Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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

Science A

Unit Biology B1a (Human Biology)

Biology

Unit Biology B1a (Human Biology)

BLY1AP

F&H

Tuesday 6 November 2012 Afternoon Session

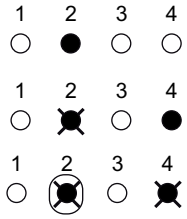
For this paper you must have:
- a black ball-point pen
- an objective test answer sheet.

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 14 of this booklet.

FOUNDATION TIER

Section One

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

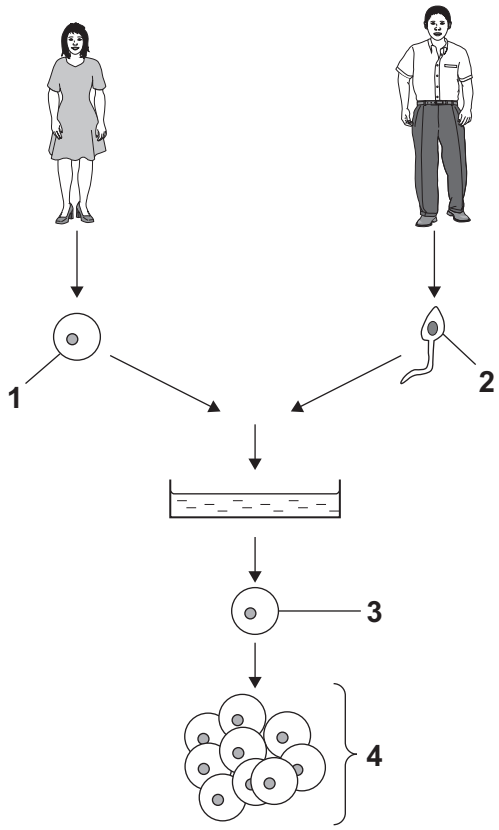
In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1**–**4**.

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

Mark your choices on the answer sheet.

QUESTION ONE

This question is about IVF (in vitro fertilisation).



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

A egg

B embryo

C fertilised egg

D sperm

QUESTION TWO

Many factors can cause diseases.

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

A arthritis

B diabetes

C heart disease

D high blood pressure

	Factor
1	blood sugar level is high in this disease
2	joints become worn in this disease
3	too much cholesterol causes this disease
4	too much salt in the diet causes this disease

Turn over for the next question

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** . . . .

Hormones control the total amount of water lost from the body.

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

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 or not the drug is allowed to be prescribed for people with AIDS will be made by . . . **4** . . . .

QUESTION FIVE

This question is about some substances taken into the body, or produced in the body, when we are ill.

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

A antibiotics

B antibodies

C painkillers

D toxins

	Feature
1	chemicals produced by white blood cells
2	drugs taken to kill bacteria in the body
3	drugs taken to relieve the symptoms of some diseases
4	chemicals produced by bacteria

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

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 is true, which animal is the most active?

1 rabbit

2 dolphin

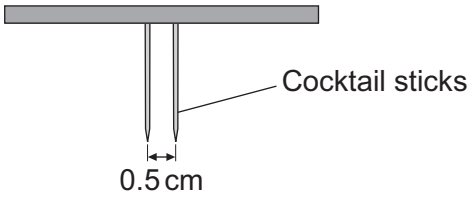
3 pig

4 cow

Turn over for the next question

QUESTION SEVEN

A class of 30 students did an investigation to find out how sensitive different parts of the body are to touch.



A student fixed the points of the two cocktail sticks 0.5 cm apart. He then pressed the sticks gently on different parts of the body of a blindfolded student. This was repeated with all 30 students.

The table below shows the number of students who were able to feel both points.

Part of the body tested	Number of students feeling both points
Forehead	15
Lip	27
Fingertip	29
Back of hand	14
Knee	9

7A What would be the best way to display these results?

1 a pie chart

2 a line graph

3 a bar chart

4 a scattergram

7B From these results, which part of the body is most sensitive to touch?

1 knee

2 fingertip

3 lip

4 forehead

7C Some parts of the body are more sensitive to touch than other parts of the body.

This is because in these parts the skin contains more . . .

1 cells.

2 hairs.

3 muscles.

4 receptors.

