

Candidate Name	Centre Number	Candidate Number
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**GCSE**

235/02

**SCIENCE  
HIGHER TIER  
BIOLOGY 1**

A.M. TUESDAY, 17 June 2008

45 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	6	
2.	4	
3.	5	
4.	5	
5.	5	
6.	6	
7.	6	
8.	7	
9.	6	
<b>Total</b>	<b>50</b>	

**ADDITIONAL MATERIALS**

In addition to this paper you may require a calculator.

**INSTRUCTIONS TO CANDIDATES**

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

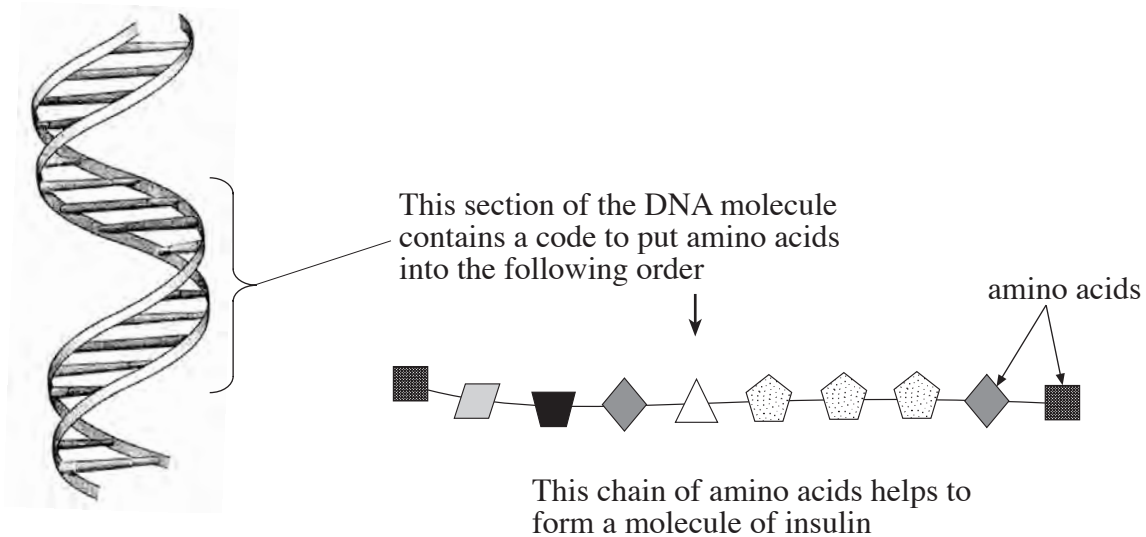
**INFORMATION FOR CANDIDATES**

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

Answer **all** questions.

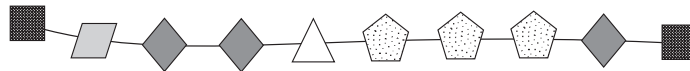
1. The diagram below shows a section of a molecule of DNA.



- (a) What name is given to the section of DNA that contains the code for insulin? [1]

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- (b) A hospital patient was found to have a fault in his DNA which resulted in him producing the following sequence of amino acids in his insulin.



- (i) Draw a circle around the part of the insulin molecule that has changed. [1]
- (ii) What name is given to this type of fault in the DNA? [1]
- .....
- (c) Which groups of chemicals does insulin belong to? [2]  
Underline **two** answers:

