

Write your name here

Surname

Other names

**Pearson Edexcel Certificate**  
**Pearson Edexcel**  
**International GCSE**

Centre Number

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Candidate Number

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**Biology**  
**Unit: KBI0/4BI0**  
**Paper: 2B**Thursday 14 January 2016 – Morning  
**Time: 1 hour**

Paper Reference

**KBI0/2B**  
**4BI0/2B****You must have:**Calculator  
Ruler

Total Marks

## Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- Show all the steps in any calculations and state the units.

## Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*

## Advice

- Read each question carefully before you start to answer it.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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**PEARSON**

**Answer ALL questions.**

- 1 Read the passage below. Use the information in the passage and your own knowledge to answer the questions that follow.

**Therapeutic Cloning versus Reproductive Cloning**

Some people find the idea of cloning frightening. They have an image of identical human beings being created by scientists. This is why some people were concerned when Dolly the sheep was created by reproductive cloning.

- 5 Therapeutic cloning is different as it could help to repair damaged tissue, for example in the treatment of diabetes, heart disease or the loss of photoreceptors in the eye that cause blindness.

- 10 The procedure involves putting an adult body cell nucleus into an enucleated egg cell. This egg cell is then stimulated to divide into an embryo. Some cells in this embryo are called stem cells. This means they have the ability to develop into many different cell types. The stem cells are removed and can be used to treat diseases in any body organ or tissue by replacing the damaged cells.

- 15 This type of therapy reduces the risk of rejection by the immune system. Cells from another person would be recognised as being foreign and would be attacked by the immune system. This rejection of foreign tissue is a major challenge of organ transplants, alongside the fact that there is a huge shortage of available organs for donation.

- 20 Some scientists hope that the stem cells created by therapeutic cloning might be useful in the treatment of heart disease. Heart disease is a major cause of death in the UK. It reduces the transport of oxygen to heart muscle cells and eventually kills them. The remaining living cells attempt to keep the heart pumping but heart failure may occur. Replacing damaged heart muscle tissue using stem cells, created by therapeutic cloning, may offer people a chance to survive heart failure. Studies show that stem cells injected directly into damaged heart tissue improve heart function and help with the formation of new capillaries.

- 25 Therapeutic cloning does result in the destruction of an embryo after the stem cells are removed and this destruction has caused concern over the morality of the procedure. Also, because therapeutic cloning uses a body cell nucleus, there is still concern that a scientist may attempt to move beyond therapeutic cloning and create a cloned human being.



(a) In cloning, an adult body cell nucleus is put into an enucleated egg cell.

What is meant by the term **enucleated** (line 7)?

(1)

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(b) Name the part of the eye that contains photoreceptors (line 5).

(1)

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(c) Explain why reducing the transport of oxygen to heart muscle cells will make them contract less efficiently and may kill these cells (lines 19 and 20).

(4)

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(d) The formation of new capillaries helps to improve heart function (line 24).

Explain how the structure of a capillary is adapted to help improve heart function.

(2)

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(e) Give two advantages of using organs produced by therapeutic cloning compared to using donated organs.

(2)

1 .....

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(f) Dolly the sheep was created by reproductive cloning (line 3).

Explain how a mammal such as Dolly the sheep has been cloned.

(5)

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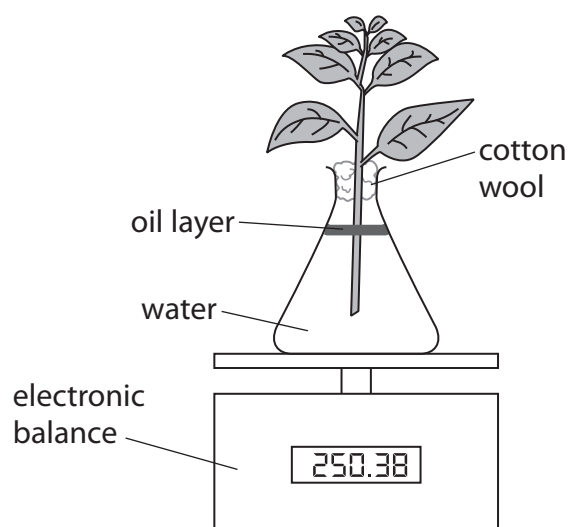
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**(Total for Question 1 = 15 marks)**



2 A student sets up this apparatus to investigate the transpiration rate of a plant.



(a) (i) Suggest how the student could determine the transpiration rate of the plant.

(2)

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(ii) Draw a diagram of the apparatus that the student should set up as a control.

