CCEA GCSE BIOLOGY

BIOLOGY



EXAM QUESTION PACK

UNIT 2 FOUNDATION TIER GBY21 PAPERS

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Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2016

Biology

Unit 2
Foundation Tier

GBY21

[GBY21]

FRIDAY 17 JUNE, MORNING

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in blue or black ink only. **Do not write with a gel pen.**
Answer **all fourteen** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is **90**.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **14**.

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1 Look at the words in the box.

surgery	**container**	**uncontrolled**	**capsule**
X-rays	**uneven**	**malignant**	**controlled**

Use words from the box to **complete the sentences**.

Cancer is _____ cell division.

Cancer can result in two types of tumour.

Tumours can be benign or _____ .

Benign tumours are surrounded by a _____ and can be

easily removed by _____ . [4]

2 Arteries, veins and capillaries carry blood around the body.

(a) **(i)** Which type of blood vessel carries blood away from the heart?

_____ [1]

(ii) Which type of blood vessel has walls which are one cell thick?

_____ [1]

(b) Explain why veins have valves.

_____

_____ [1]

(c) Explain why an artery has a thick layer of muscle.

_____

_____ [1]

(d) Name the vein which carries blood from the lungs to the heart.

_____ [1]

[Turn over

3 There are a number of ways to measure growth.

(a) **Draw lines** to link each organism to the **best** method of measuring its growth.

Organism	Method of measuring growth
Mouse	Count number of cells
Yeast	Measure length
	Dry mass

[2]

The photographs show an oven and a balance.

oven



© Principal Examiner



balance

© jauhari1 / iStock / Thinkstock

(b) This apparatus can be used to measure the dry mass of a plant.

Describe how.

_____

_____

_____

_____

_____

_____ [3]

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4 The photograph shows a girl rolling her tongue.



© Herve Conge, ISM / Science Photo Library

Tongue rolling is controlled by a gene.

(a) What is a gene?

_____

_____ [1]

The gene for tongue rolling has two alleles.

The allele for tongue rolling **(R)** is dominant to the allele for non-rolling **(r)**.

(b) (i) **Complete the Punnett square** to show the possible children of two people who can roll their tongue.

		Mother	
	Gametes	**R**	**r**
Father	**R**		Rr
	r		rr

[2]

(ii) Draw a (circle) around the genotype of the homozygous recessive child. [1]

(iii) What proportion of the children could be heterozygous?

_____ [1]

[Turn over

5 **(a)** A group of Year 10 pupils carried out a survey of their class.

The numbers of tongue rollers and non-rollers were counted.

The table shows the results.

Number of pupils	
Tongue rollers	**Non-rollers**
17	3

(i) Suggest which type of graph should be used to present these results.

Draw a (circle) around the correct answer.

bar chart **histogram** **scatter graph** [1]

The pupils could have made the results of the survey more reliable.

(ii) Describe how.

_____ [1]

(b) Tongue rolling is an example of variation.

(i) Name this **type** of variation.

_____ [1]

Tongue rolling is controlled by genes.

Height can also be controlled by genes.

(ii) Give **one other** cause of variation in height.

_____ [1]

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6 Secondary sexual characteristics develop in girls and boys during puberty.

The development of these characteristics is caused by chemicals released from the reproductive organs.

(a) What **type** of chemical causes the development of secondary sexual characteristics?

_____ [1]

The chemical released in girls is oestrogen.

(b) Where in the girl's reproductive system is oestrogen produced?

_____ [1]

(c) Name the chemical which causes secondary sexual characteristics to develop in boys.

_____ [1]

(d) **(i)** Describe **one** secondary sexual characteristic which develops **only** in **boys**.

_____

_____ [1]

(ii) Describe **one** secondary sexual characteristic which develops **only** in **girls**.

_____

_____ [1]

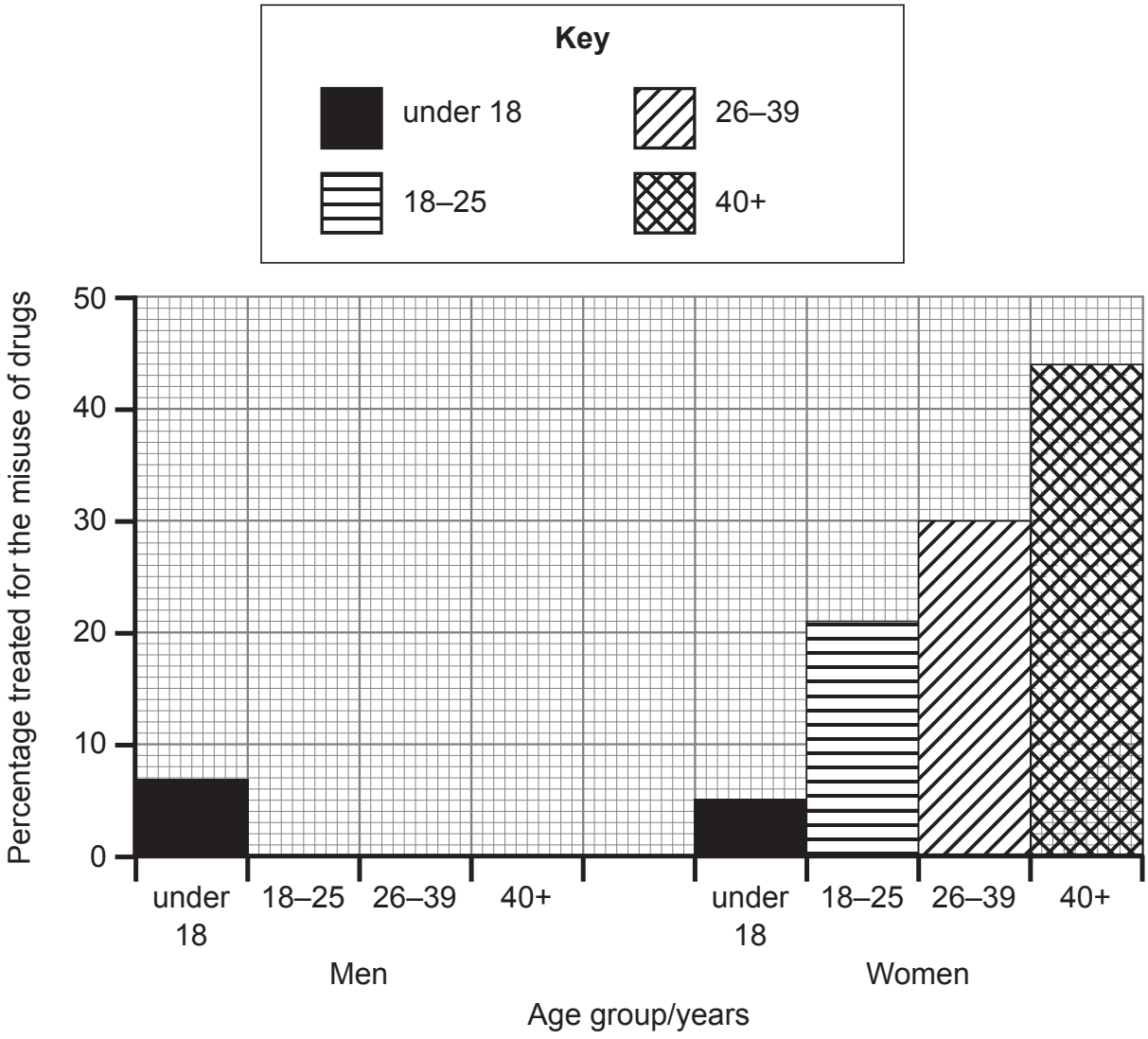
[Turn over

7 The number of men and women treated for the misuse of drugs was recorded in Northern Ireland between April 2013 and March 2014.

The table and the graph compare the age groups of those men and women treated for the misuse of drugs.

Age group/years	Percentage of men treated for the misuse of drugs	Percentage of women treated for the misuse of drugs
Under 18	7	5
18–25	36	21
26–39	39	30
40+	18	44

Statistics from Northern Ireland Drug Misuse Database 1 April 2013 – 31 March 2014. © Crown Copyright - Contains public sector information licensed under the Open Government Licence v3.0.



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(a) (i) **Complete the graph** for the percentage of **men** treated for the misuse of drugs.
The first bar has been drawn for you. [3]

Look at the graph.

(ii) Describe the trend in the age of men treated for the misuse of drugs.

_____

_____

_____ [2]

Look at the results for people **under 40 years of age**.

(b) How does the **total** percentage of men under the age of 40 years treated for the misuse of drugs compare to the total percentage of women under the age of 40 years treated for the misuse of drugs?

Use data for the percentage of under 40 year olds to support your answer.

_____

_____

_____ [2]

[Turn over

8 **(a)** Penicillin is an antibiotic.

It was discovered by Alexander Fleming.

(i) **Choose** the **two** scientists who developed penicillin for large-scale production.

Draw a (circle) around the **two** correct answers.

Florey **Watson** **Crick** **Chain** **Wilkins** **Chargaff** [2]

(ii) Name the type of organism that produces penicillin.

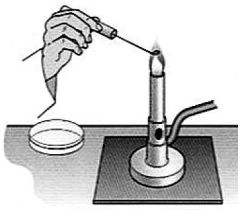
_____ [1]

A patient suffering from a throat infection had a sample of bacteria taken from his throat by a nurse.

The bacteria in the sample were inoculated on to a Petri dish of sterile agar in the hospital laboratory.

The diagrams show some of the aseptic techniques used during inoculation.

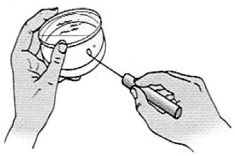
(b) Explain the reason for each aseptic technique.



Flame inoculating loop.

_____

_____ [1]



Do not completely remove lid.

_____

_____ [1]



Wash hands after inoculation.

_____

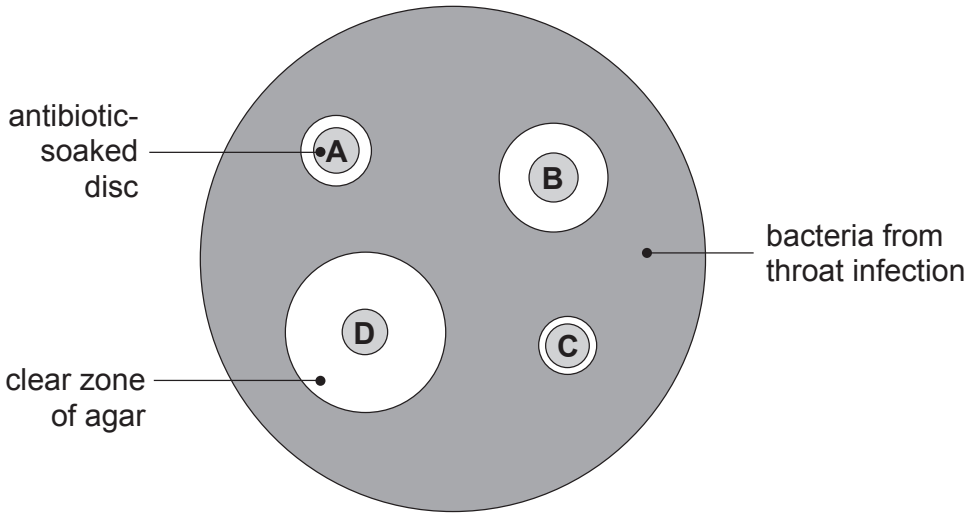
_____ [1]

© 'Biology for You' by Gareth Williams, Page 348, (Nelson Thornes, 2006), illustrations copyright
© Gareth Williams and Nelson Thornes 2006, reprinted by permission of the publishers, Oxford University Press

Filter paper discs were soaked in four different antibiotics, A, B, C and D.

These discs were then placed on the bacteria growing on the agar in the Petri dish.

The diagram shows the Petri dish after it was incubated for 48 hours .



The area of the clear zone around each antibiotic-soaked disc was measured.

The table shows the results .

Antibiotic disc	Area of clear zone /mm²
A	79
B	177
C	50
D	380

Look at the results.

(c) Suggest which antibiotic a doctor should prescribe for the patient suffering from this throat infection.
Give **data** from the table to help explain your answer.

Antibiotic _____

Explanation _____

_____

_____

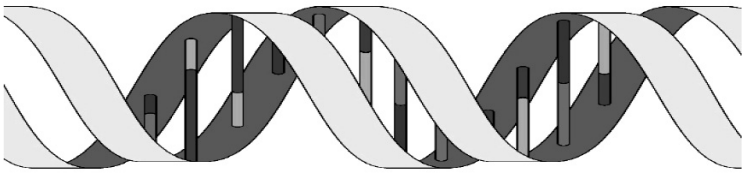
_____ [3]

[Turn over

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9 The diagram shows part of a molecule.

This molecule is found in the nucleus of cells.



Source: CCEA

Look at the diagram.

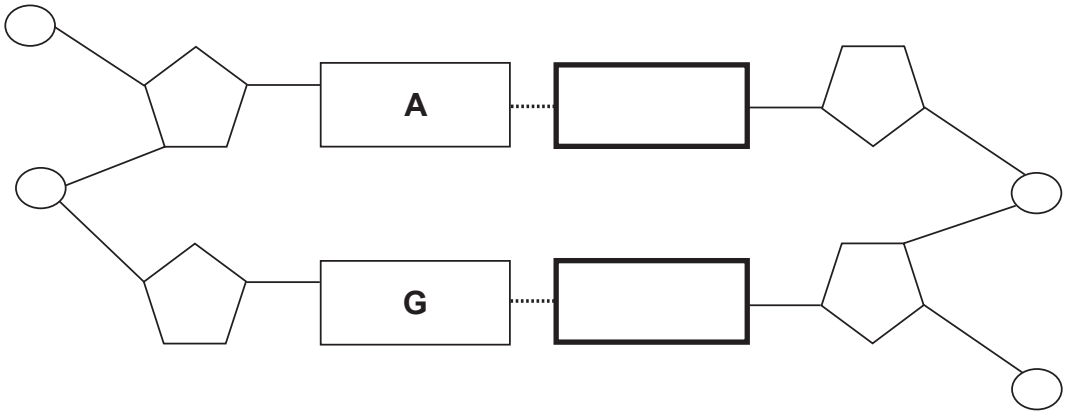
(a) (i) Name this molecule.

