

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



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

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

BLY1AP
F&H

Wednesday 2 March 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

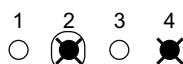
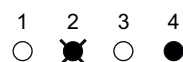
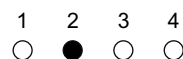
- 30 minutes

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 14 of this booklet.

FOUNDATION TIER

Section One

Questions **ONE** to **FIVE**.

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

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

Mark your choices on the answer sheet.

QUESTION ONE

Drugs have many different uses.

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

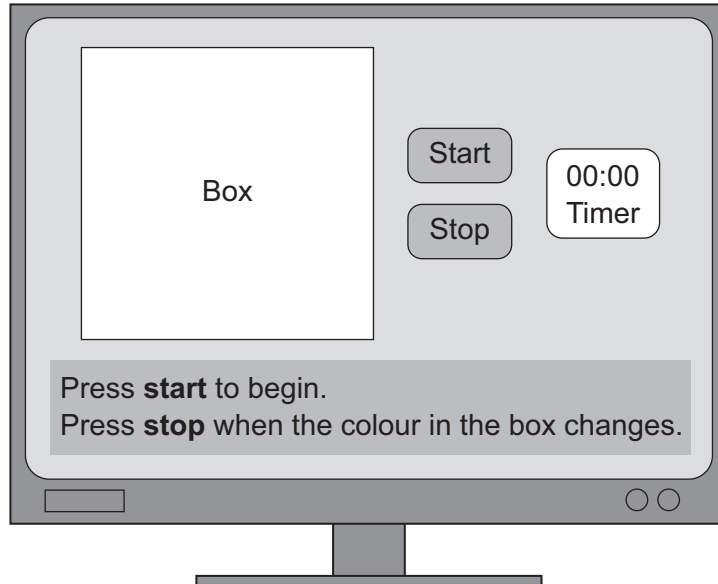
- A** cocaine
- B** nicotine
- C** statin
- D** thalidomide

1	a drug developed for use as a sleeping pill
2	the addictive drug in tobacco smoke
3	an illegal addictive drug
4	a drug used to lower the concentration of cholesterol in the blood

QUESTION TWO

A computer is used to measure a person's reaction time.

The diagram shows the computer screen.



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

- A** an effector
- B** a receptor
- C** a response
- D** a stimulus

The change in colour of the box is . . . **1**

The change in colour of the box is detected by . . . **2**

Pressing **stop** is . . . **3**

The muscle used to press **stop** is . . . **4**

Turn over ►

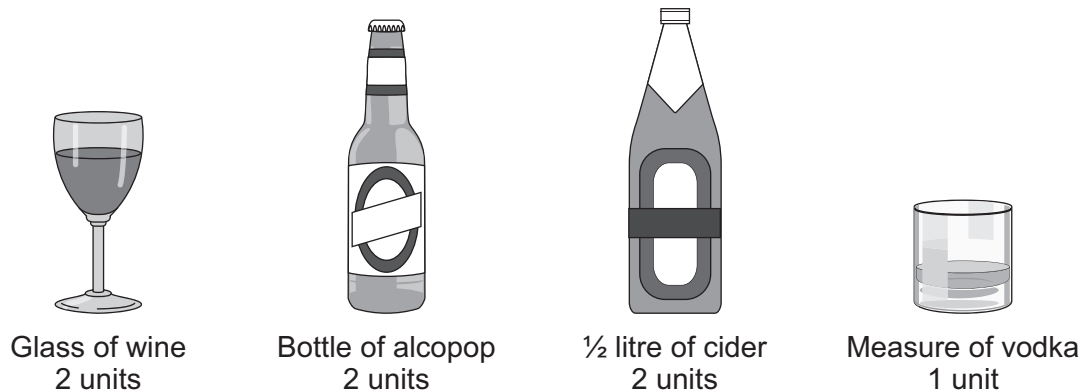
QUESTION THREE

Doctors are worried about the amount of alcohol drunk by teenagers.

