

**GCSE**

**BIOLOGY A**

Biology A Unit 3 Ideas in Context plus B7

**Specimen Paper**

Candidates answer on the question paper:

Additional materials: ruler (cm/mm), calculator

**F** **A223/01**

1 hour

Candidate  
Name

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Centre  
Number

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Candidate  
Number

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**TIME** 1 hour

**INSTRUCTIONS TO CANDIDATES**

- Write your name, centre number and candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers on the dotted lines unless the question says otherwise.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- There is a space after most questions. Use it to do your working. In many questions marks will be given for a correct method even if the answer is incorrect.
- Do not write in the bar code. Do not write in the grey area between the pages.
- **DO NOT WRITE IN THE AREA OUTSIDE THE BOX BORDERING EACH PAGE. ANY WRITING IN THIS AREA WILL NOT BE MARKED.**

**INFORMATION FOR CANDIDATES**

- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **55**.

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**This specimen paper consists of 28 printed pages.**

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Answer **all** the questions.

1. This question is about photosynthesis.
  - (a) Put rings around **two** substances used in photosynthesis.

**carbon dioxide**

**cellulose**

**nitrogen**

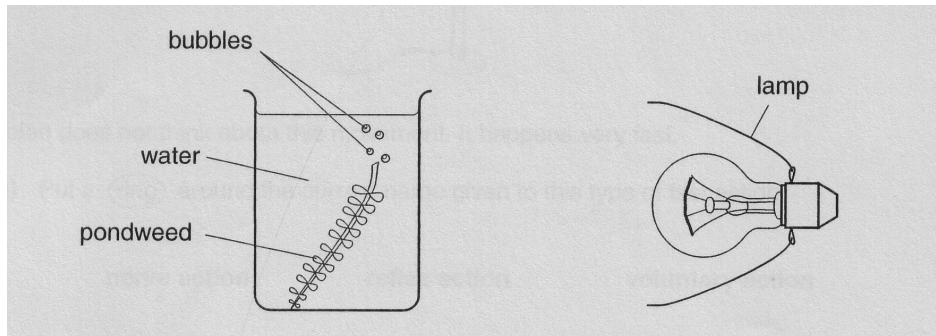
**oxygen**

**water**

[2]

(b) Ayesha does an experiment to show photosynthesis in pondweed.

The diagram shows the apparatus she uses.



Ayesha measures the distance of the pondweed from the lamp.

She waits ten minutes. Then she counts the number of bubbles given off by the pondweed in two minutes.

She moves the lamp away from the pondweed, and repeats the experiment.

The table shows her results.