7D A different class of students repeated the same experiment and got similar results.

What does this suggest?

1 The students all have sensitive skin.

2 The data collected is reliable.

3 The students made errors when collecting their data.

4 The two classes should have tested different parts of the body.

Turn over for the next question

QUESTION EIGHT

Smoking cannabis may affect health.

8A Cannabis . . .

1 is a legal drug.

2 is a recreational drug.

3 contains nicotine.

4 is a **very** addictive drug.

The table shows the results of a survey about cannabis smoking and depression.

How many times cannabis was used in the past year	Men		Women	
	Number in survey	% who got depression	Number in survey	% who got depression
Fewer than 5	523	9	7	19
Between 5 and 50	60	10	46	17
1 to 4 times each week	73	12	32	31
Daily	73	15	37	68

8B 60 men in the survey used cannabis between 5 and 50 times per year.

How many of these men got depression?

1 6

2 10

3 50

4 70

8C Which pattern is shown by **all** the data in the table?

1 Cannabis has a greater effect on men than on women.

2 Cannabis has a greater effect on women than on men.

3 Men and women are affected equally by cannabis.

4 Increased use of cannabis always results in an increase in the percentage of users who get depression.

8D Which of the following is a true statement?

1 The data proves that smoking cannabis causes depression.

2 The data provides evidence of a link between smoking cannabis and depression.

3 The data shows that there is no link between smoking cannabis and depression.

4 There were not enough people in the survey to draw a reliable conclusion.

Turn over for the next question

QUESTION NINE

If you take in less energy than you use, you will lose weight.
A diet book claims that a low-carbohydrate diet results in quicker weight loss and a more healthy body than a low-fat diet.

Scientists did an investigation to see if this claim is true.

- They used 120 overweight volunteers divided into two equal groups.
- Both groups were allowed 2000 kilocalories per day.
- **Group 1** was given a diet containing less than 20 g of carbohydrate per day.
- **Group 2** was given a low-fat diet containing less than 30% of energy from fat and less than 300 mg of cholesterol per day.
- Both groups were given the same exercise programmes to do at home.
- Both groups went to a weekly information meeting.

9A In what way did the scientists plan a controlled investigation?

1 All volunteers were allowed the same amount of fat per day.

2 All volunteers had the same starting weight.

3 All volunteers were given a low-cholesterol diet.

4 All volunteers were allowed the same amount of energy per day.

The results after 24 weeks are shown in the table.

	Group 1 Low carbohydrate diet	**Group 2 Low fat diet**
Percentage of volunteers who completed the trial	76%	57%
Mean change in body mass	–12.9%	–6.7%
Mean change in body fat mass	–9.4 kg	–4.8 kg
Mean change in blood high-density lipoproteins (HDL) concentration	+ 55 mg per litre	–16 mg per litre
Mean change in blood low-density lipoproteins (LDL) concentration	+ 16 mg per litre	–74 mg per litre

9B The investigation would have been more reliable if all the volunteers . . .

1 had been allowed more energy per day.

2 had done the exercise programme under supervision.

3 had lost the same amount of mass.

4 had been given the same amount of cholesterol per day.

9C The difference in the mean change in blood HDL concentration between **Group 1** and **Group 2** was . . .

1 16 mg per litre.

2 39 mg per litre.

3 55 mg per litre.

4 71 mg per litre.

9D The data supports the diet book's claim because . . .

1 people on the low-carbohydrate diet had an increased blood LDL concentration.

2 people on the low-fat diet had a bigger decrease in blood HDL concentration.

3 people on the low-fat diet lost less body mass, on average.

4 more people on the low-carbohydrate diet completed the trial.

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

This question is about some substances taken into the body, or produced in the body, when we are ill.

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

A antibiotics

B antibodies

C painkillers

D toxins

	Feature
1	chemicals produced by white blood cells
2	drugs taken to kill bacteria in the body
3	drugs taken to relieve the symptoms of some diseases
4	chemicals produced by bacteria

QUESTION TWO

This question is about the effects of different substances on the body.

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

A carbon monoxide

B processed foods

C polyunsaturated fats

D nicotine

	Effect
1	may lead to low birth mass
2	may lead to increased blood pressure
3	may reduce blood cholesterol levels
4	may lead to addiction

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

Smoking cannabis may affect health.