_____ [1]

(ii) What term is used to describe the shape of this molecule?

_____ [1]

The diagram shows a section of this molecule.



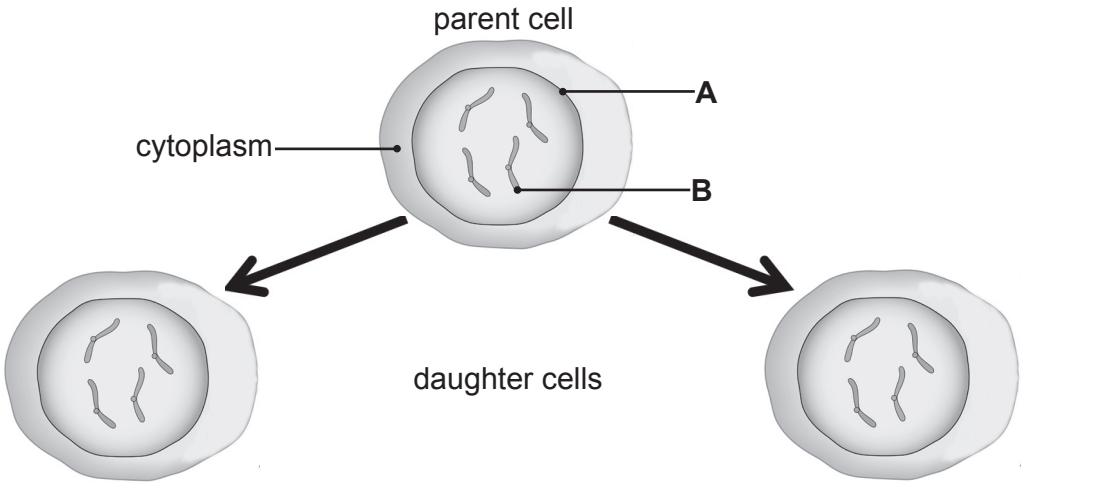
Look at the diagram.

(b) (i) Draw a (circle) around a sugar in this molecule. [1]

(ii) **A** and **G** are bases.
Complete the diagram by writing the letter for each matching base in the empty boxes. [2]

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(c) The diagram shows a parent cell which has divided by mitosis to produce two daughter cells.



© Dorling Kindersley / Thinkstock

(i) Name **A** and **B**.

A _____ [1]

B _____ [1]

The daughter cells are clones.

(ii) **Use evidence from the diagram** to explain what is meant by a clone.

_____

_____

_____ [2]

(d) **Complete the table** to compare the daughter cells produced when **this parent** cell divides by mitosis and meiosis.

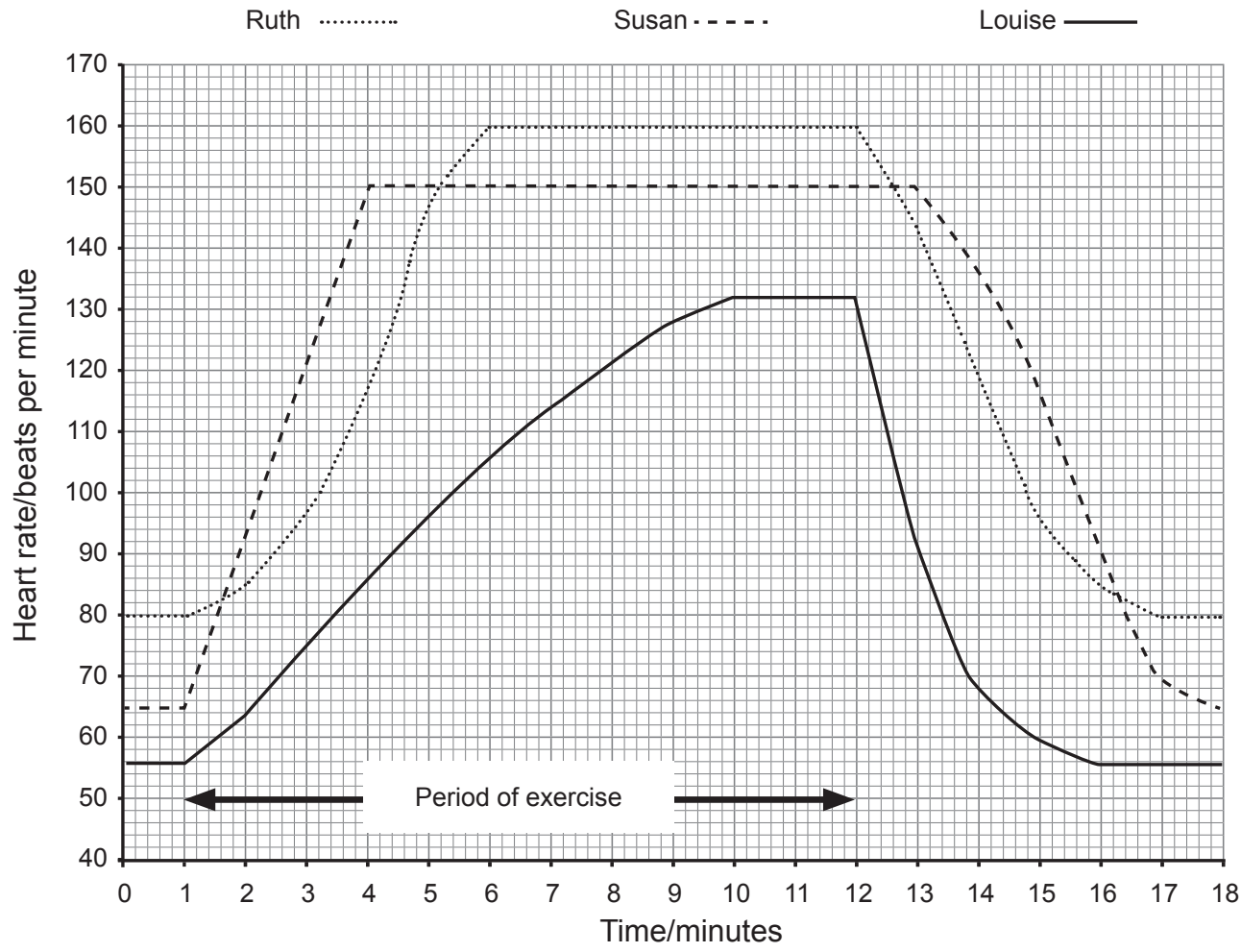
	Mitosis	**Meiosis**
Number of daughter cells	2	
Number of chromosomes in each daughter cell	4	

[2]

[Turn over

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10 The graph shows the effect of exercise on the pulse rate of three students.



10146

(a) Suggest which student is likely to have trained regularly.

Give **two** reasons for your choice.

Include **data** from the graph with each reason.

Student _____ [1]

Reason 1 _____

_____

_____ [2]

Reason 2 _____

_____

_____ [2]

(b) Give **one** way the heart benefits from regular exercise.

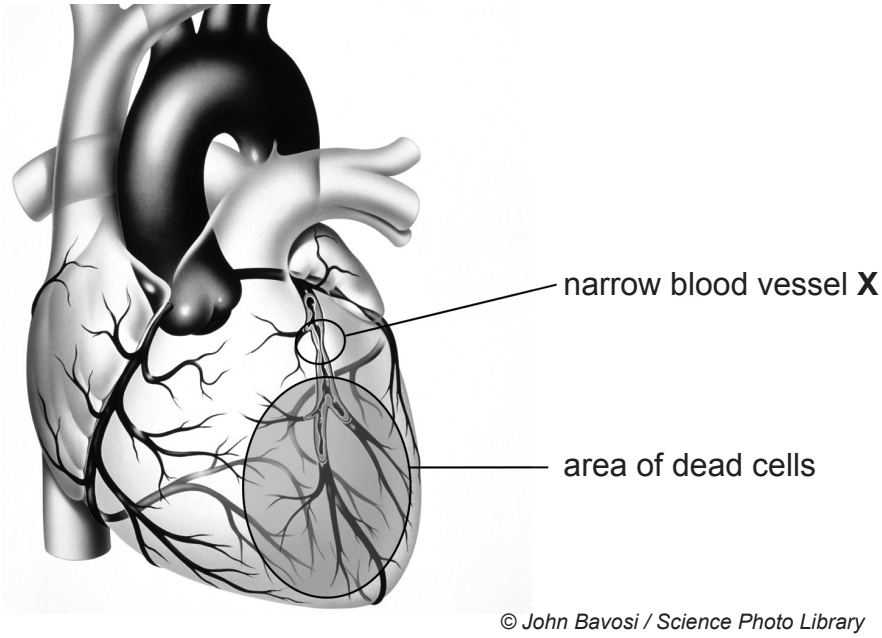
_____

_____ [1]

[Turn over

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(c) The diagram shows part of a heart after a heart attack.



© John Bavosi / Science Photo Library

(i) Name blood vessel **X**.

_____ [1]

(ii) Suggest which type of chamber is affected by this heart attack.

_____ [1]

(iii) This heart attack was caused by the inside of blood vessel **X** becoming blocked.

Suggest what caused this blockage.

_____ [1]

(iv) Explain what caused the area of dead cells.

_____

_____

_____

_____

_____

_____ [3]

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11 The table gives information on some diseases caused by microorganisms.

Complete the table.

Disease	Type of microorganism	How disease is spread	Prevention
Measles		Droplet infection	
Athlete's foot		Contact	Wearing flip flops in a swimming pool area
	Bacterium	Eating contaminated food	Cook food thoroughly
Chlamydia	Bacterium		Use a condom

[5]

[Turn over

12 A group of students used a weight potometer to investigate the water loss of three different plants after 5 days.

The table shows the results.

Plant	Loss in mass after 5 days /g	Average rate of water loss /g per day
A	8.0	
B	10.0	2.0
C	5.0	1.0

Adapted from: www.teamsciencerocks.com

(a) **Complete the table** by calculating the average rate of water loss for plant **A**.

Show your working.

[2]

(b) Suggest two **environmental** factors the students should have controlled during this investigation.

1. _____

_____ [1]

2. _____

_____ [1]

The students then counted the number of stomata found on the leaves of each plant.

They calculated the average number of stomata per mm^2.

The table shows the results.

Plant	Average number of stomata per mm^2 of leaf surface
A	51
B	74
C	18

(c) Use data from **both tables** to describe and explain the results of the investigation.

_____

_____

_____

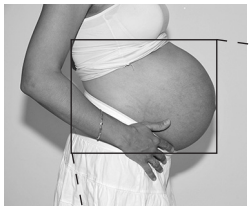
_____

_____

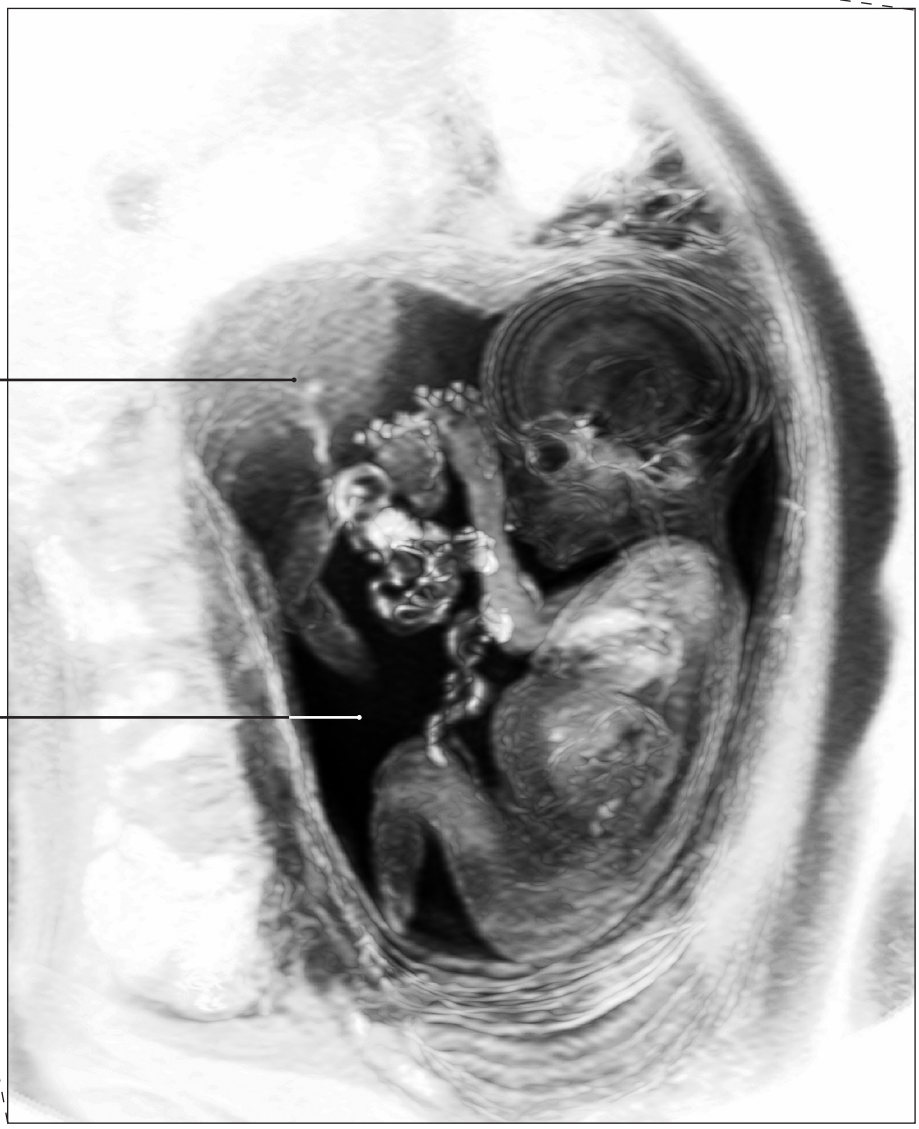
_____ [4]

[Turn over

13 The photographs show a pregnant woman and the scan of her foetus.



© Ghislain & Marie David De Lossy / Science Photo Library



© Du Cane Medical Imaging Ltd / Science Photo Library

Look at the photographs.