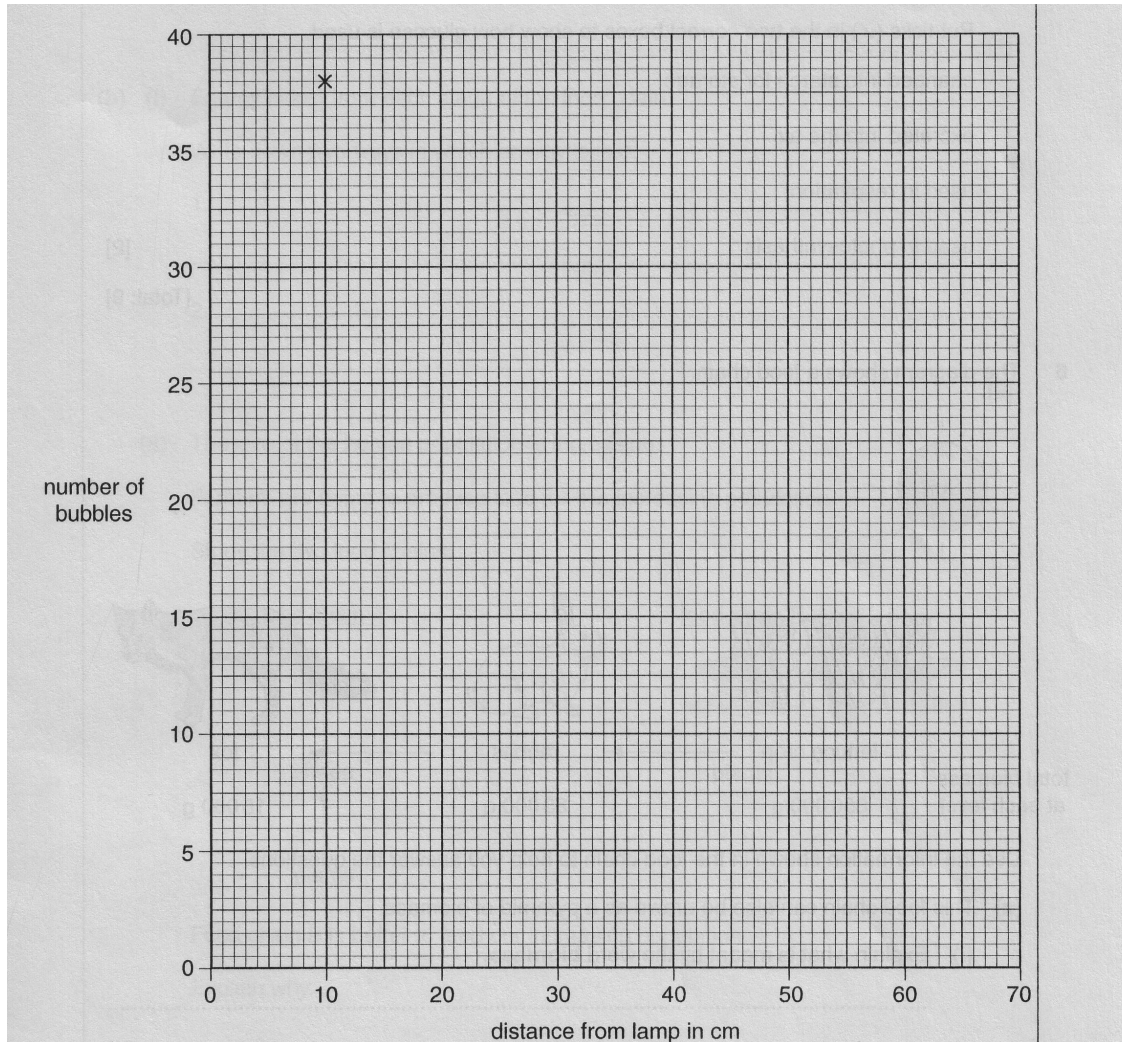
distance from lamp in cm	number of bubbles every two minutes
10	38
20	30
30	-
40	15
50	12
60	10
70	10

(i) Plot the points on the grid. The first one has been done for you.

[2]

(ii) Finish the graph by drawing the best curve.

[1]



(iii) Use your graph to find how many bubbles there will be when the lamp is 30cm away.

You **must** show clearly, **on the graph**, how you get your answer.

answer = .....bubbles [2]

(iv) Ayesha is worried that the lamp might be changing the temperature of the water.

Explain why this might make her experiment less reliable.

One mark is for a clear ordered answer.



.....

..... [2+1]

(c) During photosynthesis, glucose is made.

Plants use glucose in different ways.

Put ticks (✓) in the **two** correct boxes to show how glucose is used.

changed into starch for storage

excreted into air

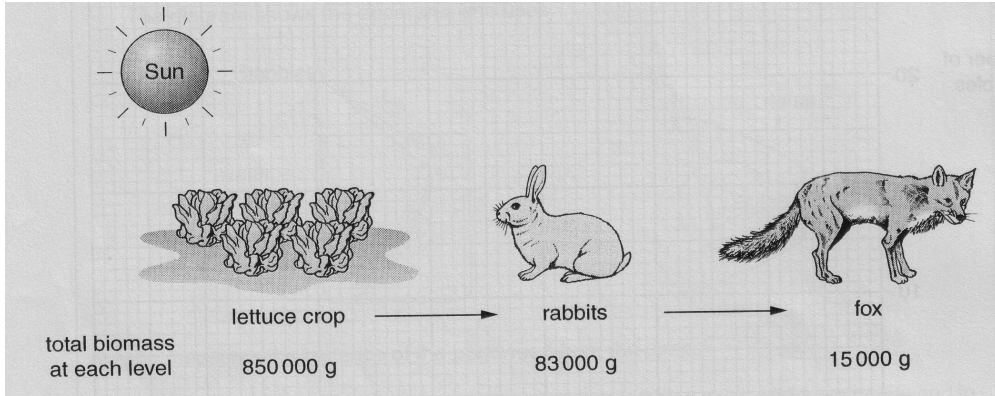
used in respiration

used in photosynthesis

[2]