3A Cannabis . . .

1 is a legal drug.

2 is a recreational drug.

3 contains nicotine.

4 is a **very** addictive drug.

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3B 60 men in the survey used cannabis between 5 and 50 times per year.

How many of these men got depression?

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2 10

3 50

4 70

3C Which pattern is shown by **all** the data in the table?

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4 Increased use of cannabis always results in an increase in the percentage of users who get depression.

3D Which of the following is a true statement?

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Turn over for the next question

QUESTION FOUR

If you take in less energy than you use, you will lose weight.
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- Both groups were given the same exercise programmes to do at home.
- Both groups went to a weekly information meeting.

4A In what way did the scientists plan a controlled investigation?

1 All volunteers were allowed the same amount of fat per day.

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3 All volunteers were given a low-cholesterol diet.

4 All volunteers were allowed the same amount of energy per day.

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4B The investigation would have been more reliable if all the volunteers . . .

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4C The difference in the mean change in blood HDL concentration between **Group 1** and **Group 2** was . . .

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4D The data supports the diet book's claim because . . .

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2 people on the low-fat diet had a bigger decrease in blood HDL concentration.

3 people on the low-fat diet lost less body mass, on average.

4 more people on the low-carbohydrate diet completed the trial.

Turn over for the next question

QUESTION FIVE

5A During a race, a runner produces a lot of sweat.

This can be dangerous because . . .

1 less water is lost as urine because of an increase in sweating.

2 less energy is available for running, because more energy is used to cool the body.

3 the ion concentration in the blood rises because more water is lost by increased sweating.

4 the rates of chemical reactions in the body decrease.

5B Carbohydrates are needed in sports drinks to . . .

1 replace the ions lost in sweat during a race.

2 replace the sugars used in energy release during the race.

3 balance the amount of water lost in sweat during the race.

4 increase the growth of muscle during a race.

The table shows the composition of four different sports drinks, **P**, **Q**, **R** and **S**.

Drink	Glucose in g per dm^3	Ions in mg per dm^3	Fats in mg per dm^3	Protein in g per dm^3
P	110	23	0	1.2
Q	68	96	0.1	0
R	78	82	0.3	0
S	136	25	0	0.2

5C During a race, a runner drinks 5 bottles of drink **Q**. Each bottle contains 0.5 dm^3 of the drink.

Which row of the table below correctly shows his intake of glucose and ions?

	Intake of glucose in g	Intake of ions in mg
1	17	24
2	65	95
3	170	240
4	272	384

5D One factor affecting the rate of uptake of ions from a sports drink into an athlete's blood is the ratio of the ion concentration to the glucose concentration. The nearer this ratio is to 1:1 the greater the rate of ion uptake from the drink.

Considering **only** this factor, from which drink would the rate of ion uptake be the greatest?

1 **P**

2 **Q**

3 **R**

4 **S**

QUESTION SIX

This question is about reflex actions.

6A Which of the following describes reflex actions the best?

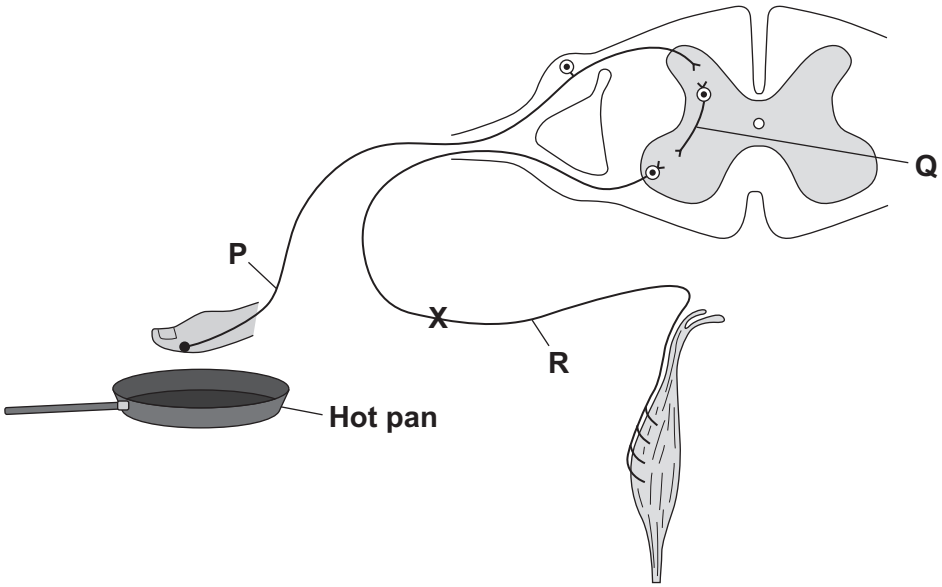
1 They are coordinated by both the brain and the spinal cord.