(3)



(b) The student changes the conditions in which the plant is kept. This affects the transpiration rate of the plant.

Complete the table by giving the missing information.

(5)

Change of condition	Change in transpiration rate	Explanation for change in transpiration rate
warmer air		
put in the dark	decrease	
increased wind	increase	
increased humidity		decreased concentration gradient

(c) Explain why transpiration is important to plants.

(2)

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**(Total for Question 2 = 12 marks)**



- 3 The table gives information about what happens to energy in food eaten by a mammal and in food eaten by a fish.

	Percentage of energy in the food that is absorbed	Percentage of absorbed energy released by respiration	Percentage of absorbed energy assimilated into biomass
Mammal (cow)	37.5	89.1	10.9
Fish (trout)	86.0	65.0	35.0

- (a) Suggest why the cow absorbs a lower percentage of energy from the food it eats than the fish.

(2)

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- (b) Suggest why the cow releases more of the absorbed energy by respiration than the fish.

(1)

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(c) The data suggests that fish farming is more productive than farming cows.

Using your knowledge of energy transfer, suggest two ways in which the productivity of cows could be improved. (4)

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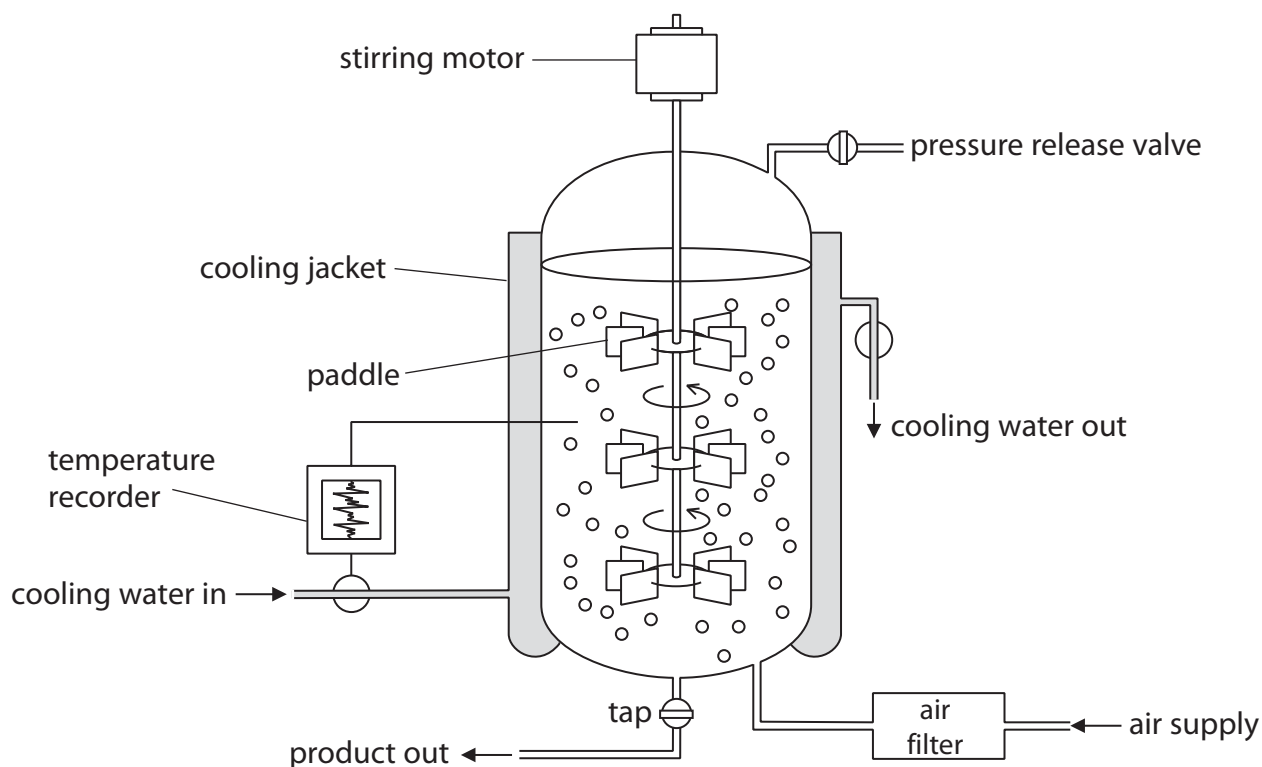
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**(Total for Question 3 = 7 marks)**



4 The diagram shows a fermenter used for growing micro-organisms.



(a) (i) Explain the function of the paddles in the fermenter.