[Total: 12]

2. The diagram shows a food chain.



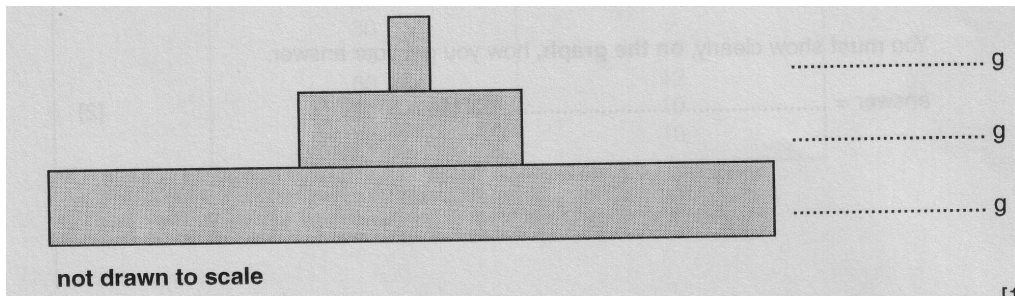
Use the information shown in the food chain to help you answer the questions.

(a) This food chain can also be drawn as a pyramid of biomass.

(i) Explain what is meant by the word **biomass**.

.....  
 .....[1]

(ii) Finish the pyramid by writing the biomass at each stage.



[1]

(iii) Energy is passed on through the food chain.

What is the source of energy for the plants?

.....[1]

(b) Energy is lost from each stage of the food chain.

Write down **two** ways in which energy is lost.

1. ....

.....

2. ....

.....[2]

[Total: 5]



3. Scientists have created the world's first genetically modified elm tree.

Between the late 1960s and the 1990s, many elm trees in Britain were attacked by Dutch Elm Disease.

More than 25 million elm trees in Britain were killed.

- (a) Scientists use genetic engineering to develop genetically modified trees.

Here are four sentences (**A-D**) about how genetic engineering is performed.

They are in the wrong order.

Fill in the boxes to show the correct order.

The first one has been done for you.

- A** Put disease-resistant gene into cells of elm tree.
- B** Scientists work out how to grow elm tree cells into young trees.
- C** Find disease-resistance gene.
- D** Grow cells into young trees.

<b>B</b>			
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[2]

(b) Suggest **one** reason why some scientists are concerned about introducing genetically modified trees into our environment.



One mark is for correct spelling.

.....

..... [1+1]

[Total: 4]

4. Jane's heart rate is normally 73 beats per minute. Jane did an experiment to see how exercise affected her heart rate.

The table shows Jane's heart rate at different times.

time after exercise in minutes	0	2	4	6	8	10	12	14
heart rate in beats per minute	115	99	92	86	80	76	73	73

- (a) After exercise her heart rate had increased.

Use Jane's results to complete the following sentences.

Jane's highest heart rate during the experiment was.....beats per minute.

This was an increase of..... compared to her normal heart rate.

[2]

(b) Explain why Jane's heart rate increases during exercise.

Use the following words in your answer.

**carbon dioxide    muscles    oxygen    respiration**

One mark is for a clear ordered answer.



.....  
.....  
.....  
.....  
..... [3+1]

(c) Jane's heart rate returns to normal.

How many minutes does this take?

.....[1]

(d) Jane's friend Sue has a resting heart rate of 71.

She is worried that it is different to Jane's heart rate.

Should Sue worry about this difference?

.....  
.....[2]

[Total: 9]

5.