The recommended maximum number of units of alcohol per week is:

- 14 units for a female
- 21 units for a male.

The diagram shows the number of units of alcohol in different drinks.



The table shows the amount of alcohol that some teenagers drink.

Isabelle drinks 2 alcopops and 2 vodkas at a party.	Nathan drinks 15 half-litre glasses of cider and 5 vodkas each week.	Graham drinks 3 half-litres of cider each week.	Alison drinks 2 glasses of wine every night.
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Use the above information to match the number of units, **A**, **B**, **C** and **D**, with the statements **1–4** in the table.

- A** 2 units
- B** 5 units
- C** 6 units
- D** 14 units

1	the number of units in a bottle of alcopop
2	Nathan's average number of units each day
3	the number of units more than the recommended maximum that Alison (a female) drinks each week
4	the total number of units that Isabelle had at the party

QUESTION FOUR

The drug thalidomide was banned because it caused limb abnormalities in human embryos. Now thalidomide is being tested to find out if it can be used to treat people with the disease AIDS.

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

- A** doctors
- B** pregnant women
- C** politicians
- D** volunteers

The tests will be designed by . . . **1**

In the tests, the drug will first be given to . . . **2**

The drug should not be tested on . . . **3**

The final decision on whether the drug is allowed to be prescribed for people with AIDS will be made by . . . **4**

QUESTION FIVE

We control conditions inside our bodies.

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

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

1	produces the hormone FSH
2	gets rid of excess heat
3	removes excess water from the blood
4	produces cholesterol

Turn over ►

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 healthy diet has the correct balance of different foods.

6A In a balanced diet, which food is needed in the smallest amount?

- 1 carbohydrate
- 2 fats
- 3 proteins
- 4 vitamins

Scientists evaluated four slimming plans.

The results are shown in the table.

Slimming plan		Percentage weight loss (%)	
		Maximum	Long term
W	12 week very low energy diet using only slimming foods	15.3	8.4
X	12 week very low energy diet using both slimming foods and usual foods	14.1	8.4
Y	12 week very low energy diet and going to slimming classes	21.8	9.0
Z	17 week very low energy diet and going to slimming classes	19.2	9.3

6B One difference between slimming plan **W** and slimming plan **X** was . . .

- 1 the length of the slimming plan.
- 2 the amount of energy in the diet.
- 3 the use of slimming foods.
- 4 the use of usual foods.

6C Which slimming plan was most effective in the long term?

1 W

2 X

3 Y

4 Z

6D What was the effect of slimming classes on maximum weight loss?

1 The longer the slimming plan continued, the more the weight loss increased.

2 Slimming classes did not affect maximum weight loss if the people were on a very low energy diet.

3 Slimming classes made the slimming plan twice as effective.

4 Slimming classes always increased maximum weight loss.

Turn over for the next question

Turn over ►

QUESTION SEVEN

Read this account of a student's investigation.

I first tested three drinks, **X**, **Y** and **water**, on two friends, Pete and Raj, to find out which drink was best to use when jogging.

- I tested their reactions using a reaction timer.
- They jogged for 30 minutes, during which they drank 1 dm^3 of drink **X**.
- I then tested their reactions again in the same way.

After they had rested, they did the complete test again:

- with drink **Y**
- then with **water**
- then with **no drink**.

7A How could the student have improved his investigation?

- 1 by getting the two friends to jog for 1 hour
- 2 by testing ten friends
- 3 by using five different drinks
- 4 by asking the two friends to drink 2 dm^3 of each drink

The student's results are shown in the table.

	Reaction time in seconds				
	Before jogging	Drink X	Drink Y	Water	No drink
Pete	1.2	1.3	0.9	1.3	1.6
Raj	1.4	1.5	1.1	1.4	1.7

7B For drink **X**, what is the difference between the reaction times before jogging and after jogging?