(a) **(i)** Name the liquid found in space **A**.

_____ [1]

(ii) Explain how the liquid in space **A** protects the foetus.

_____

_____ [1]

(b) The function of the placenta is to exchange dissolved substances between the mother and the foetus.

(i) Explain how the structure of the placenta is adapted for this function.

_____

_____ [1]

(ii) Name **one** substance that is exchanged from the foetus to the mother.

_____ [1]

[Turn over

14 The table shows the chance of pregnancy occuring when using different types of contraception.

Type of contraception	Chance of pregnancy
Surgical	1 in 200
Mechanical	10 in 200
Chemical	2 in 200

An implant is a contraceptive device that works in a similar way to the pill.

It involves a small tube inserted under the skin in the upper arm of the woman.

This tube slowly releases chemicals.

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Use the information and your knowledge to answer the following questions.

- What type of contraceptive is the implant?
- Describe how the chance of pregnancy using an implant compares to surgical and mechanical types of contraception given in the table.
- Suggest **two other** advantages and **one** disadvantage of using this method when compared to the others.

In this question you will be assessed on your written communication skills, including the use of specialist scientific terms.

[6]

DO NOT WRITE ON THIS PAGE

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
Total Marks	

Examiner Number

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Rewarding Learning

General Certificate of Secondary Education
2016

GCSE Biology

Unit 2

Foundation Tier

[GBY21]

FRIDAY 17 JUNE, MORNING

MARK SCHEME

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General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

				AVAILABLE MARKS
1	uncontrolled; [1] malignant; [1] capsule; [1] surgery; [1]		[4]	4
2	**(a)**	**(i)** Artery;	[1]	
		(ii) Capillary;	[1]	
	(b)	Prevent backflow/maintain blood flow in one direction [/towards heart];	[1]	
	(c)	Withstand [high] pressure of blood;	[1]	
	(d)	Pulmonary (vein);	[1]	5
3	**(a)**	Mouse → Length, Yeast → count number of cells,	[2]	
	(b)	Any **three** from: Weigh on balance; Dry in oven; Reweigh/weigh to constant mass; Calculate difference in mass;	[3]	5
4	**(a)**	Short length of DNA;	[1]	
	(b)	**(i)** RR; [1] Rr/rR; [1]	[2]	
		(ii) Circle drawn around **rr**;	[1]	
		(iii) Half/50%	[1]	5
5	**(a)**	**(i)** Bar chart;	[1]	
		(ii) Survey more pupils;	[1]	
	(b)	**(i)** Discontinuous;	[1]	
		(ii) Environment/diet;	[1]	4
6	**(a)**	Hormone;	[1]	
	(b)	Ovary;	[1]	
	(c)	Testosterone;	[1]	
	(d)	**(i)** Body more muscular/voice deepens/enlargement of penis;	[1]	
		(ii) Pelvis and hips widen/breasts develop/menstruation;	[1]	5

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					AVAILABLE MARKS
7	**(a)**	**(i)**	Accurate plots [2]; correct use of key [1];	[3]	
		(ii)	[Percentage treated] increases with age [up to 39]; [1] Then decreases; [1]	[2]	
	(b)		more men; [1] 82% males and 56% females; [1]	[2]	7
8	**(a)**	**(i)**	Florey; [1] Chain; [1]	[2]	
		(ii)	Fungus;	[1]	
	(b)		Sterilised/heat kills bacteria; Prevent entry of microbes; Prevent spread of infection;	[3]	
	(c)		Antibiotic D; [1] 380 mm^2; [1] Kills most bacteria; [1]	[3]	9
9	**(a)**	**(i)**	DNA/deoxyribonucleic acid	[1]	
		(ii)	Double helix; [1]	[1]	
	(b)	**(i)**	Circle drawn around a sugar; [1]	[1]	
		(ii)	T; [1] C; [1]	[2]	
	(c)	**(i)**	**A** – nuclear membrane; [1] **B** – chromosome; [1]	[2]	
		(ii)	Same number/4 chromosomes; [1] Identical; [1]	[2]	
	(d)		4; [1] 2; [1]	[2]	11

				AVAILABLE MARKS
10	**(a)**	Louise; [1] Any **two** pairs of points from: • Lower heart rate at rest; 56 bpm; • Slower/more time to reach maximum heart rate; 9 mins/3 to 12 mins/at 12 mins; **or** • Lower maximum heart rate; 132 beats per min; **or** • Faster return to resting/starting rate; 4 min/14 to 18 min/at 18 min; [4]	[5]	
	(b)	Strengthened heart muscle/increased cardiac output;	[1]	
	(c)	**(i)** Coronary artery;	[1]	
		(ii) Ventricle;	[1]	
		(iii) Clot/build up of fat/cholesterol;	[1]	
		(iv) No blood flow; [1] No oxygen/sugar to cells; [1] Cells cannot respire/release energy; [1]	[3]	12
11		Virus; [1] Vaccination; [1] Fungus; [1] Salmonella; [1] Sexual intercourse; [1]	[5]	5
12	**(a)**	8 ÷ 5; [1] 1.6; [1]	[2]	
	(b)	Any **two** from: wind [speed]; Temperature; Humidity/light; Size of plant;	[2]	
	(c)	B – highest water loss of 2g per day; [1] B – largest number of stomata – 74; [1] (More) water transpires/diffuses [1] through the stomata; [1] **Accept:** converse for C	[4]	8
13	**(a)**	**(i)** Amniotic fluid;	[1]	
		(ii) Cushions the foetus;	[1]	
	(b)	**(i)** Large surface area/villi; good blood supply; thin membrane	[1]	
		(ii) Carbon dioxide/nitrogen wastes;	[1]	4

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14 Indicative Content

1. Chemical;
2. Less chance of pregnancy than mechanical type;
3. More chance of pregnancy than surgical types;

4 **and** 5. **Maximum of two** from:

- Convenient;
- Reversible;
- Does not interrupt sexual intercourse;
- Less risk than surgery;
- Reduces bleeding;

6. **One** from:
   May increase risk of blood clotting/may cause headaches/may cause tender breasts;

Accept: bullet points which start with capital letter, contain a verb and end in full stop as sentences.

Band	Response	Mark
A	Candidates **must use appropriate, specialist terms** throughout **using <u>five</u> of the above points**. They use **good** spelling, punctuation and grammar and the form and style are of a **high standard**.	[5]–[6]
B	Candidates **use some appropriate, specialist terms** throughout **using <u>three</u> of the above points**. They use **satisfactory** spelling, punctuation and grammar and the form and style are of a **satisfactory standard**.	[3]–[4]
C	Candidates **make little use of specialist terms** throughout **using some or all of the above points**. The spelling, punctuation and grammar, form and style are of a **limited** standard.	[1]–[2]
D	Response not worthy of credit.	[0]

[6] 6

Total **90**

AVAILABLE MARKS

Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2015

Biology

Unit 2
Foundation Tier

GBY21

[GBY21]

MONDAY 15 JUNE, MORNING

TIME

1 hour 30 minutes.

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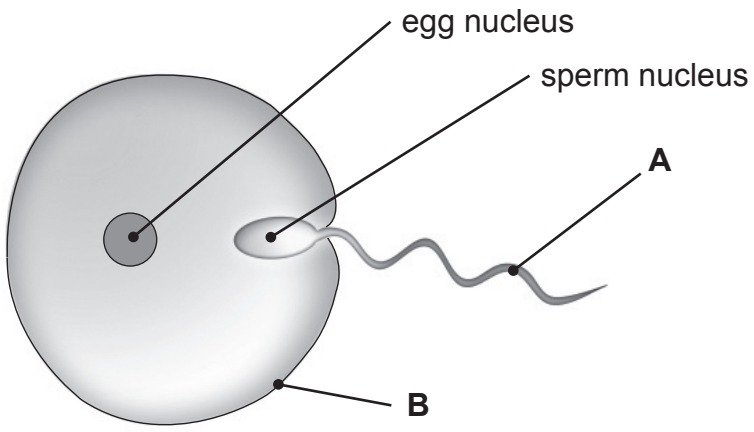
INFORMATION FOR CANDIDATES

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Quality of written communication will be assessed in Question **14**.

24GBY2101

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1 The diagram shows an egg and a sperm just before fertilisation.



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Look at the diagram.

(a) (i) Label parts **A** and **B**.

A _____ [1]

B _____ [1]

(ii) What is the function of part **A**?

_____ [1]

(b) In which part of the female reproductive system does fertilisation take place?

_____ [1]

(c) Name the cell produced by fertilisation.

Put a circle around the correct answer.

foetus **zygote** **embryo** [1]

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2 Diseases caused by microorganisms are spread and prevented in different ways.

Draw lines to link each type of microorganism to **one** correct statement about it.

Type of microorganism	Statement about microorganisms
	Cause of rubella
Cold virus	Prevented by cooking food thoroughly
Salmonella	Cause of athlete's foot
Fungus	Spread by droplet infection
HIV	Prevented by vaccination
	Spread by sharing dirty needles or sexual intercourse

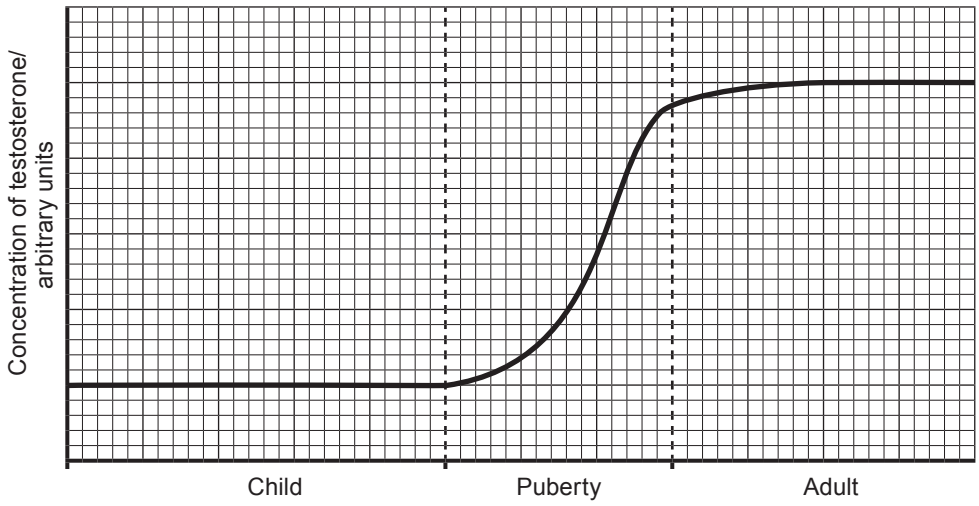
[4]

3 Testosterone is a sex hormone found in males.

(a) Name the organ that produces testosterone.

_____ [1]

(b) The graph shows changes in the concentration of testosterone in a male.



© CCEA

Look at the graph.

(i) Describe the changes in the concentration of testosterone.

_____

_____

_____

_____ [3]

(ii) During puberty testosterone brings about changes in a male's body.

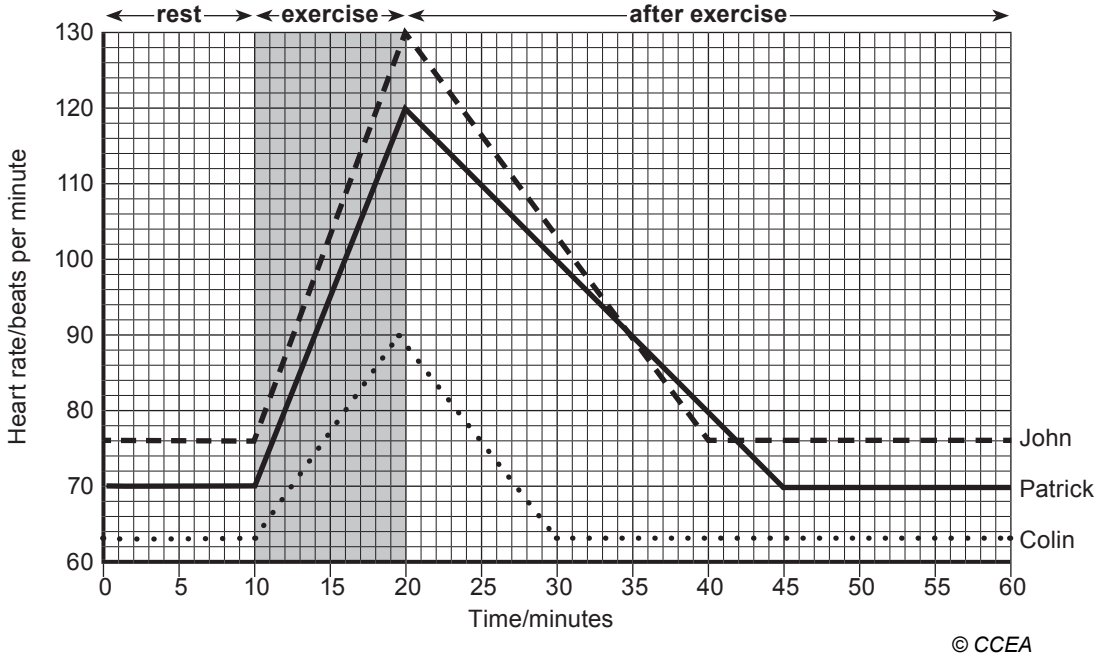
Describe **one** way the male body changes during puberty.

_____

_____ [1]

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4 The graph shows the heart rate of three men before, during and after exercise.



© CCEA

Look at the graph.

The recovery time is the time taken for the heart to return to its resting rate after exercise.

The recovery time for John is 20 minutes.

(a) What is the recovery time for Patrick?

_____ minutes [1]

(b) One of the men exercises regularly.

(i) Name this man.

_____ [1]

(ii) Give **two** pieces of evidence from the graph to support your answer.