Carbohydrates

Lipids

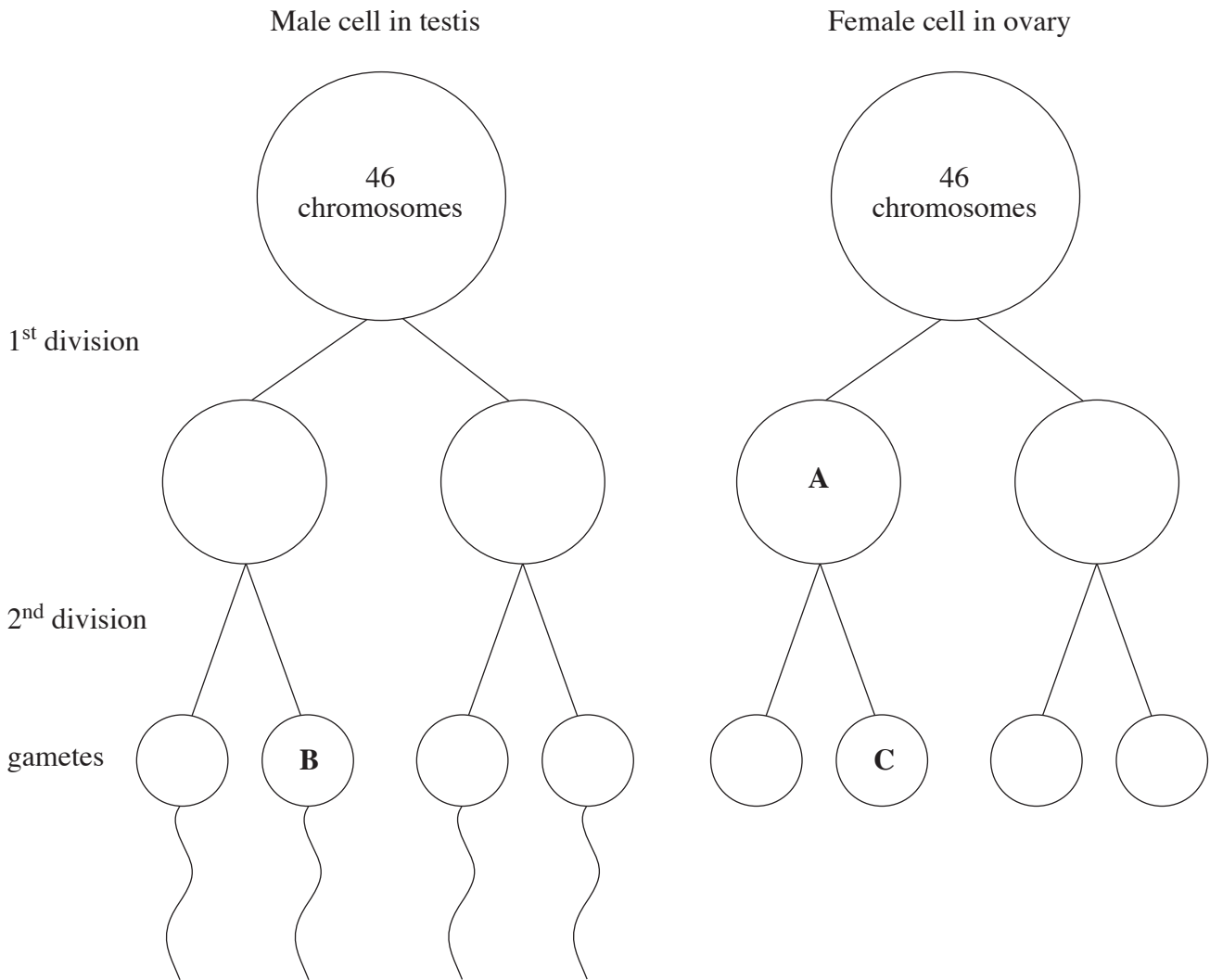
Hormones

Enzymes

Proteins

- (d) Give **one** example of the use that can be made of 'DNA fingerprints'. [1]

2. The diagram shows the production of human gametes by a type of cell division called meiosis.



(a) State the number of chromosomes in:

(i) cell **A** ..... [1]

(ii) cell **B** ..... [1]