- 1 0.1 seconds
- 2 0.2 seconds
- 3 0.3 seconds
- 4 0.4 seconds

7C Using these results, which is the best advice for people running in a competitive race?

- 1 do not drink at all
- 2 use drink **X**
- 3 use drink **Y**
- 4 drink only **water**

7D Sports drinks should contain ions to replace those lost mainly by . . .

- 1 breathing.
- 2 eating.
- 3 sweating.
- 4 urinating.

Turn over for the next question

Turn over ►

QUESTION EIGHT

'Processed food' may affect cholesterol levels in the blood.

8A 'Good' cholesterol is . . .

- 1 high-density lipoprotein.
- 2 low-density lipoprotein.
- 3 mono-unsaturated fat.
- 4 saturated fat.

8B 'Bad' cholesterol is found in large amounts in . . .

- 1 mono-unsaturated fats.
- 2 polyunsaturated fats.
- 3 saturated fats.
- 4 unsaturated fats.

8C Lowering the concentration of cholesterol in the blood helps to prevent . . .

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

8D Which row in the table shows the fat content and salt content of **most** processed foods?

	Fat content	Salt content
1	low	low
2	high	low
3	low	high
4	high	high

Turn over for the next question

Turn over ►

QUESTION NINE

Read the newspaper article published in 2009.

Swine Flu: How Serious a Threat?

The World Health Organisation says that a new strain of virus, the swine flu virus, has killed 150 people in Mexico. This shows that the virus can pass from human to human. One expert says that he expects the outbreak to develop into a pandemic.

- 9A** A pandemic is an outbreak of a disease . . .
- 1 confined to a town.
 - 2 confined to a region.
 - 3 that will **not** spread.
 - 4 that will spread all over the world.
- 9B** The swine flu virus makes us ill because the virus . . .
- 1 produces antibodies.
 - 2 produces toxins.
 - 3 reproduces rapidly.
 - 4 slows down our reactions.
- 9C** The swine flu virus made many people ill because . . .
- 1 people were **not** immune to the swine flu virus.
 - 2 painkillers do **not** work on viral diseases.
 - 3 scientists had **not** produced a new antibiotic.
 - 4 new strains of a virus are always more powerful than existing strains.

9D Scientists have developed a swine flu vaccine.

This vaccine works because it . . .

- 1 destroys the virus.
- 2 produces antitoxins.
- 3 engulfs the virus.
- 4 stimulates the production of antibodies.

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

We control conditions inside our bodies.

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

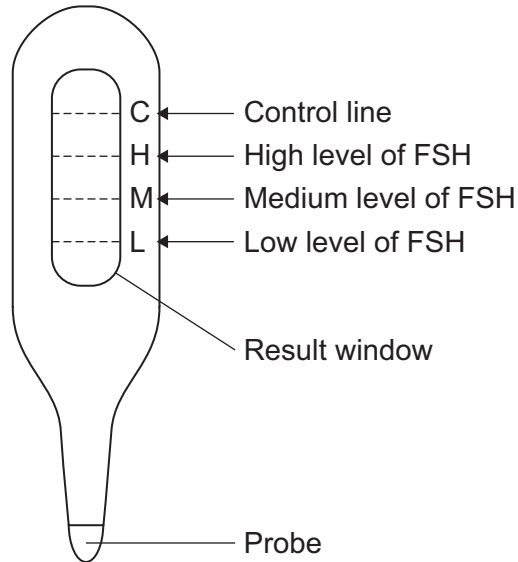
- A** liver
- B** pituitary gland
- C** kidney
- D** skin

1	produces the hormone FSH
2	gets rid of excess heat
3	removes excess water from the blood
4	produces cholesterol

QUESTION TWO

Diagram 1 shows an instrument used to test FSH concentration in urine.