1. _____

_____

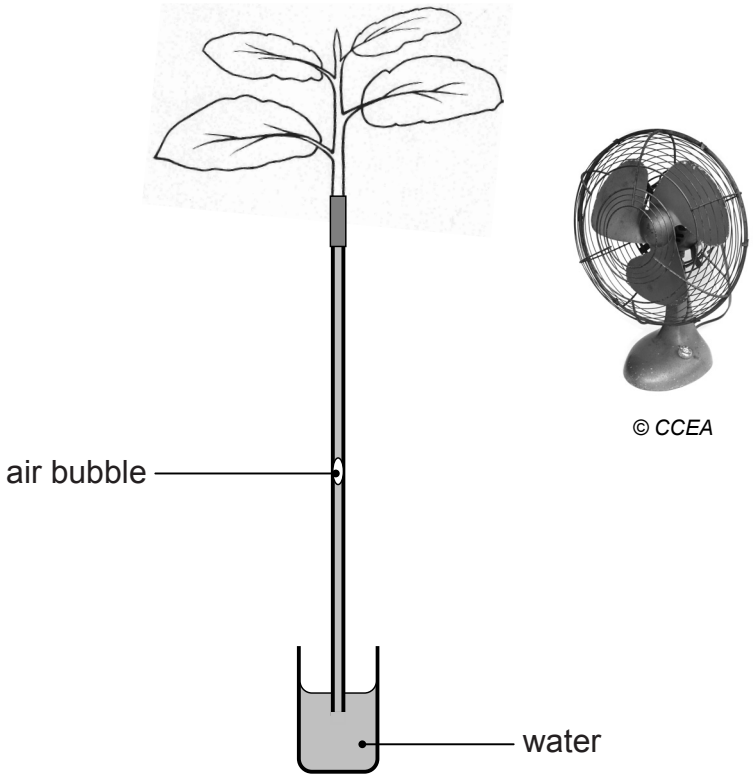
2. _____

_____ [2]

[Turn over

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5 The diagram shows a simple potometer at the start of an experiment.



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© CCEA

(a) The potometer was left for 30 minutes in front of a fan.

(i) What would happen to the air bubble during this time?

_____

_____ [1]

(ii) Explain what causes this change.

_____

_____

_____ [2]

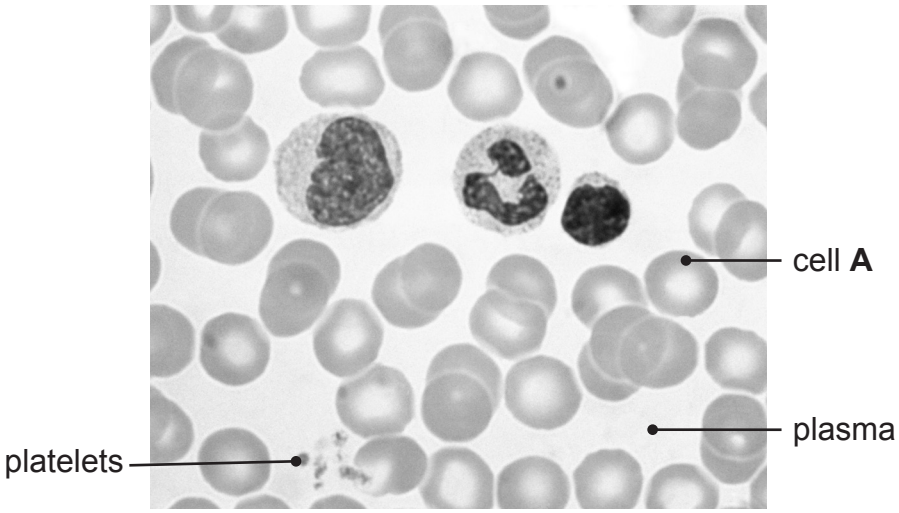
(b) Give **two other** ways plants use water.

1. _____ [1]

2. _____ [1]

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6 The photograph shows a blood smear.



© Biophoto Associates / Science Photo Library

Look at the photograph.

(a) Cell **A** is adapted to carry oxygen.

(i) Name cell **A**.

_____ [1]

(ii) Describe **two** ways it is adapted to carry oxygen.

1. _____ [1]

2. _____ [1]

(b) Name **two** substances transported in blood plasma.

1. _____ [1]

2. _____ [1]

(c) Platelets are shown in the photograph.

Give the function of platelets.

_____ [1]

[Turn over

7 Wild rabbits have brown fur.

Albino rabbits have white fur.

brown rabbit



© Colin Varndell / Science Photo Library

white rabbit



© Vladimir Iakush/ iStock/ Thinkstock

Brown fur is controlled by a dominant allele **B**.

White fur is controlled by a recessive allele **b**.

(a) What is an allele?

_____

_____ [1]

(b) The diagram shows a cross between a brown rabbit and a white rabbit.

Parents brown × white

Genotypes **Bb** ☐

Gametes (**B**) (**b**) × (**b**)

Offspring

		White
		b
Brown	B	Bb
	b	bb

(i) **Complete the diagram** by adding the genotype of the white parent. [1]

(ii) What term is used to describe the genotype of the brown parent?

_____ [1]

(iii) Name the grid used to work out the genotypes of the offspring.

_____ [1]

(iv) What is the ratio of genotypes in the offspring?

_____ [1]

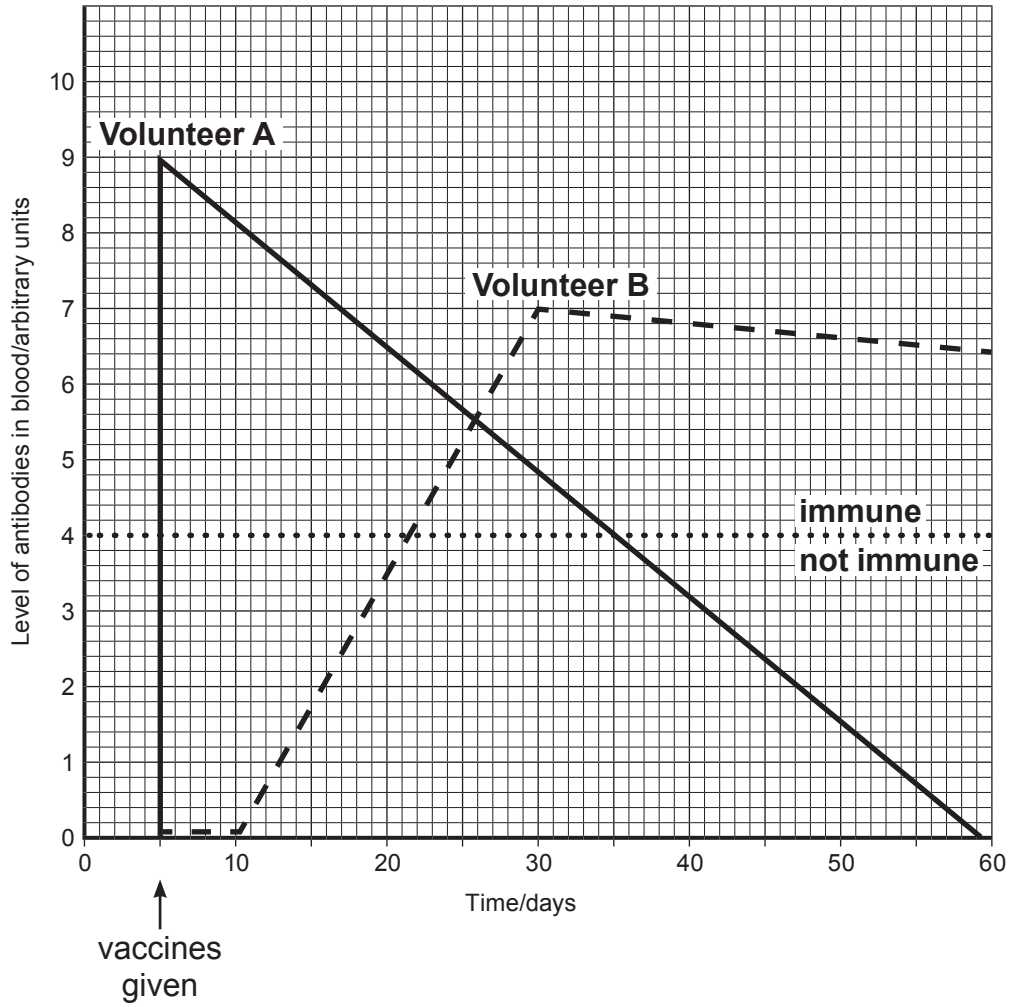
[Turn over

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8 Two volunteers were going abroad to help the victims of a disaster.

Before leaving they had to be vaccinated against a serious disease found in the disaster area.

The graph shows the level of antibodies in their blood before and after the vaccinations.



(a) What is an antibody?

_____

_____ [2]

(b) What was the antibody concentration in the blood of each volunteer on day 40?

Volunteer **A** _____ arbitrary units.

Volunteer **B** _____ arbitrary units. [2]

(c) Volunteer **A** was advised to return home by day 35.

Explain why.

_____

_____

_____

_____ [2]

(d) Volunteer **B** was given a vaccination to bring about active immunity.

(i) What is active immunity?

_____

_____ [1]

(ii) Give **two** pieces of evidence from the graph which suggests that the vaccination given to volunteer **B** brought about active immunity.

1. _____

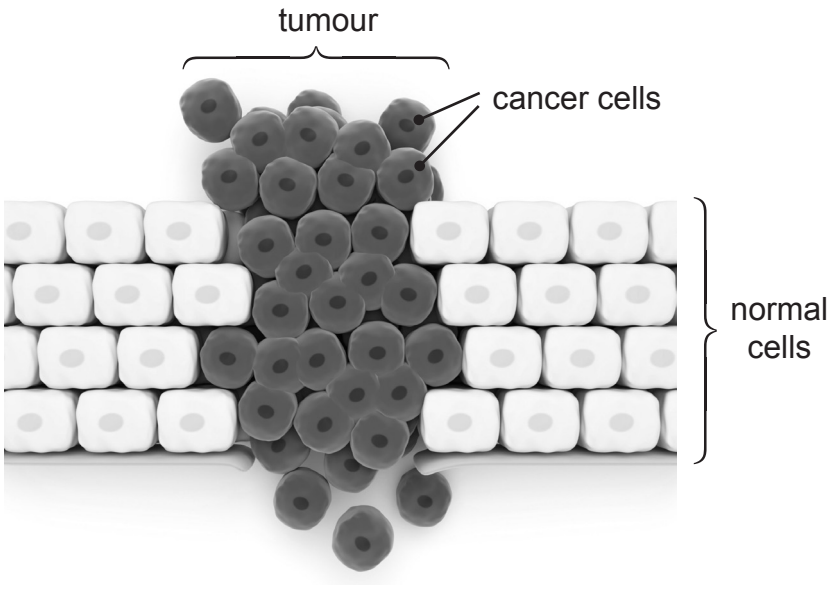
_____ [1]

2. _____

_____ [1]

[Turn over

9 **(a)** The diagram shows cancer cells in a tumour.



© Somersault18:24/ iStock/ Thinkstock

(i) What is cancer?

_____

_____

_____ [2]

Look at the diagram.

(ii) Give **one** piece of evidence, from the diagram, which suggests this tumour is malignant.

_____

_____ [1]

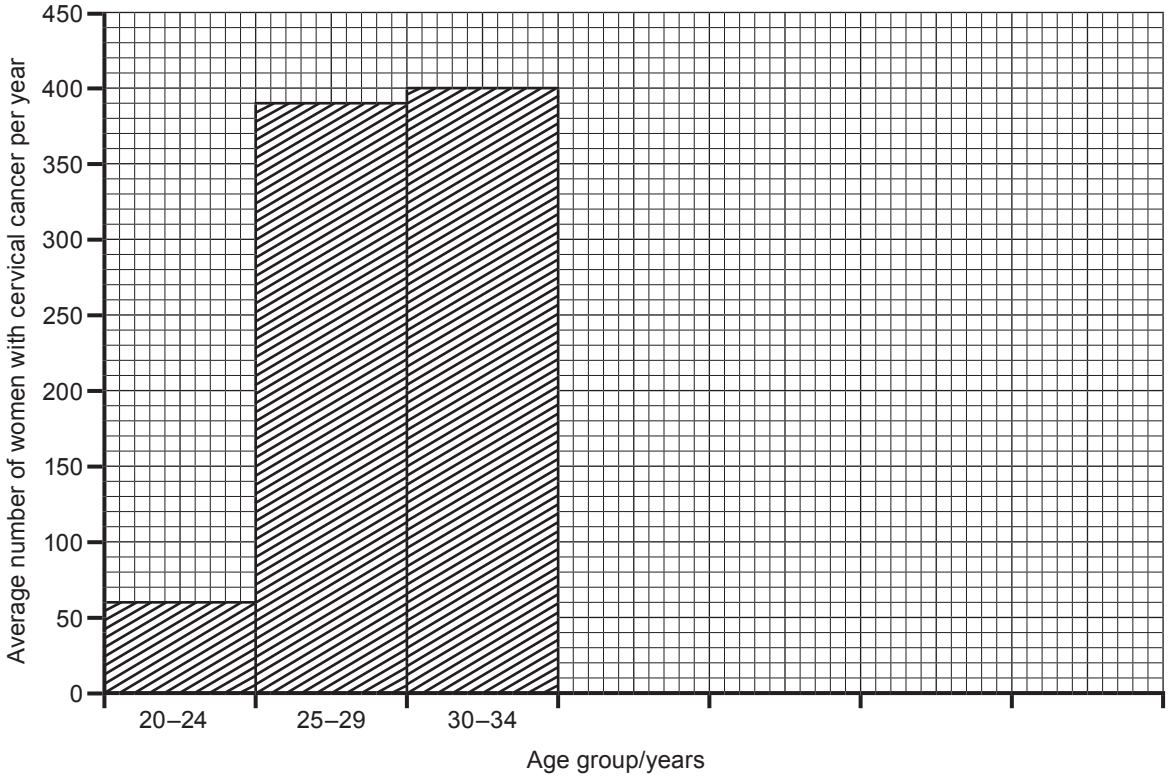
(b) The number of women in the UK diagnosed with cervical cancer was recorded over a three year period and the average number per year was calculated.

The table shows the average number of women in each age group with cervical cancer.

Age group/ years	Average number of women with cervical cancer per year
20–24	60
25–29	390
30–34	400
35–39	430
40–44	360
45–49	270
50–54	190

(i) **Complete the histogram** using the results in the table.