2 They are rapid, voluntary responses to a stimulus.

3 They involve receptors, effectors and neurones.

4 They always involve receptors and muscles.

A person accidentally touches a hot pan.
Her hand automatically moves away from the pan.
The diagram shows the parts involved in this action.



6B What types of neurone are **P** and **R**?

1 **P** is a relay neurone, **R** is a sensory neurone

2 **P** is a motor neurone, **R** is a sensory neurone

3 **P** is a sensory neurone, **R** is a relay neurone

4 **P** is a sensory neurone, **R** is a motor neurone

6C Which row in the table shows how information passes from neurone **P** to neurone **Q** and from neurone **Q** to neurone **R**?

	From P to Q	From Q to R
1	chemical	impulse
2	impulse	impulse
3	chemical	chemical
4	impulse	chemical

6D In an accident, neurone **R** was cut at the point labelled **X**.

How would this affect the person?

1 The stimulus would still be detected and the muscle would contract.

2 The stimulus would still be detected but the muscle would **not** contract.

3 The stimulus would **not** be detected and the muscle would **not** contract.

4 The stimulus would **not** be detected but the muscle would contract.

Turn over for the next question

QUESTION SEVEN

Measles is now an uncommon disease because millions of children have been given the MMR vaccine.

7A Measles vaccine contains . . .

1 antibodies.

2 antibiotics.

3 white blood cells.

4 a weakened virus.

7B If a child catches measles and then recovers, that child will **not** catch measles again because . . .

1 the child can be vaccinated.

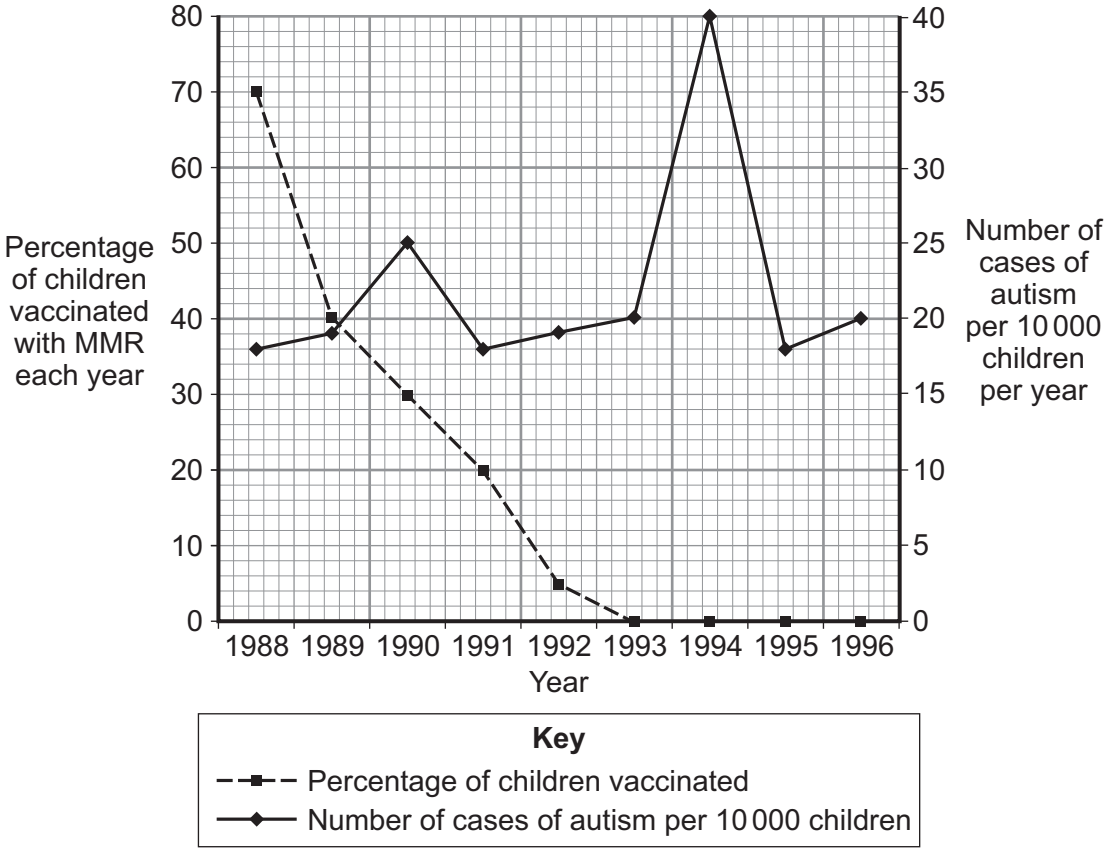
2 all the antibodies the child produced will remain in the blood.