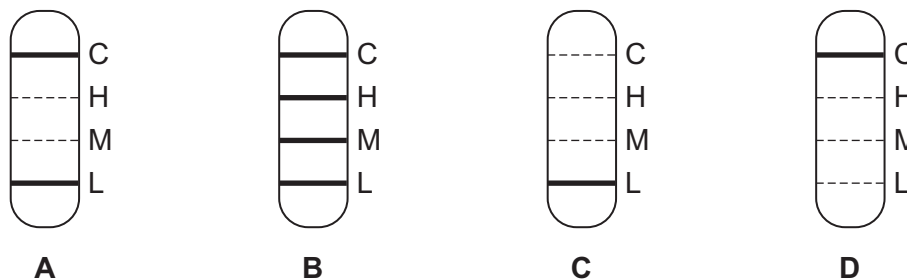
Diagram 1



The probe is put in a urine sample. After 30 minutes, dark lines may show in the result window. The control line shows when the test has been done correctly.

Diagram 2 shows the result windows of four tests, **A**, **B**, **C** and **D**.

Diagram 2



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

1	shows that the test was not done properly
2	shows the FSH level between the end of menstruation and egg release
3	shows a test on urine from a male
4	shows the FSH level at the end of the menstrual cycle

Turn over ►

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

Each of these questions has four parts.

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

QUESTION THREE

'Processed food' may affect cholesterol levels in the blood.

3A 'Good' cholesterol is . . .

- 1 high-density lipoprotein.
- 2 low-density lipoprotein.
- 3 mono-unsaturated fat.
- 4 saturated fat.

3B 'Bad' cholesterol is found in large amounts in . . .

- 1 mono-unsaturated fats.
- 2 polyunsaturated fats.
- 3 saturated fats.
- 4 unsaturated fats.

3C Lowering the concentration of cholesterol in the blood helps to prevent . . .

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

3D Which row in the table shows the fat content and salt content of **most** processed foods?

	Fat content	Salt content
1	low	low
2	high	low
3	low	high
4	high	high

Turn over for the next question

Turn over ►

QUESTION FOUR

Read the newspaper article published in 2009.

Swine Flu: How Serious a Threat?

The World Health Organisation says that a new strain of virus, the swine flu virus, has killed 150 people in Mexico. This shows that the virus can pass from human to human. One expert says that he expects the outbreak to develop into a pandemic.

- 4A** A pandemic is an outbreak of a disease . . .
- 1 confined to a town.
 - 2 confined to a region.
 - 3 that will **not** spread.
 - 4 that will spread all over the world.
- 4B** The swine flu virus makes us ill because the virus . . .
- 1 produces antibodies.
 - 2 produces toxins.
 - 3 reproduces rapidly.
 - 4 slows down our reactions.
- 4C** The swine flu virus made many people ill because . . .
- 1 people were **not** immune to the swine flu virus.
 - 2 painkillers do **not** work on viral diseases.
 - 3 scientists had **not** produced a new antibiotic.
 - 4 new strains of a virus are always more powerful than existing strains.

4D Scientists have developed a swine flu vaccine.

This vaccine works because it . . .

- 1 destroys the virus.
- 2 produces antitoxins.
- 3 engulfs the virus.
- 4 stimulates the production of antibodies.

Turn over for the next question

Turn over ►

QUESTION FIVE

It is important to keep the internal conditions of the body constant.

5A Water and ions are both lost from the body in . . .

- 1 breath and sweat.
- 2 breath and urine.
- 3 breath, sweat and urine.
- 4 sweat and urine.