Shade the bars you have drawn.



[3]

[Turn over

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All women in the UK between the ages of 25 and 54 are screened for cervical cancer.

(ii) Suggest **one** reason why women below the age of 24 are **not** included in all screening programmes.

_____

_____ [1]

(iii) Explain why screening programmes are important.

_____

_____

_____

_____ [2]

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10 **(a)** Sterilisation is a reliable method of contraception in women.

(i) Explain why sterilisation in women is reliable.

_____

_____

_____ [2]

(ii) Give **one other** advantage of sterilisation as a method of contraception.

_____

_____ [1]

(b) A condom is another method of contraception.

(i) Describe how condoms prevent pregnancy.

_____

_____

_____ [2]

(ii) Give **one** health advantage of using a condom.

_____

_____ [1]

[Turn over

11 Cigarette smoke contains nicotine.

The concentration of nicotine in the air is a measure of the total number of cigarettes being smoked.

The table shows the concentration of nicotine in 50 pubs before and after a smoking ban.

Concentration of nicotine in the air/ arbitrary units	Number of pubs	
	Before ban	After ban
0–100	0	44
101–200	1	6
201–300	3	0
301–400	20	0
401–500	26	0

© CCEA

(a) Describe the effect of the smoking ban on the concentration of nicotine in pubs.

Use data from the table to support your answer.

_____

_____

_____

_____

_____ [3]

(b) Give **two** ways nicotine affects the body.

1. _____

_____

2. _____

_____ [2]

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(c) Suggest **two other** substances in cigarette smoke that could be used to measure the impact of a smoking ban.

Explain the effect of each substance on the body.

1. Substance _____ [1]

Explanation _____

_____ [1]

2. Substance _____ [1]

Explanation _____

_____ [1]

(d) Suggest **one** reason why some people object to a smoking ban.

_____

_____ [1]

[Turn over

12 Height is an example of variation.

(a) Name the type of variation shown by height.

_____ [1]

(b) The heights of 10 pupils in a class of 26 were measured to the nearest centimetre.

The results are shown.

~~**162**~~ ~~**156**~~ ~~**180**~~ **172** **168** **169** **165** **178** **166** **168**

(i) **Complete the tally chart** for these results.
The first three have been done for you.

Height/cm	Tally	Number of pupils
155–159	I	1
160–164	I I	2
165–169		
170–174		
175–179		

[2]

(ii) Suggest which type of graph should be used to present these results.

Put a (circle) around the correct answer.

bar chart **histogram** **pie chart** [1]

(iii) What percentage of pupils were less than 165 cm tall?
Show your working.

_____ % [2]

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(iv) Suggest why this percentage may not be reliable.

_____

_____

_____ [1]

(c) **(i)** Height may be affected by a number of environmental factors.
Suggest one.

_____ [1]

(ii) Give **one** cause, other than environmental, of variation in height.

_____ [1]

[Turn over

13 During pregnancy the baby can be screened for chromosome abnormalities.

Cells from the baby are removed and allowed to divide. During the cell division the chromosomes are photographed.

(a) Name this type of screening test.

_____ [1]

(b) Name the part of the cell where chromosomes are found.

_____ [1]

The photographs show the chromosomes of two babies.

Baby A



©Leonard Lessin / Science Photo Library

Baby B



©Leonard Lessin / Science Photo Library

Baby **B** suffers from a chromosome abnormality.

(c) Name the condition caused by this chromosome abnormality.

_____ [1]

(d) What term describes the random change that causes chromosome abnormalities?

_____ [1]

Identical twins have identical sets of chromosomes.

(e) Give **one** piece of evidence from the photographs to explain why baby **A** and baby **B** are **not** identical.

_____ [1]

(f) Give **two** ethical issues that may arise because of this screening test.

_____

_____

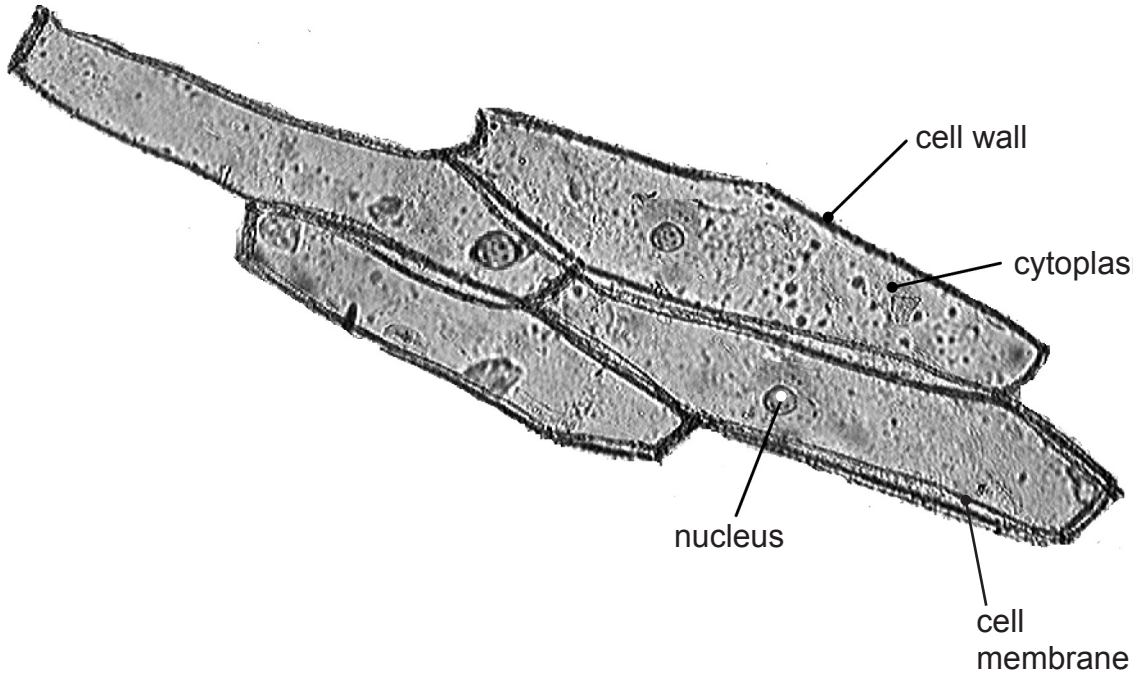
_____

_____ [2]

14 Onion tissue was moved from water into a concentrated sugar solution.

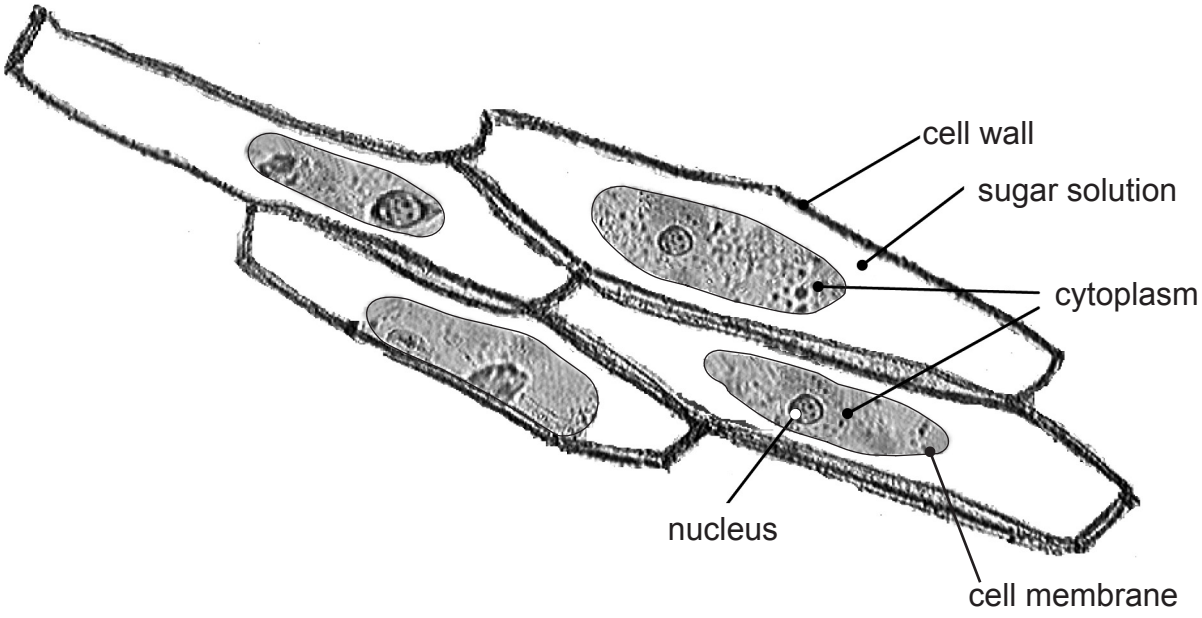
The photographs show cells of the onion tissue in each solution.

Onion cells placed in water



© CCEA

Onion cells placed in concentrated sugar solution



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Look at the photographs.

Use evidence from the photographs to

- describe how the cells changed when placed in concentrated sugar solution.
- use the theory of osmosis to explain these changes.

In this question you will be assessed on your written communication skills, including the use of specialist scientific terms.

[6]

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Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
Total Marks	

Examiner Number

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Rewarding Learning

General Certificate of Secondary Education
2015

Biology

Unit 2

Foundation Tier

[GBY21]

MONDAY 15 JUNE, MORNING

MARK SCHEME

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General Marking Instructions

Introduction

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					AVAILABLE MARKS
1	**(a)**	**(i)**	A – tail;	[1]	
			B – cell membrane;	[1]	
		(ii)	Enable sperm to swim (to egg);	[1]	
	(b)		oviduct;	[1]	
	(c)		zygote;	[1]	5
2	Cold virus – Spread by droplet infection;			[1]	
	Salmonella – Prevented by cooking food thoroughly;			[1]	
	Fungus – Cause of athlete's foot;			[1]	
	HIV – Spread by sharing dirty needles or sexual intercourse;			[1]	4
3	**(a)**		testes;	[1]	
	(b)	**(i)**	low level during childhood; increases during puberty; levels off at adulthood;	[3]	
		(ii)	body more muscular/growth of pubic/facial hair/produce sperm/ voice deepens/development of testes;	[1]	5
4	**(a)**		25 (minutes);	[1]	
	(b)	**(i)**	Colin;	[1]	
		(ii)	**Faster/shorter** recovery time; lower resting heart rate; lower maximum heart rate/described/only reaches 90 bpm; (Any **two**)	[2]	4
5	**(a)**	**(i)**	air bubble moves up/water level (in beaker) moves down;	[1]	
		(ii)	Any **two** from: water evaporates from leaves/transpiration; water taken up by/passes through plant; replaced by water from tube;	[2]	
	(b)		Any **two** from: support; transport; photosynthesis;	[2]	5
6	**(a)**	**(i)**	red blood cell	[1]	
		(ii)	haemoglobin; no nucleus; biconcave/large surface area; (Any **two**)	[2]	
	(b)		any named food molecule, e.g. glucose/amino acids; urea; carbon dioxide; hormones; (Any **two**)	[2]	
	(c)		blood clotting;	[1]	6

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					AVAILABLE MARKS
7	**(a)**	Allele is a form of a gene/type of the same gene;		[1]	
	(b)	**(i)** bb;		[1]	
		(ii) Heterozygous;		[1]	
		(iii) Punnett;		[1]	
		(iv) 1:1;		[1]	5
8	**(a)**	Protein; produced by lymphocyte/white blood cell (in response to antigen); complementary to/fits antigen; destroys antigen/microorganism; (Any **two**)		[2]	
	(b)	3.1 < 3.2; 6.8;		[2]	
	(c)	**After** 35 days antibody level falls below 4/immune threshold (described); Volunteer could catch the disease;		[2]	
	(d)	**(i)** Body/white blood cells produce **own antibodies**;		[1]	
		(ii) Delay of 5 days before antibody level starts to rise; Level of antibodies takes 15/16 days after vaccine to become immune/ 25 days to reach peak/rises slowly; Level of antibodies not as high (as volunteer A)/peaks at 7; Level of antibodies decreases slowly/remains immune until after 60 days; (Any **two**)		[2]	9
9	**(a)**	**(i)** Uncontrolled/abnormal; cell division;		[2]	
		(ii) No capsule/cells migrating;		[1]	
	(b)	**(i)** Bars correctly drawn; Labels and no spaces;		[2] [1]	
		(ii) Only a small number in age group/not cost-effective		[1]	
		(iii) early detection; improves chances of successful treatment/can be treated before it spreads;		[2]	9

					AVAILABLE MARKS
10	**(a)**	**(i)**	Oviducts are cut; prevents ova from moving through to be fertilised;	[2]	
		(ii)	Permanent/can't be reversed/very difficult to reverse;	[1]	
	(b)	**(i)**	Barrier; Stops sperm (entering vagina);	[2]	
		(ii)	Helps prevent STIs;	[1]	6
11	**(a)**		(After ban) more pubs have a lower concentration/less nicotine; Before ban most pubs (26) had over 401–500 arbitrary units; After ban most pubs (44) had 0–100 arbitrary units;	[3]	
	(b)		Causes addiction; Affects heartbeat;	[2]	
	(c)		Substance – Tar; Explanation – Causes lung cancer; Substance – Carbon monoxide; Explanation – Reduces oxygen transport;	[1] [1] [1] [1]	
	(d)		Reduced freedom of choice;	[1]	10
12	**(a)**		continuous;	[1]	
	(b)	**(i)**	Tally completed correctly; Numbers: 1, 2, **5**,**1**,**1**;	[2]	
		(ii)	Histogram;	[1]	
		(iii)	3/10 × 100; = 30;	[2]	
		(iv)	Small sample size;	[1]	
	(c)	**(i)**	Diet/calcium/proteins/vitamin D;	[1]	
		(ii)	Genetic;	[1]	9
13	**(a)**		amniocentesis	[1]	
	(b)		nucleus;	[1]	
	(c)		Down syndrome;	[1]	
	(d)		Mutation;	[1]	
	(e)		Different genders (A male, B female)/different sex chromosomes/ A–XY B–XX/different numbers of chromosomes (described);	[1]	
	(f)		Abortion (for medical reasons); Risk of miscarriage (caused by screening);	[2]	7