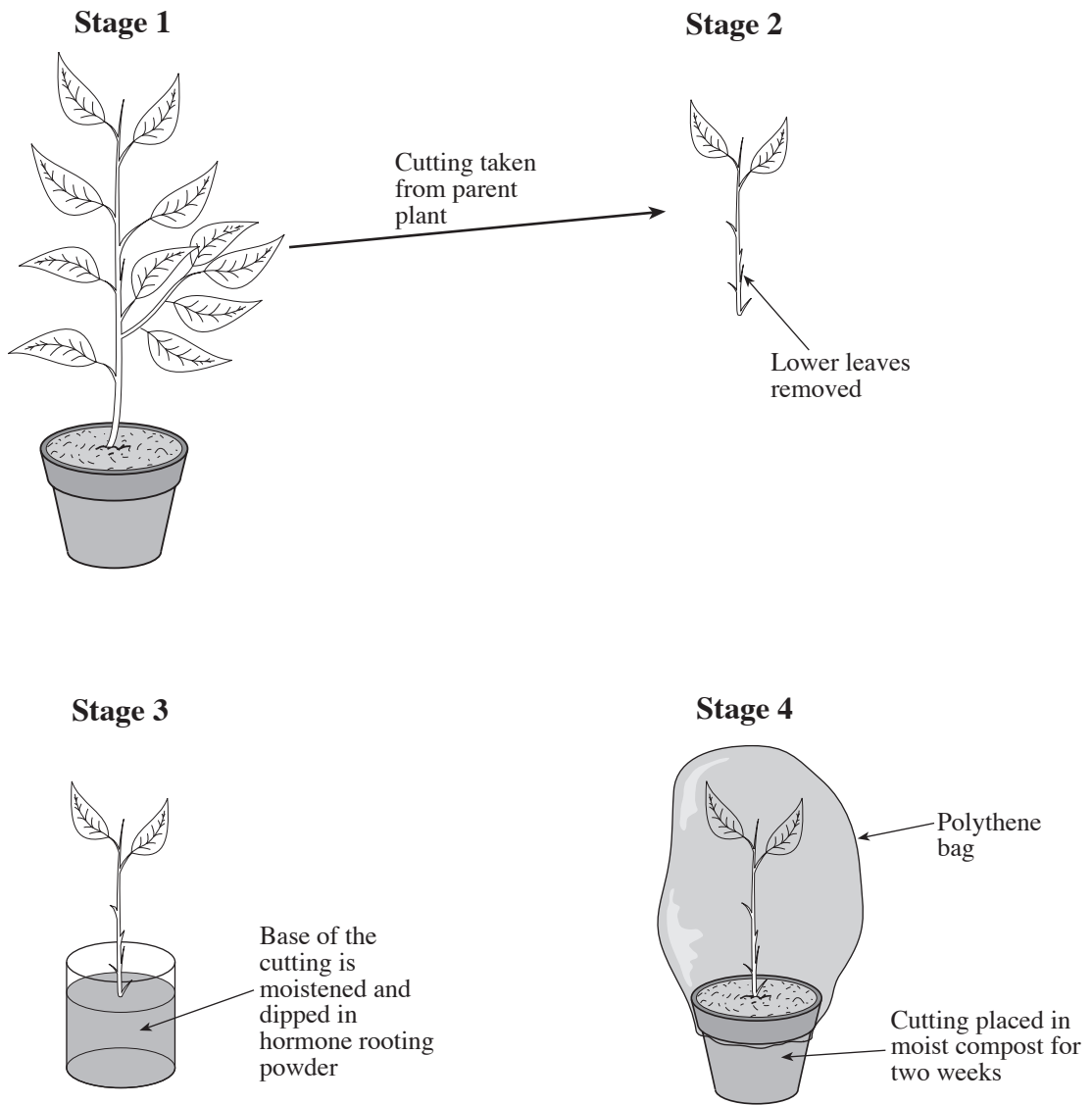
(b) What type of gamete is cell **C**? [1]

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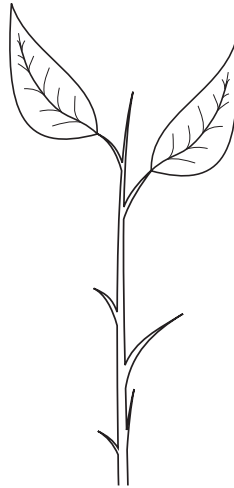
(c) State **one** reason why meiosis takes place when gametes are produced. [1]

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 .....