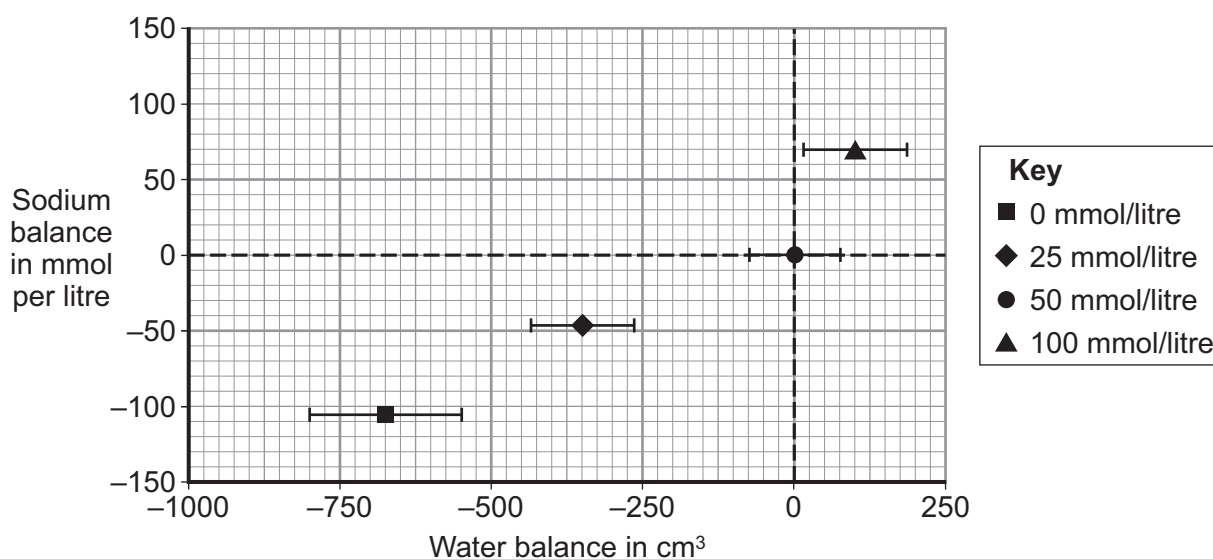
Scientists carried out an investigation to find the best concentration of sodium ions to use in a sports drink.

- The scientists dehydrated some athletes by getting them to exercise in hot conditions.
- Each athlete then drank a test drink containing one of the following concentrations of sodium ions:

Test drink W (water)	0 mmol per litre
Test drink X	25 mmol per litre
Test drink Y	50 mmol per litre
Test drink Z	100 mmol per litre

- After one hour, the scientists measured the water balance and the sodium balance of the blood of each athlete.

The results are shown in the graph.



The dashed lines on the graph show the normal water balance and the normal sodium ion balance of the body. The horizontal line at each plot shows the range of the water balance for that drink.

5B What was the range of the water balance for the 25 mmol per litre sodium ion drink?

- 1 50 cm³
- 2 100 cm³
- 3 175 cm³
- 4 250 cm³

5C The data shows that one litre of the best drink for restoring the balance of water and sodium ions contains . . .

- 1 0 mmol sodium ions.
- 2 25 mmol sodium ions.
- 3 50 mmol sodium ions.
- 4 100 mmol sodium ions.

5D If the water balance and the sodium ion balance of the body are not correct, . . .

- 1 enzymes will not work as effectively.
- 2 body cells will not work as efficiently.
- 3 body temperature will start to increase.
- 4 the kidneys will stop working.