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14 Indicative content:

1 Water has **moved out** of cells;
2 Down concentration gradient/described;
3 Through selectively/partially permeable membranes;
4 Cytoplasm shrank;
5 Cell membrane pulls away from cell wall;
6 Cells (in concentrated sugar solution) become plasmolysed;
7 Cell wall permeable to sugar solution/sugar can pass through cell wall;
8 Sugar solution enters inside cell wall;
9 Sugar does not enter cell membranes/membrane impermeable to sugar;

Response	Marks
Candidates **must use appropriate, specialist terms** throughout **using AT LEAST FIVE OF the above points**. They use **good** spelling, punctuation and grammar and the form and style are of a **high standard**.	[5]–[6]
Candidates use **some appropriate, specialist terms** throughout using **at LEAST THREE of the above points**. They use satisfactory spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
Candidates make **little use of specialist terms** throughout **USING SOME OR ALL of the above points**. The spelling, punctuation and grammar, form and style are of a **limited** standard.	[1]–[2]
Response not worthy of credit.	[0]

[6] 6

Total **90**

AVAILABLE MARKS

Rewarding Learning

General Certificate of Secondary Education
2014

GCSE Biology

Unit 2

Foundation Tier

[GBY21]

MONDAY 16 JUNE, MORNING

MARK SCHEME

STEMUP.CO.UK

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				AVAILABLE MARKS
1	**(a)**	**(i)** Days 1–5 shaded;	[1]	
		(ii) Lining of uterus breaks down (and passes out through vagina);	[1]	
	(b)	Eggs released (/ovulation) on day 14; fertilisation can occur/sperm can still be alive on day 14;	[2]	4
2	**(a)**	Nicotine – causes addiction; Carbon monoxide – less oxygen carried in blood; Tar – causes lung cancer; (3 for [2], 2 for [1])	[2]	
	(b)	Any **two** from: Ban smoking in public places/indoors; Make packaging plain/prevent display of cigarettes in shops; Education/public health intervention; Increase price of cigarettes;	[2]	4
3		Spontaneous generation; Pasteur; Swan neck; Microorganisms; 72;	[5]	5
4	**(a)**	Accurate plots; Line drawn;	[2] [1]	
	(b)	4–8;	[1]	
	(c)	**(i)** Growth rate **increases**;	[1]	
		(ii) Puberty/hormones;	[1]	6
5	**(a)**	Arrow drawn in A ↑;	[1]	
	(b)	B – Aorta; C – Left ventricle; D – Right atrium;	[1] [1] [1]	
	(c)	Prevent backflow; Into right atrium/maintain unidirectional flow of blood into ventricle/C;	[1] [1]	6

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					AVAILABLE MARKS
6	**(a)**	**(i)**	F in either oviduct;	[1]	
		(ii)	M in uterus	[1]	
		(iii)	Produce ova (eggs)/oestrogen	[1]	
	(b)	**(i)**	A – Placenta; B – Umbilical cord; C – Amniotic sac/fluid/amnion;	[1] [1] [1]	
		(ii)	Small size of foetus/not fully grown; Limbs/head not fully formed; (Accept: reference to any organ not fully developed)	[2]	8
7	**(a)**		(Different) form of same(/a) gene;	[1]	
	(b)		rr;	[1]	
	(c)		Not shown in the first generation (phenotype);	[1]	
	(d)	**(i)**	RR, Rr; Rr, rr;	[2]	
		(ii)	Circle drawn around RR	[1]	6
8	**(a)**	**(i)**	Prevents contamination/other microorganisms entering;	[1]	
		(ii)	No eating/drinking in lab Wipe down benches with disinfectant Seal Petri dishes Use sterile loops/apparatus Flame neck of bottle Sterilise equipment after use Wash hands afterwards (Any **one**)	[1]	
	(b)		Pathogens (described) which could harm humans will not grow;	[1]	
	(c)	**(i)**	C;		
		(ii)	largest clear area (of bacteria killed);	[2]	5
9	**(a)**	**(i)**	Any **two** from: Evaporates (from mesophyll cell); diffuses out; through stomata; transpiration;	[2]	
		(ii)	Temperature; light; wind; humidity; (Any **two**)	[2]	

				AVAILABLE MARKS
(b)	**(i)**	(2.0 – 1.6) ÷ 2.0 × 100; 20%;	[2]	
	(ii)	Leaves different masses at start;	[1]	
	(iii)	Leaf 1 is a control/for comparison;	[1]	
	(iv)	More **stomata** on lower surface/vaseline blocks **stomata**;	[1]	9

10 **(a)** Abnormal cell division; [1]

(b) **Indicative content:**

Maximum [2]
1 Cancer cell larger;
2 Cancer cell larger nucleus;
3 Cancer cell irregular shape;

Maximum [2]
4 Not in a capsule;
5 Spreading in blood/lymph;
6 Spread around the body/into other tissues;

Maximum [2]
7 Tumour has its own blood supply;
8 To provide cells with food/energy/oxygen;
9 (Cancer cells) continue to divide/grow;

Response	Mark
Candidates **must use appropriate, specialist terms** throughout **using at least FIVE of the above points**. They use good spelling, punctuation and grammar and the form and style are of a **high standard**.	[5]–[6]
Candidates use **some appropriate, specialist terms** throughout **using at least THREE of the above points**. They use **satisfactory** spelling, punctuation and grammar and the form and style are of a **satisfactory** standard.	[3]–[4]
Candidates make **little use of specialist terms** throughout to give one of the above points. The spelling, punctuation and grammar, form and style are of a **limited** standard.	[1]–[2]
Response not worthy of credit.	[0]

[6]

(c) **(i)** Number of women diagnosed **falls** after screening was introduced in 1988; [1]

(ii) Early detection; Faster/more effective treatment; [2]

(iii) Surgery; radiotherapy; chemotherapy; [3]

(d) Any **two** from
Protection against virus;
before having sexual relationship;
Only girls get cervical cancer; [2] 15

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					AVAILABLE MARKS
11	**(a)**	Similarity – Both have genetic material;	[1]		
		Difference – (Any **one** from): TB has double stranded genetic material, HIV single stranded; TB has cell wall, HIV has protein layers; TB has plasmids, HIV does not;	[1]		
	(b)	(Spread in saliva) by **coughing**/**sneezing**;	[1]		
	(c)	Spread – Sexual **intercourse**/bodily fluids exchanged/blood to blood contact (described);	[1]		
		Prevented – Condom/abstinence/screening blood;	[1]		5
12	**(a)**	**(i)** Similarity – Death from CHD increases with age;	[1]		
		Difference – More men than women die from CHD;	[1]		
		(ii) More women in population;	[1]		
	(b)	Don't smoke cigarettes; exercise regularly; avoid stress; Reduce salt/fat/cholesterol/alcohol; (Any **two**)	[2]		5
13	**(a)**	Quadrats/Random sampling; Weigh fruits; Record on table/tally chart; Any **three**	[3]		
	(b)	**(i)** **Continuous** variation;	[1]		
		(ii) Histogram	[1]		
	(c)	Most strawberries between **10.0 and 11.9**; Data range described; Any **one**	[1]		6
14	**(a)**	**(i)** Cell/vacuole/nuclear **membrane**;	[1]		
		(ii) Lets some/certain/small substances pass through;	[1]		
	(b)	**(i)** Smaller vacuole; cell membrane away from cell wall; Nucleus correct shape and position;	[3]		
		(ii) Plasmolysed/plasmolysis;	[1]		6
			Total		**90**

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Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2013

Biology

Unit 2

Foundation

[GBY21]

GBY21

TUESDAY 18 JUNE, MORNING

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided. Do not write outside the box, around each page or on blank pages.
Complete in blue or black ink only. **Do not write with a gel pen**.
Answer **all fourteen** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 90.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in questions **6**, **10(b)** and **14**.

8251

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Examiner Only	
Marks	Remark

1 Cigarette smoke has a range of effects on the body.

(a) Name **two** lung diseases caused by tar in cigarette smoke.

1. _____ [1]

2. _____ [1]

Carbon monoxide combines permanently with haemoglobin in red blood cells.

(b) What effect does this have on the body?

_____

_____ [1]

(c) Name **one** chemical in cigarette smoke which affects the heart rate.

_____ [1]

Total Question 1

2 Complete the table showing the features of blood vessels.

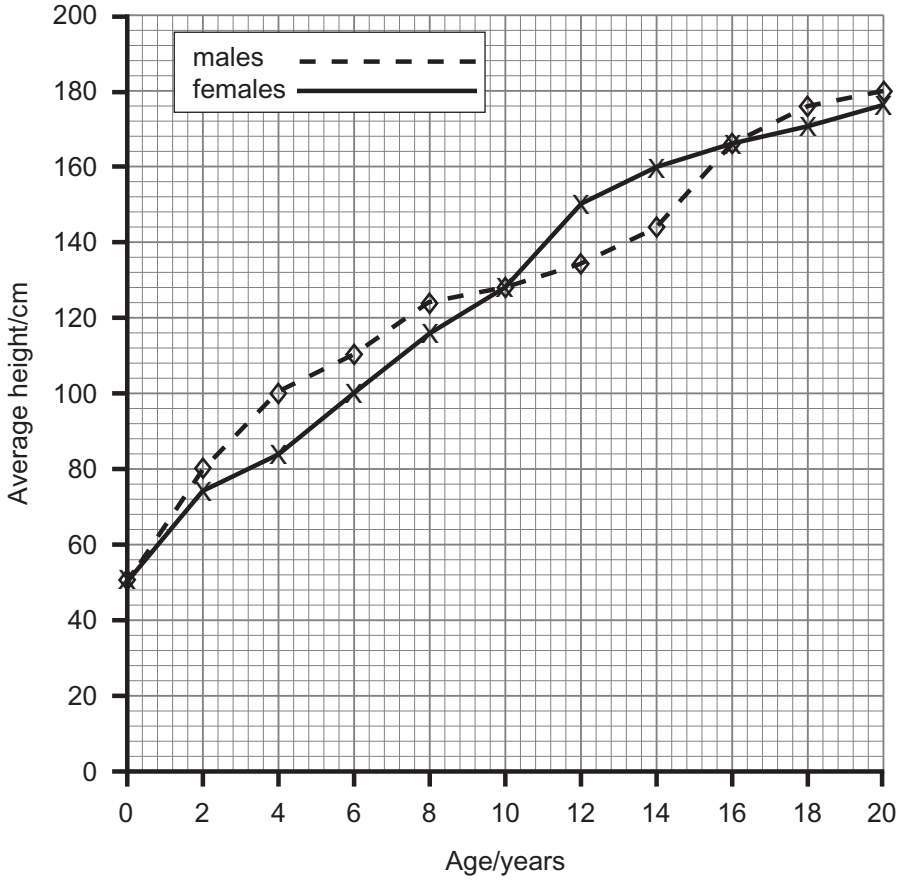
Feature	Artery	Vein	Capillary
Presence of valves	no	yes	
Wall thickness		thin	
Blood pressure	high		very low

[1] [2] [1]

Total Question 2

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3 The graph shows the average height of males and females from birth to 20 years old.



(a) What is the average height of a newborn baby?

_____ cm [1]

(b) Between which ages are females taller than males?

_____ and _____ [2]

This graph uses height to measure growth.

(c) Name the process which increases cell numbers.

_____ [1]

(d) Name **one other** way to measure growth.

_____ [1]

Examiner Only	
Marks	Remark
Total Question 3	

[Turn over

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4 The table shows the percentage of women surviving after being diagnosed with breast cancer.

Time since diagnosis/months	Percentage of women surviving	
	1996	2006
6	94.2	96.6
12	91.0	94.3
18	87.4	92.6
24	84.5	90.6

© N. Ireland Cancer Registry, Centre for Public Health, Queen's University, Belfast.

(a) How does the percentage of women surviving 24 months after diagnosis change from 1996 to 2006?

Use percentages from the table to support your answer.

_____

_____

_____

_____ [2]

(b) The number of women screened for breast cancer increased from 1996 to 2006.

Give **two** advantages to the women screened for breast cancer.

_____

_____

_____

_____

_____ [2]

(c) Give **one** way breast cancer can be treated.

_____ [1]

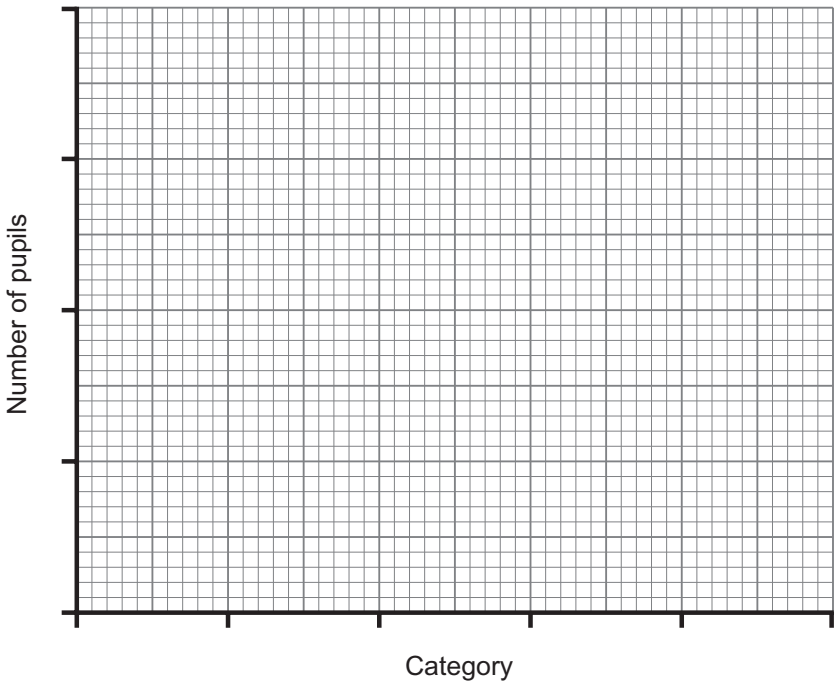
Examiner Only	
Marks	Remark
Total Question 4	

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5 The table shows the number of pupils in a class who could roll their tongue and the number who were non-rollers.