**Is 'Bird Flu' coming our way?**

<b>What is bird flu?</b>	<b>The Government plan for bird flu</b>
<p>Bird flu was thought only to infect birds until the first human cases were seen in Hong Kong in 1997.</p> <p>Humans can catch the disease through close contact with live infected birds.</p> <p>Flu produces symptoms which are similar to other types of flu such as fever, sore throats and coughs.</p> <p>The World Health Organisation said that, by the end of January 2005, there had been 55 confirmed cases of bird flu and 42 deaths in Asia.</p> <p>There are signs that bird flu can be passed from person to person.</p> <p>In Thailand a girl who had the disease may have passed the virus to her mother. They both died. The girl's aunt, who was also infected, survived the virus.</p> <p>Fortunately the normal virus only seems to pass to close relatives and spreads no further.</p>	<p>In a normal year between 12 000 and 18 000 people die in Britain from normal flu.</p> <p>The British government have started preparing for an epidemic of modified bird flu.</p> <p>They have produced a plan to buy 14.6 million courses of an antiviral drug called Tamiflu.</p> <p>Experts say that the government should order supplies of the vaccine against the normal bird flu that is present in Asia.</p> <p>Of course this might not work against a modified bird flu virus.</p> <p>Another difficulty at the moment is that the main vaccine factory in Britain has been having problems.</p> <p>It was closed for a while because microorganisms were contaminating the vaccine.</p> <p>Animal-rights protesters have also been targeting the factory.</p>

### How bird flu vaccine is made

Bird flu virus is first weakened



It is then grown on hens' eggs



Genetic material from the virus is extracted and mixed with genetic material from other known strains.



The vaccine is then tested on animals



Human testing then takes place

### How serious is the threat?

	number of people who will die in Britain		
death rate %	if 10% are infected	if 25% are infected	if 50% are infected
1.0	56 700	141 800	283 700
1.5	85 100	212 800	425 500
2.0	141 800	354 600	709 300

(a) Flu usually produces similar effects on most people.

(i) Put a **ring** around one of these effects.

**blindness**

**fever**

**weak bones**

[1]

(ii) The following four steps happen if a person catches bird flu.

**A**

body cells are  
damaged

**B**

virus is breathed  
in

**C**

close contact with  
birds

**D**

virus reproduces  
in the lungs

Write the letters to show the correct order in which the steps happen.

The first one has been done for you.

<b>C</b>			
----------	--	--	--

[2]

**(b)** The number of people who die from any disease depends on two factors.

- The percentage of people who are infected
- The percentage of these people who die, (the percentage death rate).

**(i)** In 1918 a new strain of flu virus caused an epidemic in Britain.

It infected about 45% of the population.

The percentage death rate was 1%.

Put a ring around the number of people who died of the flu in 1918.

Use the table in the article to help you.

**50 000**

**100 000**

**150 000**

**250 000**

[1]

**(ii)** The article says that 55 people in Asia have been infected by normal bird flu.

Of these people, 42 have died.

Work out the percentage death rate.

..... % [2]



- (iii) The percentage death rate for people with normal bird flu is very high.

Despite this, scientists do not think that normal bird flu is much of a threat to people.

Tick (✓) one box next to the reason why they think this.

People who catch it are very unlikely to die.

It does not pass very easily from person to person.

Only people in Asia can be infected.

[1]

- (c) The article says that it is possible to make a vaccine against normal bird flu.

- (i) Put a tick (✓) in the box next to the best definition of a vaccine.

A drug that is taken that attacks the virus in the body.

A chemical that is sprayed on infected surfaces.

A weakened form of the virus that prepares the body so it attacks the virus if it enters the body.

[1]

- (ii) When the vaccine is made, the virus is grown on hens' eggs.

Why are eggs from hens used?

.....[1]

(iii) Explain why the vaccine tested on animals before humans.



One mark is for correct spelling.

.....  
.....  
..... [2+1]

(iv) Suggest why animal-rights protesters are targeting the vaccine factory.

.....  
.....  
.....  
..... [2]

(d) The article says that the normal bird flu vaccine may not work on a modified bird flu virus.

The government are therefore storing a drug called Tamiflu.

Tamiflu is not an antibiotic.