Turn over for the next question

Turn over ►

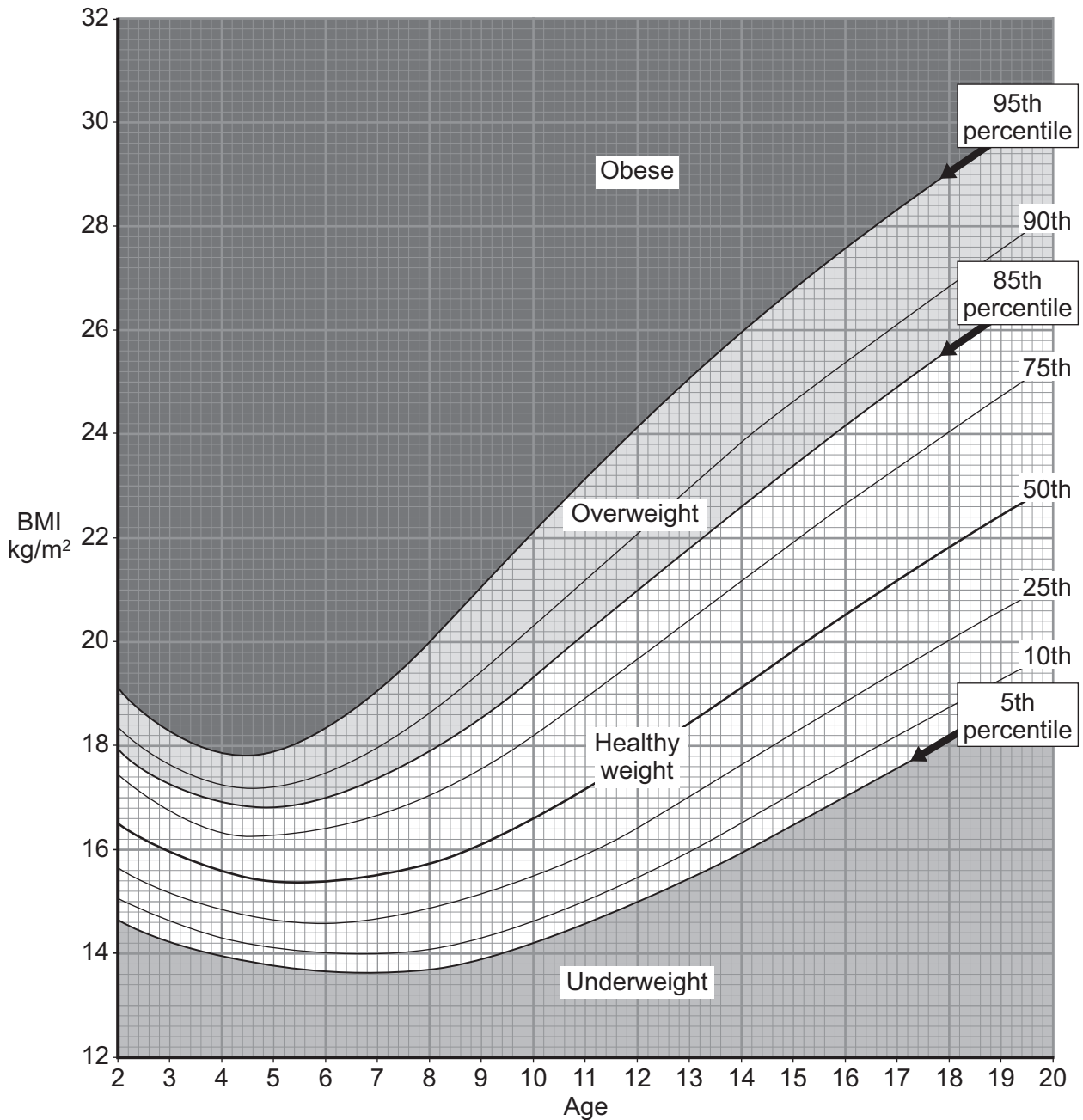
QUESTION SIX

Body mass index (BMI) is a reliable indicator of body fatness for most people.

BMI is a number calculated from a person's mass and height.

The BMI number is plotted on a BMI-for-age growth chart. This chart compares a young person's BMI number with the BMI numbers of other young people of the same sex and age.

The lines obtained by this method are called percentiles. The graph shows the BMI percentiles for males aged from 2 to 20.



6A A 10-year-old male with a BMI of 21 is . . .

- 1 obese.
- 2 overweight.
- 3 a healthy weight.
- 4 underweight.

6B An 18-year-old male on the 75th percentile is . . .

- 1 obese.
- 2 overweight.
- 3 a healthy weight.
- 4 underweight.

6C The formula for calculating BMI is $\text{mass} \div \text{height}^2$.

From the shape of the curves on the graph, we can see that between the ages of 2 and 4 . . .

- 1 height^2 and mass increase at the same rate.
- 2 height^2 increases faster than mass.
- 3 mass increases faster than height^2 .
- 4 a boy does not grow much.