3. (a) A stem cutting is taken from a plant and prepared as follows:



- (i) After two weeks the cutting was removed from the compost, washed carefully and examined. Complete the diagram below to show the appearance of the cutting. [1]



- (ii) Suggest **one** reason why the lower leaves were removed in stage 2 and the cutting was placed under a polythene bag in stage 4. [1]

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.....

- (b) Explain why the cutting, when fully grown, will look exactly like the parent plant. [2]

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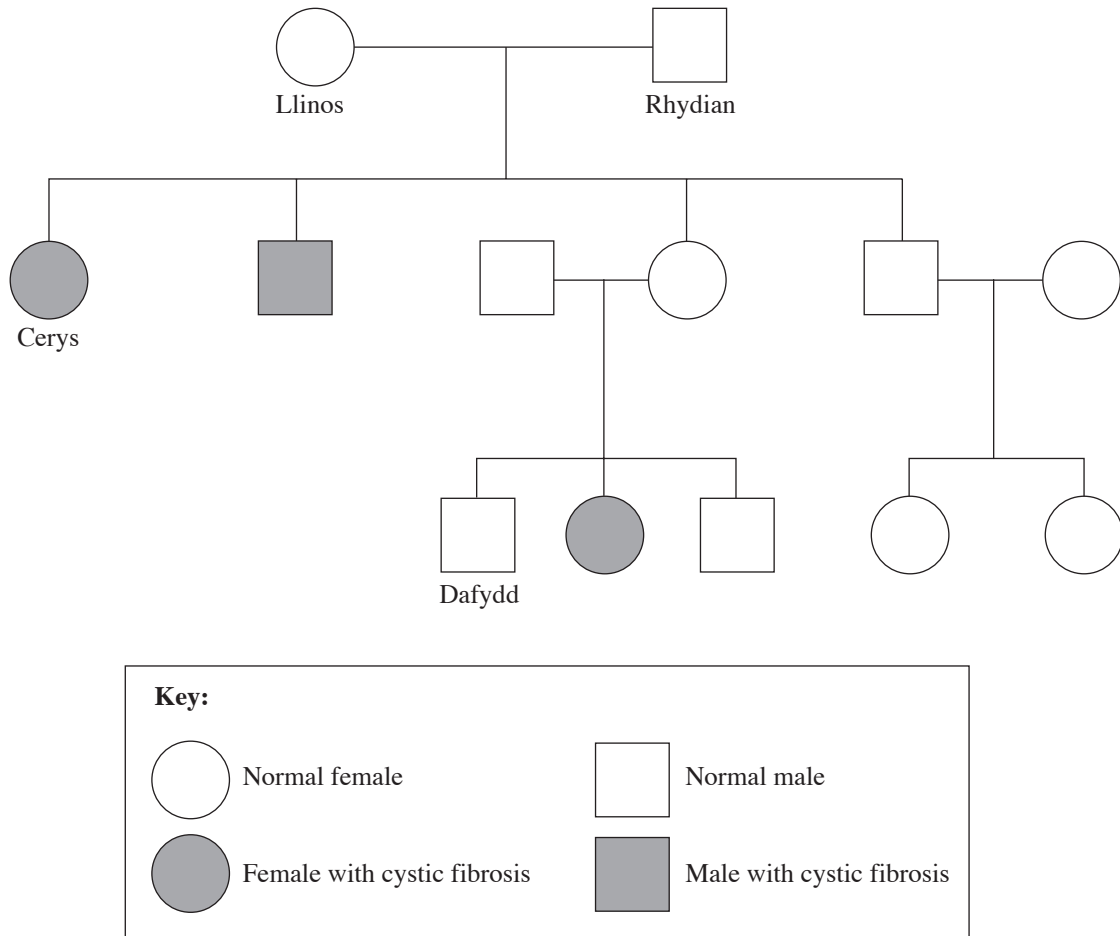
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- (c) State **one** commercial advantage of producing plants from cuttings. [1]