Why can't bird flu be treated with antibiotics?

.....  
..... [1]

[Total: 15]

6. Some footballers suffer from injuries to their joints.

(a) Draw one line from each part of a joint to the function of that part.

Use each part only once.

**part of a joint**

Ligaments

Tendons

Muscles

synovial fluid

**function**

join bone to bone

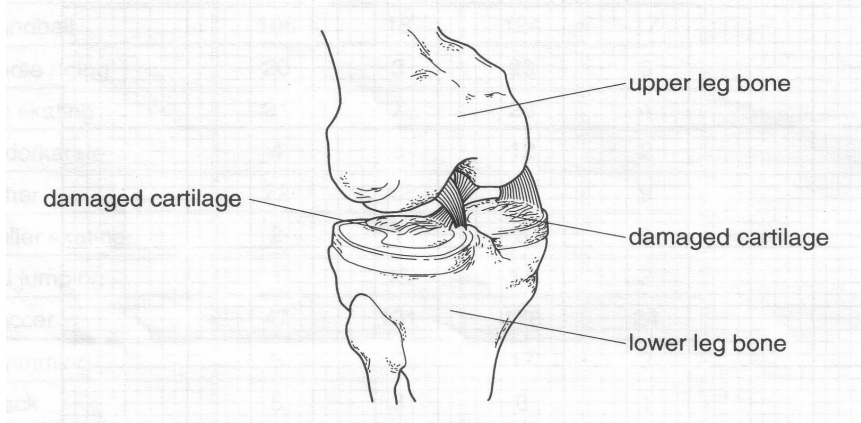
move the bones at a  
joint

reduce friction between  
bones

join muscles to bone

[3]

(b) A common injury to footballers' knees is shown in this diagram.



When the cartilages are damaged the joint may become swollen and movement may be painful.

Why are there cartilages in the knee joint?

.....[1]

(c) A footballer with a damaged knee decides to visit an expert in sports injuries.

The expert asks the footballer a number of questions before he examines his knee.

Suggest **two** questions that he might ask the footballer.

1. ....

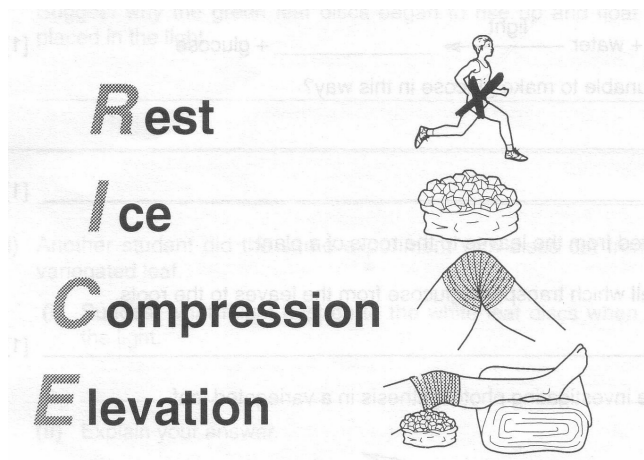
.....

2. ....

.....[2]

(d) The immediate treatment for a knee injury is called RICE.

This is shown in the following diagram.



Use this diagram and your biological knowledge to answer the following questions.

(i) Why does a person with a joint injury have to rest?

.....  
 .....[1]

(ii) If a joint becomes swollen people often apply ice to the swollen area.

Suggest why using ice helps to reduce the swelling.

.....  
 .....[1]

- (iii) Sometimes people put an elastic bandage around the swollen joint. They are advised to make sure that the bandage is not too tight.

Suggest a reason for this advice.

.....  
.....[1]

- (iv) Suggest why raising the injured joint above the level of the heart helps reduce the swelling.