(2)

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(ii) Explain why the pH in the fermenter needs to be controlled.

(2)

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(iii) Name one useful product that can be made in this fermenter.

(1)

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(b) Some micro-organisms grown in anaerobic conditions will produce a fuel called biogas.

Explain two changes that need to be made to the design of the fermenter so it can be used to produce biogas by anaerobic fermentation.

(2)

1 .....

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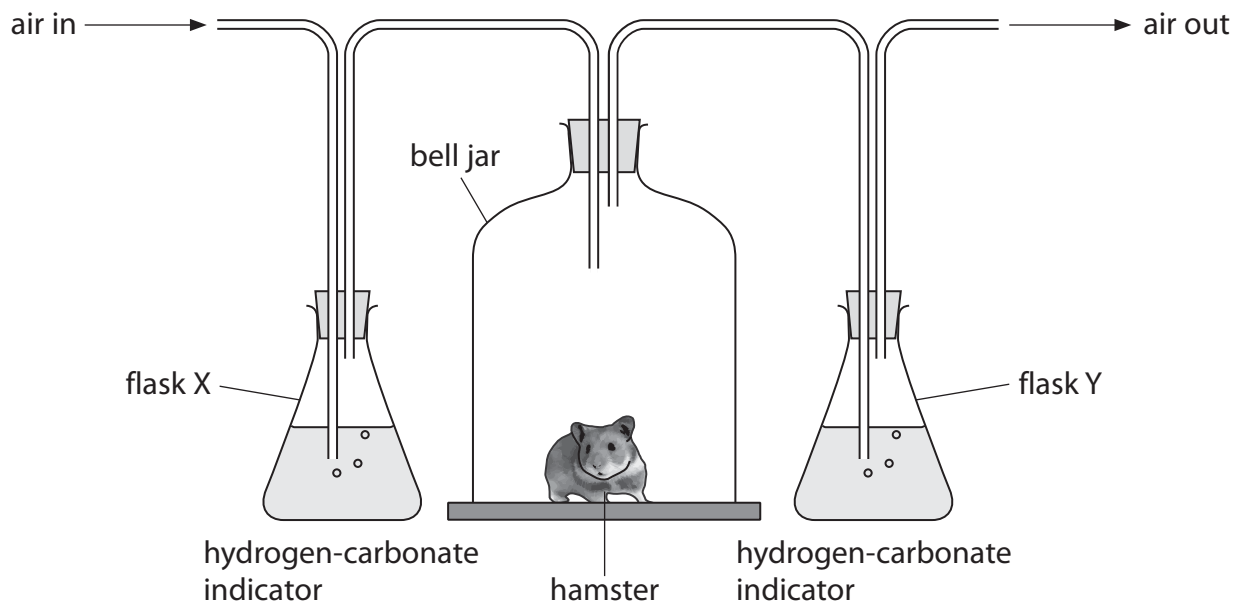
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**(Total for Question 4 = 7 marks)**



5 A scientist uses this apparatus to find out if body size affects the rate of respiration in hamsters, which are small mammals.



She puts a small hamster into a bell jar and measures the time taken for the hydrogen-carbonate indicator to change colour in flask Y.

She then repeats the experiment with a bigger hamster.

(a) (i) State the colour that the hydrogen-carbonate indicator would be in flask X and flask Y at the end of each experiment.

(2)

flask X.....

flask Y.....

(ii) Explain the colour change of the hydrogen-carbonate indicator in flask Y at the end of each experiment.

(1)

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(b) The table shows the scientist's results.

Time taken to change the colour of the hydrogen-carbonate indicator in flask Y in minutes	
Small hamster	Big hamster
6	8

(i) Hamsters need to maintain a constant body temperature.

Use this information and your knowledge to explain the difference in these results.

(2)

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(ii) Explain why hamsters need to maintain a constant body temperature.

(2)

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(c) The scientist's results are not reliable and might not be accurate.

(i) Explain why her results are not reliable.

(1)

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(ii) Explain why her method might not produce accurate results.

(1)

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(d) Give three variables that the scientist should control in her experiments.

(3)

1 .....

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2 .....

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3 .....

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**(Total for Question 5 = 12 marks)**



**6** Plants can reproduce sexually and produce seeds.

These seeds can remain dormant for long periods of time before germination takes place.

(a) What is meant by the term **germination**?

(1)

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(b) Explain three conditions needed for seeds to germinate.

(6)

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**(Total for Question 6 = 7 marks)**

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**TOTAL FOR PAPER = 60 MARKS**





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