6D The metabolic rate of a young male with a BMI of 34 is most probably . . .

- 1 lower than average.
- 2 greater than average.
- 3 about average.
- 4 about the same BMI as an adult.

QUESTION SEVEN

Some infections can be treated using antibiotics.

7A Antibiotics can . . .

- 1 relieve the symptoms of infectious diseases by acting as painkillers.
- 2 kill viruses inside body cells.
- 3 cause white blood cells to produce antibodies.
- 4 kill some strains of bacteria.

Often, a doctor will prescribe antibiotics for an ear infection the first time a child goes to the doctor with earache.

Scientists investigated 240 young children with earache to see if the antibiotic was really needed. Some of the children were given the antibiotic. Other children were given a placebo.

The results are shown in the table.

	Children given an antibiotic	Children given a placebo
Average time for which the child had a fever	2 days	3 days
Average time for which the child had severe pain	3 days	3 days
Average amount of painkilling medicine given in the first 10 days	2.3 doses	4.1 doses
Difference in the redness of the infected eardrum after 4 days	No difference between the two groups	
Difference in the redness of the infected eardrum after 11 days	No difference between the two groups	

7B Compared with the children given the placebo, the children given the antibiotic had . . .

- 1 fever and severe pain for a shorter time.
- 2 severe pain and painkilling medicine for a longer time.
- 3 less redness of the eardrum after 11 days.
- 4 no difference in the redness of the eardrum after 4 days and the period of severe pain.

-
- 7C** The best conclusion that can be drawn from these results is that children with ear infections . . .
- 1 should always be prescribed antibiotics.
 - 2 recover from all symptoms more quickly if given antibiotics.
 - 3 should be given a placebo on the first visit to a doctor.
 - 4 do **not** really need to be prescribed an antibiotic on the first visit to a doctor.

- 7D** Doctors are concerned that antibiotic resistance is increasing in some bacteria.

The increase is because . . .

- 1 antibiotics cause bacteria to mutate into resistant forms of bacteria.
- 2 bacteria mutate spontaneously, then antibiotics do not kill the resistant forms of the bacteria.
- 3 the strongest bacteria mutate into resistant forms of bacteria.
- 4 after being in contact with antibiotics, bacteria decide to mutate.

Turn over for the next question

Turn over ►

QUESTION EIGHT

After operations, patients can have large scars.

Scientists have developed a new drug. The drug can help to reduce scarring if it is injected during the operation.

The scientists carried out double-blind trials. The purpose of the trials was to find out how much of the drug should be injected to reduce scarring.

- Each patient in the trial had a large vein removed from their left leg and a large vein removed from their right leg.
- Two surgeons operated at the same time. One surgeon operated on the left leg and the other surgeon on the right leg.
- During the operation, a hospital researcher injected a dose of the drug into one of the patient's legs and a placebo into the other leg.

8A A double-blind trial was used so that . . .

- 1 the surgeons could operate on both legs at the same time.
- 2 neither surgeon nor patient could influence the outcome of the trial.
- 3 the hospital researchers would know into which leg to inject the drug.
- 4 equal amounts of the drug or the placebo were used.

8B One year after the operation, the hospital researchers measured and photographed the scars on both legs.

Which factor might have made the trial unreliable?

- 1 Both legs belonged to the same patient and so would have the same natural healing power.
- 2 The researcher did not know whether he was injecting the drug or the placebo.
- 3 Both legs were operated on at the same time.
- 4 Two different surgeons did the operations.

- 8C** In the year after the operation, each patient had to fill in some questionnaires. The patients also went back to the hospital to be examined. After all the testing was finished, the patient volunteers were paid £300 each.

Giving the volunteers £300 meant that . . .

- 1 the volunteers' opinions on the scars were unbiased.
- 2 the volunteers were more likely to complete all the requirements of the trials.
- 3 the risk of having the drug injected would be less.
- 4 the volunteers would say that the scar on the leg that had the drug injected would be smaller.