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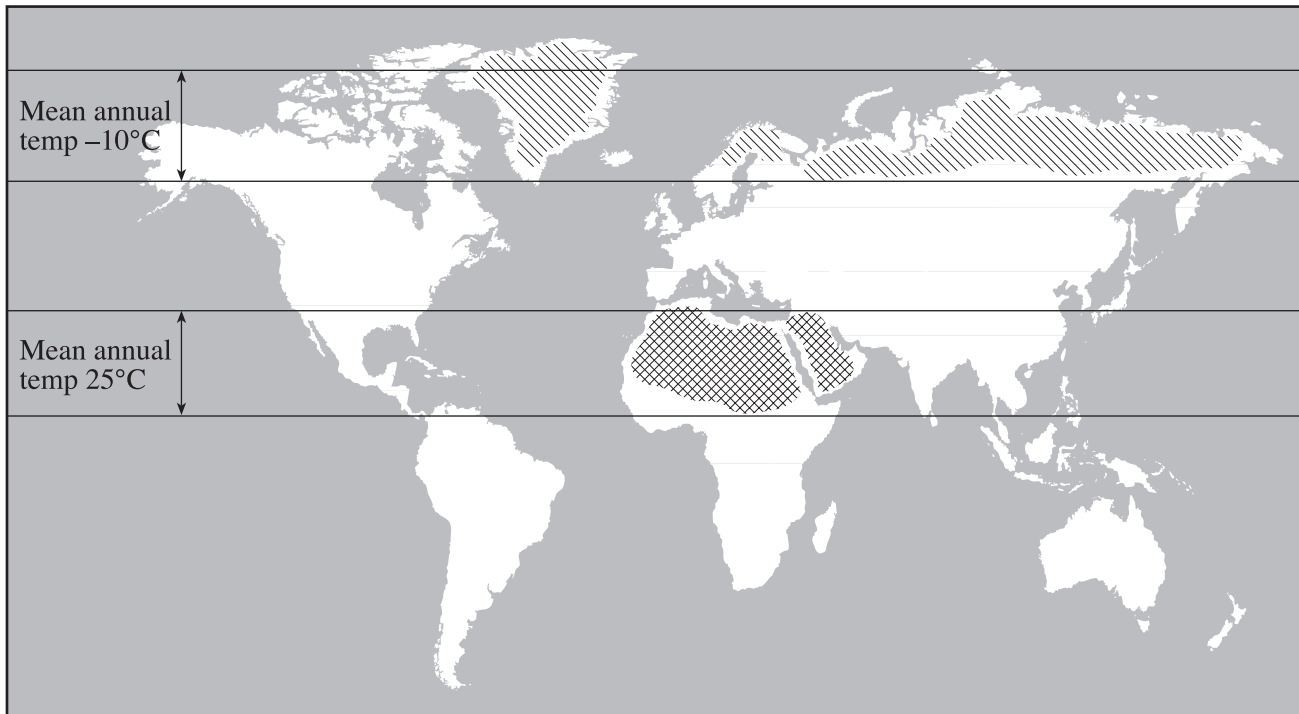
4. The diagram below shows the inheritance of cystic fibrosis in a family.




- (a) Using **N** to represent the normal allele and **n** to represent the allele for cystic fibrosis, state:  
The genotypes of the grandparents Llinos and Rhydian. [2]
- Llinos .....
- Rhydian .....
- (b) State the genotype of Cerys. [1]
- .....
- (c) State the **two** possible genotypes that could occur in Dafydd. [2]
- (i) .....
- (ii) .....