Category	Number of pupils
Roller	18
Non-roller	8

(a) Draw an appropriate graph of these results. [3]



(b) (i) Name this type of graph.

_____ [1]

(ii) What type of variation is shown by this data?

_____ [1]

(iii) Give **one** cause of this variation in tongue rolling.

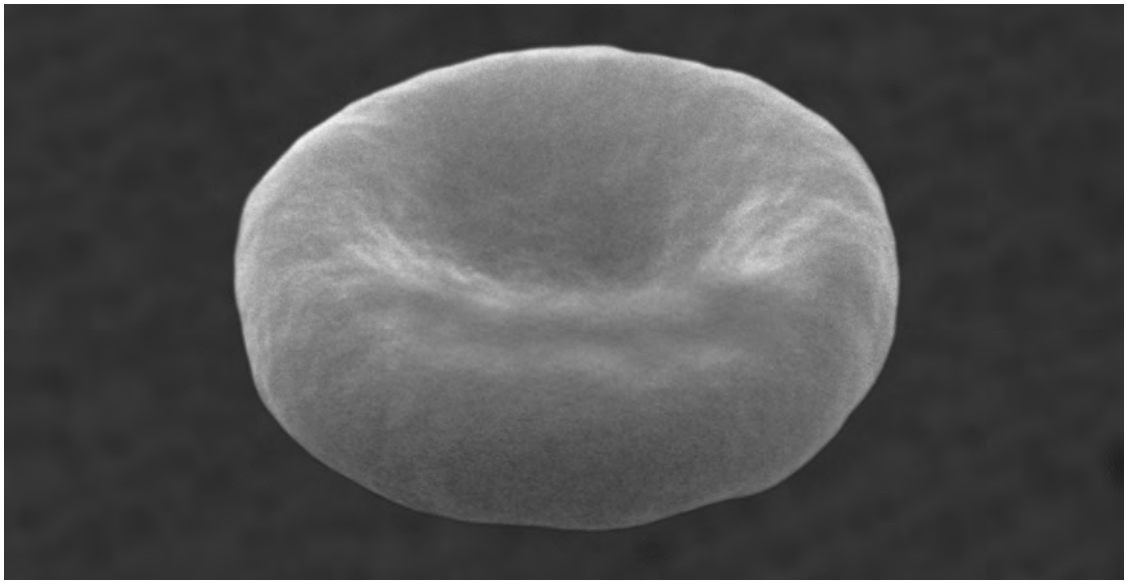
_____ [1]

Examiner Only	
Marks	Remark
Total Question 5	

[Turn over

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6 The photograph shows a red blood cell.



© Dr.Stanley Flegler, Visuals Unlimited / Science Photo Library

Describe and explain **three ways** a red blood cell is adapted for its function of oxygen transport.

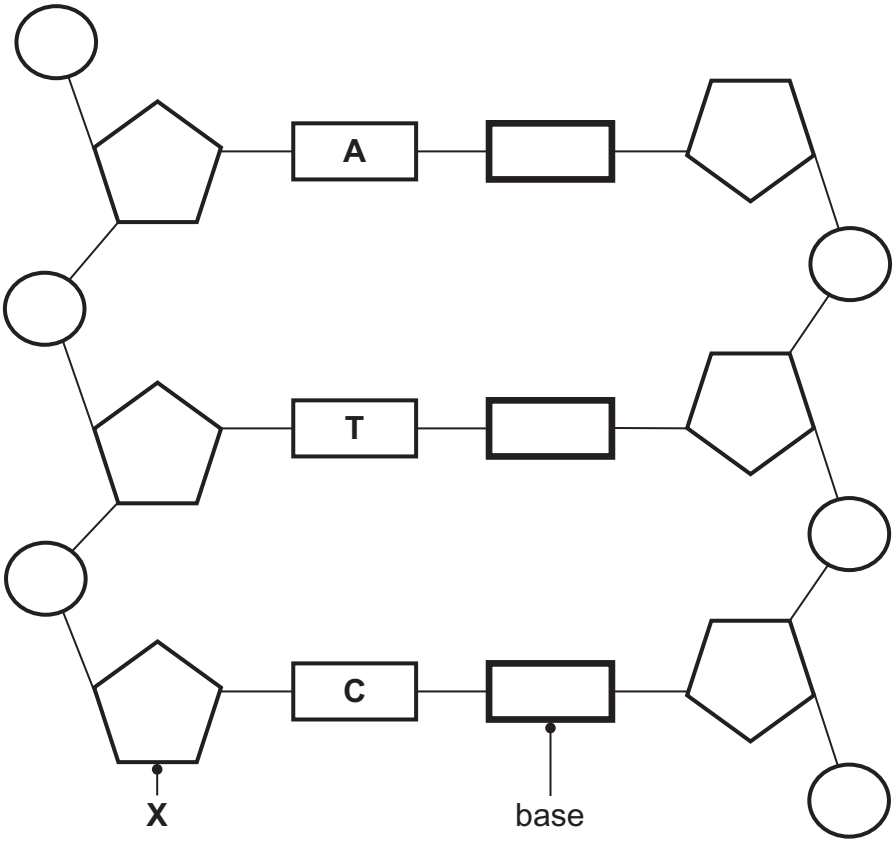
In this question, you will be assessed on your written communication skills, including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Remark
Total Question 6	

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7 The diagram shows part of a DNA molecule.



(a) **Complete the diagram.** Place the correct letters for the bases in the boxes. [2]

(b) What is molecule **X**?

Draw a (circle) around the correct answer in the list below.

protein phosphate amino acid starch sugar [1]

(c) What term is used to describe the shape of a DNA molecule?

_____ [1]

(d) Where is the DNA molecule found in the cell?

_____ [1]

Examiner Only	
Marks	Remark
Total Question 7	

[Turn over

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8 The table shows the average number of pregnancies occurring per year when using different contraceptive methods.

Method	Average number of pregnancies per year
Female sterilisation	Less than 1 in 200
Male sterilisation	Less than 1 in 2000
Contraceptive pill	
Female condom	5 in 100
Male condom	2 in 100

Source: Family Planning Association leaflet – Your guide to contraception

(a) The contraceptive pill is 99% effective.

(i) **Complete the table** by calculating the average number of pregnancies occurring per year for the contraceptive pill.

[1]

(ii) Suggest **two** reasons why the contraceptive pill is not 100% effective.

1. _____

_____ [1]

2. _____

_____ [1]

Examiner Only

Marks	Remark

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(iii) Give **one** advantage and **one other** disadvantage of using the contraceptive pill.

Advantage _____

_____ [1]

Disadvantage _____

_____ [1]

(iv) **Use the information in the table** to decide which method of contraception is the most reliable and which is least reliable.

Most reliable _____ [1]

Least reliable _____ [1]

(b) What term is used to describe methods of contraception which include male and female sterilisation?

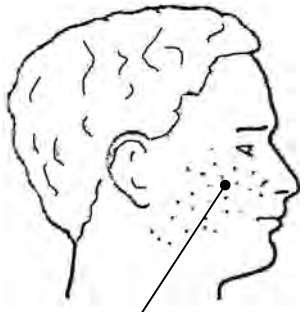
_____ [1]

Examiner Only	
Marks	Remark
Total Question 8	

[Turn over

9 Freckles in humans are caused by a recessive allele.

Examiner Only	
Marks	Remark



freckles

© Investigations in Applied Biology and Biotechnology by Peter Freeland, published by Hodder & Stoughton Education Ltd, 1990. ISBN 0340 50630X. Reproduced by permission of Hodder Education.

(a) (i) Explain what is meant by an allele.

_____

_____ [1]

(ii) Name the type of cell division which produces gametes.

_____ [1]

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(b) The diagram shows a cross between Pamela and Tony.
Pamela and Tony are both heterozygous for normal skin.

Use **N** for the allele for normal skin and
n for the allele for freckled skin.

		Pamela	
	Gametes	**N**	
Tony			
	n		

(i) Name this type of diagram.

_____ [1]

(ii) **Complete the diagram** to show
the parent's gametes and
the possible genotypes of offspring. [3]

(iii) Give the **ratio** of normal skin to freckled skin in the children.

_____ [1]

(iv) What **proportion** of the offspring will have homozygous genotypes?

_____ [1]

(v) Explain why it is not possible to be certain of the genotype of one of the children with normal skin.

_____

_____

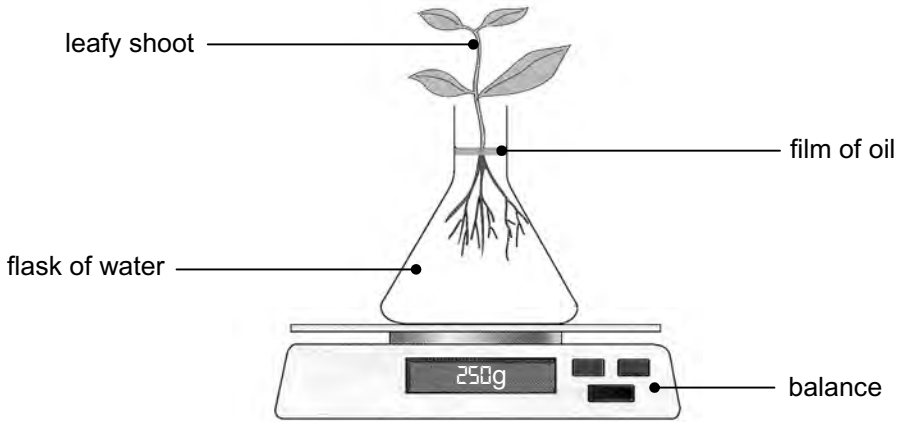
_____ [2]

Examiner Only	
Marks	Remark
Total Question 9	

[Turn over

DO NOT WRITE ON THIS PAGE

10 The diagram shows a weight potometer.



© Barking Dog Art

(a) Describe the function of the film of oil in the flask.

[1]

(b) Describe and explain how the plant causes the loss of mass in the flask.

In this question, you will be assessed on your written communication skills, including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Remark

[Turn over

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The apparatus was used by a group of students to investigate the effect of wind on the rate of water loss from a leafy shoot over a period of 24 hours.

The results are shown in the table.

Time/hours	Loss in mass of flask/g	
	In still conditions	In windy conditions
0	0	0
4	2	8
8	4	16
12	6	24
16	8	32
20	10	40
24	12	48

(c) Suggest **one** way the students made the investigation a fair test.

_____

_____ [1]

(d) Calculate the average rate of loss of mass per hour of the flask during 24 hours in still conditions.
Show your workings.

Average rate of loss of mass _____ g per hour [2]

Examiner Only

Marks	Remark

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(e) What conclusions can be made about the effect of wind on the rate of loss of mass of the flask?
Use data to support your answer.

_____

_____

_____ [2]

(f) Suggest how the students created the windy conditions.

_____ [1]

(g) Give **two other** environmental factors the students could have investigated using this apparatus.

1. _____ [1]

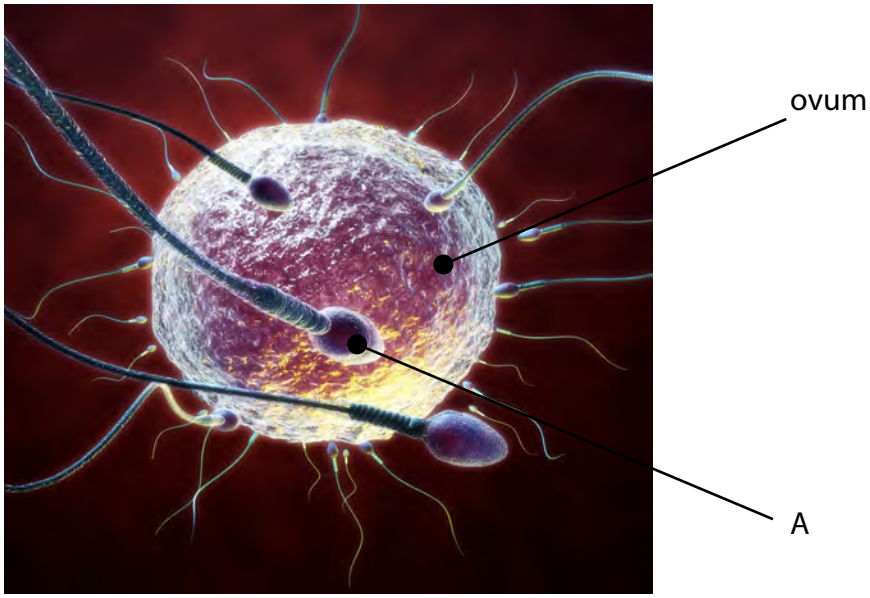
2. _____ [1]

Examiner Only	
Marks	Remark
Total Question 10	

[Turn over

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11 The photograph shows sperm swimming towards an ovum.



© Medi-mation / Science Photo Library

(a) (i) Name part **A** of the sperm.

_____ [1]

(ii) Describe **one** way part **A** is adapted to its function.

_____ [1]

(iii) Give **one other** way the sperm is adapted to its function.

_____ [1]

(iv) Suggest **one** reason why all the sperm do not appear to be the same size.

_____

_____ [1]

(b) Name the cell produced by fertilisation.

_____ [1]

Examiner Only	
Marks	Remark
Total Question 11	

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(Questions continue overleaf)

[Turn over

Examiner Only	
Marks	Remark

12 (a) A ban on smoking in workplaces came into effect in the Republic of Ireland in 2004.

Bar staff completed a health questionnaire about their symptoms, before the ban and three years after the ban.

The table shows the results of the questionnaires.

Symptom	Percentage of bar staff complaining of symptoms	
	Before ban	3 years after ban
Eye irritation	82	51
Sneezing	75	34
Coughing	87	67

Adapted from: "Respiratory health improvement continues after workplace smoking ban in Ireland" by Michele Agnew, Patrick Goodman, Luke Clancy: Reproduced by permission of the European Respiratory Society Eur Respir J October 2008; 32, Suppl. 32: 259s (Abstract 1577) © European Respiratory Society

(i) Suggest **one** conclusion that can be made from the results of the questionnaires about the health of bar staff.

Use data from the table to support your conclusion.