3 white blood cells will quickly produce the same antibodies again.

4 white blood cells will surround the virus.

MMR vaccination began in Japan in 1988. There was concern about a possible link between MMR and autism, so MMR vaccination ended in 1993.

The graph shows the percentage of children vaccinated with MMR and the number of children developing autism.



7C How many cases of autism would be expected in a city with a population of 50 000 children in 1990?

1 25

2 30

3 125

4 250

7D Does the data in the graph suggest that the MMR vaccine was causing autism?

1 Yes, because the number of cases of autism decreased when the vaccination rate decreased.

2 Yes, because the rate of autism increased even when no MMR was given.

3 No, because the two graphs cross in 1989.

4 No, because the rate of autism increased after the MMR vaccination had stopped.

QUESTION EIGHT

Some crocodiles live in lakes in Africa. These lakes may contain rotting meat and vegetation.

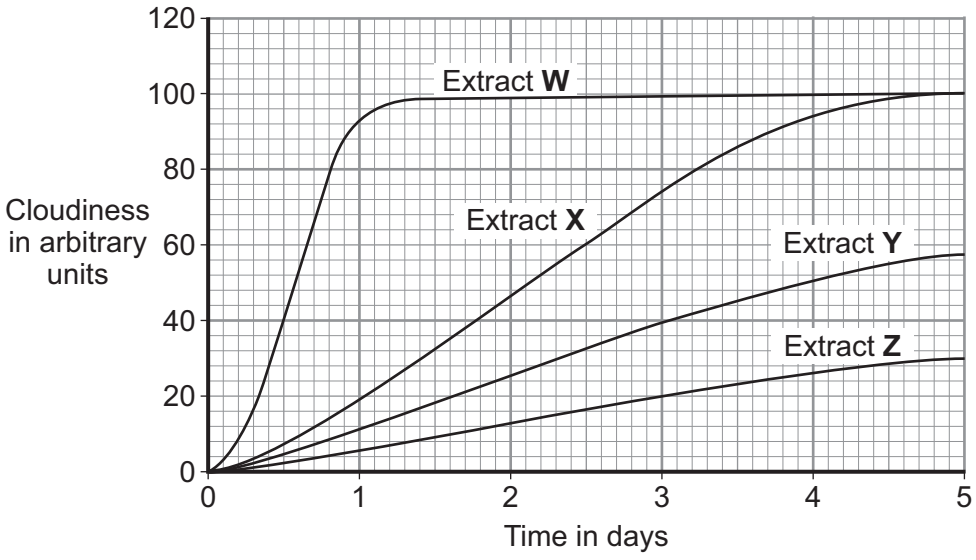
- Crocodiles often get cuts. These cuts do not get infected very often.
- When local people bathe in the same lakes, **their** cuts often become infected.

8A Which row in the table correctly identifies the two statements?

	Cuts on crocodiles rarely become infected	**Cuts on local people often become infected**
1	Theory	Hypothesis
2	Hypothesis	Theory
3	Observation	Observation
4	Hypothesis	Observation

- A researcher took a sample of crocodile blood and made four extracts, **W**, **X**, **Y** and **Z**, from the blood.
- He added these extracts to MRSA bacteria in tubes of nutrient solution.
- The tubes were kept in a warm place for five days.
- When bacteria grew, the nutrient solution went cloudy.