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5. The map shows the world distribution of both the Arctic and Fennec foxes and the mean annual temperatures where these animals are found. The Arctic fox is found throughout the Arctic and sub-Arctic tundra whilst the Fennec fox is found in the Sahara and Arabian deserts.



Key :

 Arctic fox

 Fennec fox

<i>Profiles</i>	Arctic fox	Fennec fox
		
Body mass / kg	6.5 – 17.0	1.0 – 1.5
Ear length / cm	4.0	15.0
Coat colour	White (winter)	Sandy cream



(a) (i) Using the information on page 8, explain how the profiles of both the Arctic and Fennec foxes allow them to survive in their environments.

Ear length: [1]

.....  
.....

Coat colour: [2]

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.....

(ii) The body mass of the Arctic fox is greater than the body mass of the Fennec fox. Suggest how this is an adaptation to living in a very cold environment. [1]

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(b) The Fennec fox is nocturnal (active during the night). Suggest how this is an adaptation to the environment in which it lives. [1]

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6. When a hair pin was applied sharply to a person's hand, the person moved their hand quickly.



(a) What is the name given to this type of reflex action? [1]

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(b) For the example shown above, describe, WITHOUT THE USE OF A DIAGRAM, the path taken by a nerve impulse as it passes from the receptor in the skin to the effector in the arm. [5]

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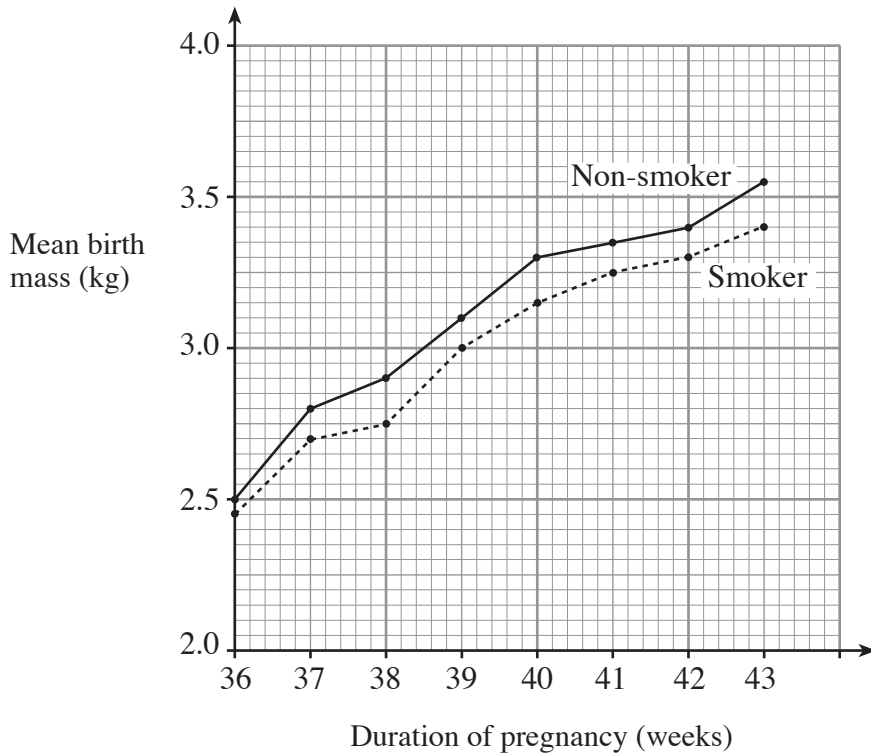
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7. (a) The duration of pregnancy can vary. The graph shows the relation between the mass of babies at birth and the duration of pregnancy in a sample of smoking and non-smoking mothers.



- (i) What would be the most likely mass at birth of a non-smoker's baby which is born at 38 weeks? [1]

..... kg

- (ii) State **two** conclusions you can draw from this graph. [2]

I. ....

II. ....

- (b) Describe how attitudes to smoking have changed over time as scientific evidence about its effects has accumulated. [3]

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8. (a)



- Male guppies, as shown above, are colourful tropical fish.
- Their colours occur in various patterns.
- The patterns are controlled by genes.
- Some patterns are more commonly seen than others.
- Predators find it more difficult to target the rarer, most colourful patterns but easily find the less colourful patterns.
- Female guppies select the most colourful males to breed.