_____

_____

_____

_____ [2]

(ii) Which symptom shows the greatest change after the ban?

_____ [1]

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(b) Give **one** reason why a ban on smoking in workplaces could benefit non-smokers.

_____

_____ [1]

(c) Suggest why some people are opposed to a ban on smoking in workplaces.

_____

_____ [1]

Examiner Only	
Marks	Remark
Total Question 12	

[Turn over

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13 Scientific method involves the following steps:
observation, making a hypothesis, experimentation, conclusion, validation.

Jenner is famous for having applied scientific method while developing vaccination as a way of preventing smallpox.

Some of the steps in Jenner's development of a smallpox vaccine were:

A Infect a person with cowpox. Then infect the person with smallpox.

B Jenner and other scientists repeated the procedure and got the same results.

C A person infected with cowpox may be protected from smallpox.

D Jenner heard dairymaids say "I shall never have smallpox for I have had cowpox".

(a) Which of the steps used by Jenner is an example of

observation? _____ [1]

validation? _____ [1]

(b) **Use the information given above** to help explain why Jenner's vaccination is an example of artificial, active immunity.

Artificial _____

_____ [1]

Active _____

_____ [1]

We now know that white blood cells, known as phagocytes, are important in protecting the body against diseases.

(c) Describe how phagocytes help protect against diseases.

_____

_____

_____ [2]

Examiner Only	
Marks	Remark
Total Question 13	

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(Questions continue overleaf)

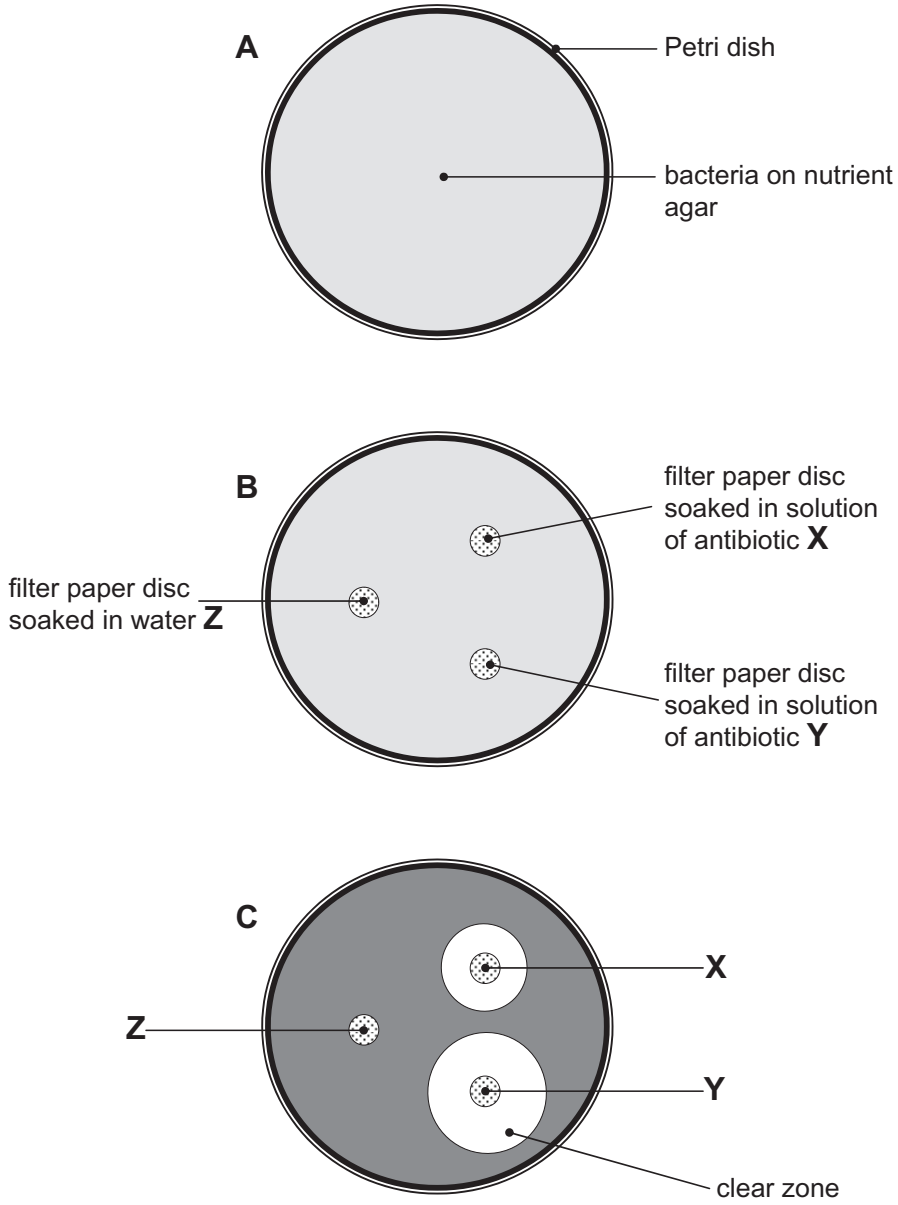
[Turn over

14 A student investigated the effect of two antibiotics **X** and **Y** on the growth of a bacterium.

Examiner Only	
Marks	Remark

She carried out the following procedure using aseptic techniques.

1. 1 ml of bacterial culture was added to a sterile Petri dish containing sterile nutrient agar as shown in diagram **A**.
2. Discs of filter paper were soaked in antibiotic solutions or water and placed on top of the nutrient agar. This is shown in diagram **B**.
3. The Petri dish was sealed, inverted and incubated at no more than 20°C for 48 hours. Diagram **C** shows the appearance of the Petri dish after this time.



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Use evidence from the diagram and the procedure to explain:

- Which antibiotic was most effective
- How the experiment was a fair test
- The safety precautions needed.

In this question, you will be assessed on your written communication skills, including the use of specialist scientific terms.

[6]

Examiner Only	
Marks	Remark
Total Question 14	

THIS IS THE END OF THE QUESTION PAPER

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For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
Total Marks	

Examiner Number

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Rewarding Learning

General Certificate of Secondary Education
2013

Biology

Unit 2

Foundation Tier

[GBY21]

TUESDAY 18 JUNE, MORNING

MARK SCHEME

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General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

				AVAILABLE MARKS
1	**(a)**	Any **two** from: (Lung) cancer; Bronchitis; Emphysema;	[2]	
	(b)	Reduced oxygen carrying capacity/transport/for cells (respiration);	[1]	
	(c)	Nicotine;	[1]	4
2		No/none; Thick; One cell (thick)/thin; Low;	[4]	4
3	**(a)**	50 cm;	[1]	
	(b)	10; and 16 years;	[2]	
	(c)	Mitosis;	[1]	
	(d)	Increased (cell) mass;	[1]	5
4	**(a)**	Percentage of women surviving has increased; 84.5% to 90.6%/by 6.1%;	[1] [1]	
	(b)	Any **two** from: Early detection; Smaller tumour/less cancer cells; Less likely to have spread; **Easier** to treat/operate on/remove;	[2]	
	(c)	Surgery/radiotherapy/chemotherapy;	[1]	5
5	**(a)**	Accurate plots; categories labelled; y-axis scale;	[3]	
	(b)	**(i)** Bar chart;	[1]	
		(ii) Discontinuous;	[1]	
		(iii) Genetic/inherited;	[1]	6

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		AVAILABLE MARKS
6	**Indicative content:** 1 Thin/permeable membrane; 2 O_2 can pass in and out of cell; 3 Biconcave shape/large surface area; 4 Faster O_2 uptake/diffusion into/release from cell; 5 Haemoglobin; 6 Binds to oxygen (when in high concentration); 7 Lacks/no nucleus; 8 More volume/space for haemoglobin/O_2 transport; 9 Flexible/small size; 10 Able to move through capillaries; Each explanation must be in the context of appropriate adaptation to be awarded.	

Response	Marks
Candidates **must use appropriate, specialist terms** throughout to describe and explain how a red blood cell is adapted to oxygen transport **using AT LEAST FIVE OF the above points.** They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
Candidates must use appropriate, specialist terms throughout to describe and explain how a red blood cell is adapted to oxygen transport using **AT LEAST THREE OF** the above points, They use satisfactory spelling, punctuation and grammar and the form and style are of a **satisfactory** standard.	[3]–[4]
Candidates must use appropriate, specialist terms throughout to describe and explain how a red blood cell is adapted to oxygen transport **using AT LEAST ONE OF the above points.** The spelling, punctuation and grammar, form and style are of a limited standard.	[1]–[2]
Response not worthy of credit.	[0]

[6] 6

7 **(a)** **T**, **A**, **G**; [2]

(b) Sugar; [1]

(c) Double helix; [1]

(d) Nucleus; [1] 5

					AVAILABLE MARKS
8	(a)	(i)	1 in 100;	[1]	
		(ii)	Any **two** from: Forgetting to take it (on time); Upset stomach/sick/vomiting/diarrhoea; Other medication may affect it; Other appropriate response;	[2]	
		(iii)	**Advantage:** Any **one** from: Convenient; Does not interrupt sexual intercourse; Reduces premenstrual pain; Reduces bleeding; Protects against some cancers; Other appropriate response; **Disadvantage:** Any **one** from: May increase risk of blood clotting, breast cancer or cervical cancer; May cause headaches; May cause tender breasts; Other appropriate answer;	[2]	
		(iv)	Male sterilisation; Female condom;	[2]	
	(b)		Surgical;	[1]	8
9	(a)	(i)	Different form of **gene**;	[1]	
		(ii)	Meiosis;	[1]	
	(b)	(i)	Punnett square;	[1]	
		(ii)	Gametes: Pamela – n, Tony – N; Offspring correct: NN, Nn, Nn, nn; **Accept:** ECF (after wrong gametes given)	[1] [2]	
		(iii)	3:1;	[1]	
		(iv)	Half/50%;	[1]	
		(v)	Could be NN; or Nn;	[2]	10

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10 (a) Prevent evaporation from (surface of) water; [1]

(b) Indicative content:

1 Water absorbed by plant roots;
2 By osmosis;
3 Passes up stem/to leaves;
4 Evaporates from mesophyll cells;
5 Diffuses;
6 Across/through air spaces;
7 Leaves through stomata;
8 Transpiration;

Response	Marks
Candidates **must use appropriate, specialist terms** throughout to describe and explain how the plant causes the loss of mass in the flask **using AT LEAST FIVE OF the above points.** They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
Candidates must use appropriate, specialist terms throughout to describe and explain how the plant causes the loss of mass in the flask using **AT LEAST THREE OF** the above points. They use satisfactory spelling, punctuation and grammar and the form and style are of a **satisfactory** standard.	[3]–[4]
Candidates must use appropriate, specialist terms throughout to describe and explain how the plant causes the loss of mass in the flask **using AT LEAST ONE OF the above points.** The spelling, punctuation and grammar, form and style are of a limited standard.	[1]–[2]
Response not worthy of credit.	[0]

[6]

(c) Any **one** from:
Only one variable changed;
Same time/duration;
Same volume of water in flask;
Same shoot/plant;
Same volume of oil;
Same temperature; [1]

(d) 12 ÷ 24; [1]
0.5 (g per hour); [1]

(e) Greater loss in mass of flask in windy conditions; [1]
48 g vs 12 g/2 g per hour vs 0.5 g per hour; [1]

(f) Use a fan; [1]

(g) Temperature;
Humidity; [1]
Light/dark; [1]

AVAILABLE MARKS

15

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					AVAILABLE MARKS
11	**(a)**	**(i)**	Head/nucleus;	[1]	
		(ii)	Contains half the number of chromosomes/haploid; **Accept:** Contains enzymes to help entry into egg;	[1]	
		(iii)	Tail/flagellum;	[1]	
		(iv)	Some are further away (from camera) than others/reference to 3D image;	[1]	
	(b)		Zygote;	[1]	5
12	**(a)**	**(i)**	Bar workers' health has improved; Any **one** from: Eye irritation from 82% to 51%/31% less; Sneezing from 75% to 34%/41% less; Coughing from 87% to 67%/20% less;	[2]	
		(ii)	Sneezing;	[1]	
	(b)		Reduces passive smoking/the amount of smoke in the air they are forced to breathe in;	[1]	
	(c)		Freedom of choice/rights of the smoker/fall in revenue;	[1]	5
13	**(a)**		D; B;	[1] [1]	
	(b)		**Artificial** – Infected/injected/introduced **by man**; **Active** – body/patient/person who is being vaccinated **produces own antibodies**;	[1] [1]	
	(c)		**Engulf** bacteria/viruses; **Digest** bacteria/viruses;	[2]	6

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14 Indicative content:

Maximum of **two** from points 1, 2 and 3.

1 Y;

2 Has largest (diameter of) clear zone/correct (comparative) measurement of **Y** clear zone (diameter);

3 More **bacteria** are killed/affected/the less resistant the bacterium is to the antibiotic;

Maximum of **two** from points 4, 5 and 6.

4 Water is control/for comparison with the antibiotic solutions;

5 Concentration of antibiotic solution/size of filter paper/incubation time/ nutrient agar/type or amount of bacteria/temperature, [kept constant/same/controlled];

6 Only one variable changed/investigated;

Maximum of **two** from points 7, 8 and 9.

7 Incubated at 20 °C **or below**;

8 Seal plates/don't open plates;

9 Sterile [/sterilise] apparatus [/equipment/agar]/aseptic techniques described;

Response	**Marks**
Candidates must use appropriate, specialist terms throughout to explain the conclusion and why the experiment was a fair test **using AT LEAST FIVE of the points above.** They use good spelling, punctuation and grammar and the form and style are of a high standard.	[5]–[6]
Candidates use some appropriate, specialist terms throughout to explain the conclusion and why the experiment was a fair test using **AT LEAST THREE of the points above.** They use **satisfactory** spelling, punctuation and grammar and the form and style are of a satisfactory standard.	[3]–[4]
Candidates **make little use of** specialist terms throughout to explain the conclusion and why the experiment was a fair test using **AT LEAST ONE of the points above.** The spelling, punctuation and grammar, form and style are of a **limited** standard.	[1]–[2]
Response not worthy of credit.	[0]

[6] 6

Total **90**

AVAILABLE MARKS