The graph shows how the cloudiness of the nutrient solutions changed over the five days.



8B The researcher decided to purify one of the extracts to isolate the bacteria-killing chemical.

Which extract would he be most likely to choose to purify?

1 Extract **W**

2 Extract **X**

3 Extract **Y**

4 Extract **Z**

8C After several pure chemicals had been isolated from one extract, the chemicals were trialled.

The table shows four stages in the trialling of a new chemical.

Stage	Trialled on
P	human volunteers who do not have a disease
Q	cell cultures
R	animals
S	humans who do have a disease

Which is the correct sequence for these stages?

1 **R** $\rightarrow$ **S** $\rightarrow$ **Q** $\rightarrow$ **P**

2 **Q** $\rightarrow$ **P** $\rightarrow$ **S** $\rightarrow$ **R**

3 **Q** $\rightarrow$ **R** $\rightarrow$ **P** $\rightarrow$ **S**

4 **S** $\rightarrow$ **P** $\rightarrow$ **R** $\rightarrow$ **Q**

8D Volunteers in trials of new chemicals . . .

1 should always be paid for taking part.

2 should always be told about the risks of side-effects.

3 should be able to choose whether to take the new chemical or a placebo.

4 should be told whether they have been given the placebo or the new chemical.

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 inserting sperm into the womb.

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

1 Fertilisation happens 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'?

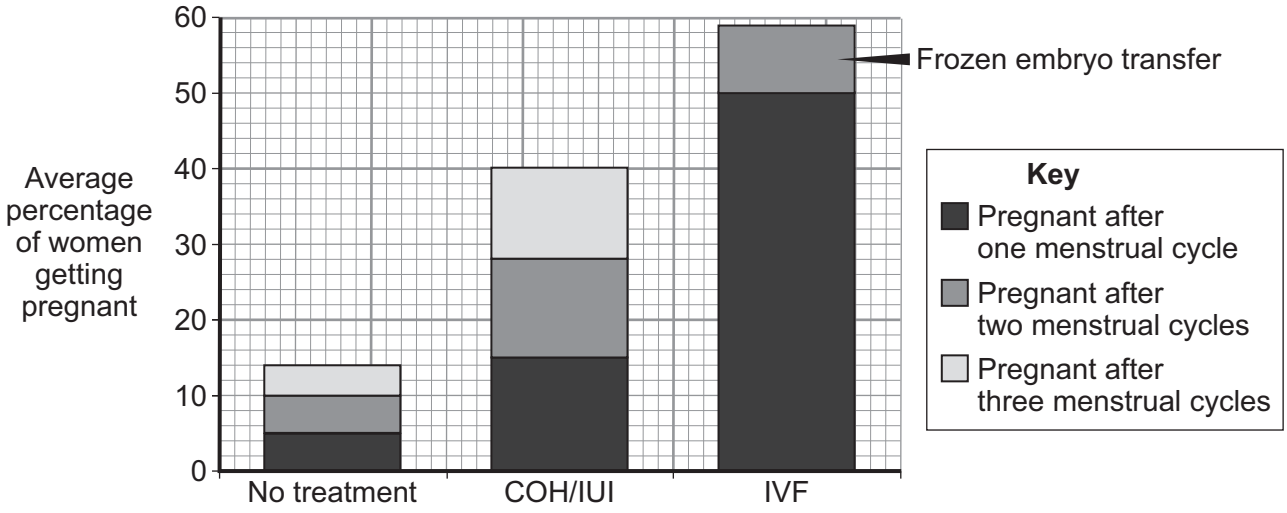
1 FSH only

2 FSH and oestrogen

3 FSH and LH

4 LH and oestrogen

The graph shows the average percentage of women getting 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 probable reason for the higher success rate of IVF compared with COH/IUI?

1 More 'fertility drugs' are used in IVF.

2 Doctors can choose the best embryos to use.

3 More eggs are produced in IVF.

4 Doctors can examine the sperm before the sperm are used.

END OF TEST

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