Use this information to explain how natural selection results in male guppies existing in such a rich variety of colours. [5]

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(b) This example of natural selection could be used to explain a theory put forward by a famous British scientist in 1859 in his book *The Origin of Species*.

(i) Name the theory. [1]

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(ii) Name the famous scientist who developed the theory. [1]

.....

9. Untreated sewage accidentally leaked into a river. Environmental health officers took samples of the river water at various distances down stream from the sewage outflow. The percentage (%) oxygen in each sample was measured and the animals in the samples were also counted. Here are the results:

<i>Distance from sewage outflow (m)</i>	<i>% dissolved oxygen</i>	<i>Animals present</i>
0	0	20 rat-tailed maggots 36 sludgeworms
20	3	8 rat-tailed maggots 20 sludgeworms
50	10	2 rat-tailed maggots 5 sludgeworms
100	25	5 sludgeworms 46 water lice
150	30	40 water lice
200	34	24 water lice 2 fish (sticklebacks)

- (a) Some of the animals in the table are used as “indicator species”. Explain what this means. [1]

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- (b) State what happens to the % dissolved oxygen as the water flows away from the outflow. [1]

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- (c) Which animal occurs in the widest range of dissolved oxygen? [1]

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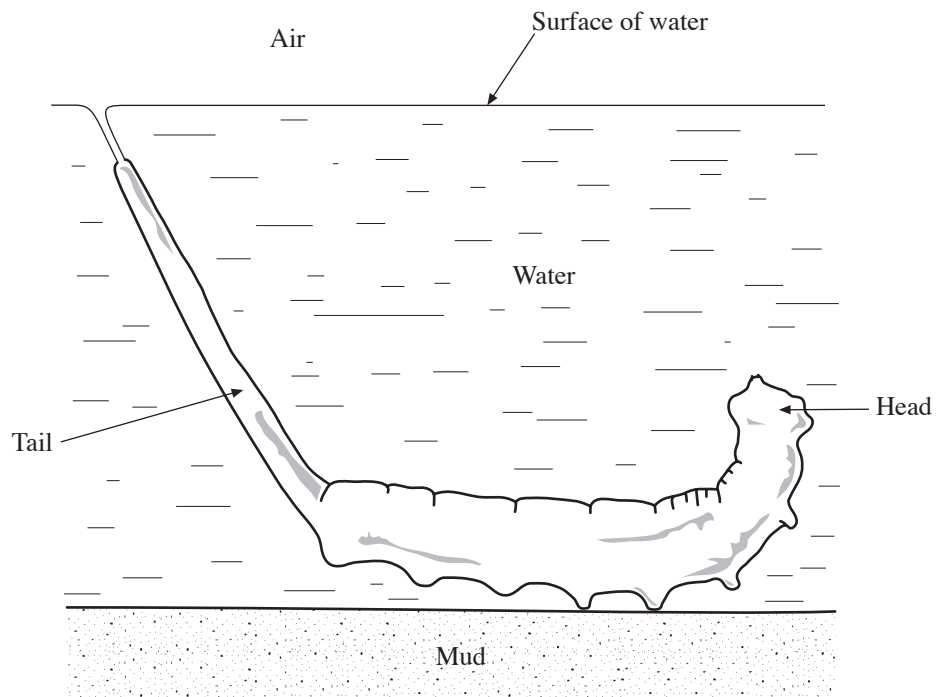
- (d) (i) Name a type of organism in sewage which alters the oxygen content of the water. [1]

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- (ii) What process causes this effect? [1]

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(e) The diagram shows a rat-tailed maggot living in water.



From the diagram name **one** adaptation shown which allows this animal to live in its environment. [1]

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