4 During the three outbreaks there were similar death rates for each age group.

9D We cannot easily compare the actual number of those who died during the three outbreaks because . . .

1 the number of deaths is too small.

2 there is very little difference between the death rates in the three outbreaks.

3 the data does not give death rates.

4 there is no direct information on the proportion of age groups in the population.

END OF TEST

There are no questions printed on this page