- 8D** Only a small quantity of this new drug is available at present.

In the circumstances, which of the following might people think is an unethical use of the drug?

- 1 using the drug on children in operations to correct inherited deformities
- 2 using the drug on patients that need a life-saving operation
- 3 using the drug on women in operations to increase the size of their breasts
- 4 using the drug on patients having operations after a car crash

Turn over for the next question

Turn over ►

QUESTION NINE

There are several ways of helping infertile women to become pregnant.

These include:

- IVF (in vitro fertilisation)
- FET – implanting frozen embryos from previous IVF treatments into the womb
- COH/IUI – treating the woman with ‘fertility drugs’ to release several eggs, then introducing sperm into the womb.

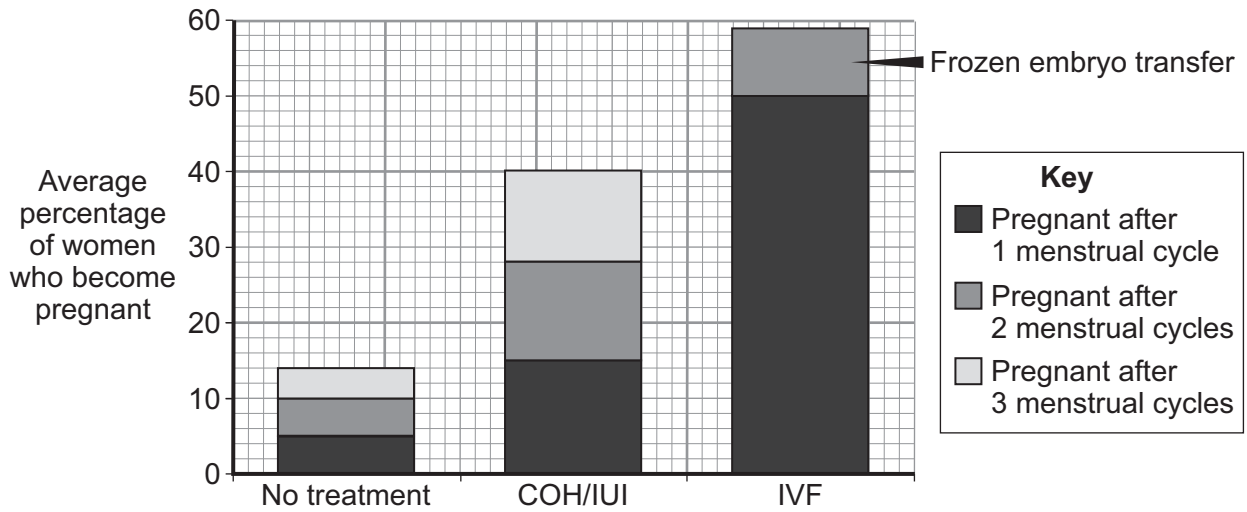
9A What is the main difference between COH/IUI and IVF?

- 1 Fertilisation takes place inside the woman in COH/IUI.
- 2 ‘Fertility drugs’ are not used in IVF.
- 3 Sperm are not used in IVF.
- 4 Embryos are not formed in COH/IUI.

9B Which hormones are normally used as ‘fertility drugs’?

- 1 FSH only
- 2 FSH and oestrogen
- 3 FSH and LH
- 4 LH and oestrogen

The graph shows the average percentage of women who become pregnant after one, two and three menstrual cycles.



9C IVF treatment increases the chance of getting pregnant after one menstrual cycle.

By how much does IVF treatment increase the chance?

- 1 4 times
- 2 5 times
- 3 10 times
- 4 60 times

9D What is the most likely reason for the higher success rate of IVF over COH/IUI?

- 1 More 'fertility drugs' are used in IVF.
- 2 Doctors can select the best embryos to use.
- 3 More eggs are produced in IVF.
- 4 Doctors can examine the sperm before they are used.

END OF TEST

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