.....  
.....[1]

[Total: 10]

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**GCSE**

**BIOLOGY A**

Biology A Unit 3 Ideas in Context plus B7

**Specimen Mark Scheme**

Maximum mark for this paper is [55]

**F** **A223/01**

1 hour

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**This specimen mark scheme consists of 4 printed pages.**

Question Number	Answer	Max Mark
<p>1(a)</p> <p>1(b)i</p> <p>1(b)ii</p> <p>1(b)iii</p> <p>1(b)iv</p> <p>1(c)</p>	<p>Carbon dioxide; Water;</p> <p>Correct plots; <b>Deduct one mark per error</b></p> <p>Best curve;</p> <p>Reading from graph; Correct lines drawn;</p> <p>Change the rate of photosynthesis; Any reason why eg enzymes; <b>One mark for a clear link between explanation and reason;</b></p> <p>Changed into starch for storage; Used in respiration;</p> <p style="text-align: right;"><b>Total marks</b></p>	<p>[2]</p> <p>[2]</p> <p>[1]</p> <p>[2]</p> <p>[2]</p> <p>[1]</p> <p>[2]</p> <p>[12]</p>
<p>2(a)i</p> <p>2(a)ii</p> <p>2(a)iii</p> <p>2(b)</p>	<p>Mass of living material; 15000 83000 850000;</p> <p>Sun;</p> <p><b>Two from:</b> Respiration; Heat; Excretion; Moving; Uneaten parts; Death;</p> <p style="text-align: right;"><b>Total marks</b></p>	<p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[2]</p> <p>[5]</p>
<p>3(a)</p> <p>3(b)</p>	<p>B C A D C before A; A before D;</p> <p>Worried about the gene spreading to other plants/ Worried about the elm trees becoming pests/ Worried about the effect on animals feeding on the elm; <b>One mark for correct spelling;</b></p> <p style="text-align: right;"><b>Total marks</b></p>	<p>[2]</p> <p>[1]</p> <p>[1]</p> <p>[4]</p>

4(a)	115; 42;	[2]
4(b)	<b>Three from:</b> Jane's muscles working harder; More respiration; Need to supply more oxygen; Remove more carbon dioxide; <b>One mark for a clear ordered answer.</b>	[3] [1]
4(c)	12 minutes;	[1]
4(d)	Very little difference / probably not significant; Peoples heart rates show variation;	[2]
<b>Total marks</b>		<b>[9]</b>
5(a)i	Fever;	[1]
5(a)ii	C,B,D,A B before D; D before A;	[2]
5(b)i	250 000	[1]
5(b)ii	$42/55 \times 100 = 76.36\%$	[2]
5(b)iii	It does not pass very easily from person to person;	[1]
5(c)i	A weakened form...	[1]
5(c)ii	The virus usual reproduces/grows/lives in birds / hens are birds;	[1]
5(c)iii	To see if it works; To see if it is harmful;	[2]
<b>One mark for correct spelling;</b>		<b>[1]</b>
5(c)iv	The factory is using animals to produce/test the virus; They believe that it is cruel to the animals;	[2]
5(d)	Antibiotics only work on bacteria / Antibiotics don't work on viruses;	[1]
<b>Total marks</b>		<b>[15]</b>

<p><b>6(a)</b></p>	<p>Ligaments = bone to bone Tendons = muscle to bone Muscles = move the bones at a joint Synovial fluid = reduce friction at a joint</p>	<p>[3]</p>
<p><b>6(b)</b></p>	<p>Stop the bones rubbing together / absorb shock;</p>	<p>[1]</p>
<p><b>6(c)</b></p>	<p><b>Two from:</b> Symptoms; Current medication; Alcohol and tobacco consumption; Previous treatments/problems; Family history;</p>	<p>[2]</p>
<p><b>6(d)i</b></p>	<p>Prevent further damage / Provide opportunity for healing;</p>	<p>[1]</p>
<p><b>6(d)ii</b></p>	<p>Reduce temperature / Reduce blood flow;</p>	<p>[1]</p>
<p><b>6(d)iii</b></p>	<p>It would cut off blood supply to the injured limb;</p>	<p>[1]</p>
<p><b>6(d)iv</b></p>	<p>Makes it easier for blood to flow back to the heart;</p>	<p>[1]</p>
<p style="text-align: right;"><b>Total marks</b></p>		<p>[10]</p>
<p style="text-align: right;"><b>Overall marks</b></p>		<p>[55]</p>