

# Gold Paper

## Question Paper 9

Level	A Level
Subject	Biology
Exam Board	OCR
Paper	Gold Paper
Booklet	Question Paper 9

**Time allowed:** 77 minutes

**Score:** /57

**Percentage:** /100

### Grade Boundaries:

A*	A	B	C	D	E
>69%	56%	50%	42%	34%	26%

# Question 1

Animals respond to frightening or stressful stimuli in their environment.

This question is about the 'fight or flight' response in mammals.

Fig. 2.1 (**on the insert**) shows a husky dog in a calm state.

Fig. 2.2 (**on the insert**) shows a different husky displaying external signs of the 'fight or flight' response.

- (a) Describe **three** features in the external appearance of the husky in Fig. 2.2 that are due to the 'fight or flight' response.

[3]

- (b) The 'fight or flight' response is brought about by the hormone adrenaline and the autonomic nervous system working together. As well as causing external differences in appearance, the 'fight or flight' response causes numerous changes in the functioning of the internal organs.

Complete Table 2.1 to describe how **two** internal organs would function differently in a calm mammal compared to a frightened mammal.

[6]

**Table 2.1**

internal organ	calm mammal	frightened mammal



Fig. 2.1



Fig. 2.2

(c) The differences you described in part (b) are coordinated by the **autonomic** nervous system. The autonomic nervous system has two divisions, each of which uses a different neurotransmitter to bring about effects in the internal organs.

In the table below, state which division of the autonomic nervous system will be active in each case, and name the **neurotransmitter** that will be secreted by neurones into the organs.

[4]

	calm mammal	frightened mammal
division of the autonomic nervous system activated		
name of neurotransmitter secreted by neurones		

(d) State precisely where in the body adrenaline is produced.

[2]

- (e) The adrenaline molecule is not lipid-soluble, therefore it cannot pass directly through the cell surface membrane. In order to bring about changes inside the cell, adrenaline relies on a second messenger system.
- (i) Describe the events that occur after adrenaline reaches the cell surface membrane that then result in changes in metabolism inside the cell cytoplasm.

**[4]**

- (ii) The second messenger system is a multi-step mechanism. It enables large changes in cell metabolism to occur rapidly, although only relatively small numbers of adrenaline molecules are involved.

Suggest how having a number of steps in the signalling pathway enables a small number of adrenaline molecules to rapidly cause large effects.

**[2]**

**[Total: 21]**

## Question 2

The European corn borer moth, *Ostrinia nubilalis*, is a pest of agriculture. Its larvae develop inside maize stems and eat the contents, weakening the stems so that the plants collapse.

The bacterium *Bacillus thuringiensis* ('Bt') produces a protein that poisons the larvae of moths and butterflies. This protein can be isolated from cultures of Bt and packaged in fluids to be sprayed on the surface of plants.

The gene coding for the toxic protein has also been isolated. It has been incorporated into a genetically modified strain of maize called Bt corn. This makes the plant tissues poisonous to the corn borer moth.

- (a) Consider the statement:

*'Genetically modified plants and animals should be classed as new species'.*

Outline **one** experiment or investigation that would provide evidence to support or contradict the statement.

[3]

- (b) A farmer wants to increase the yield of maize.

A friend recommends planting genetically-modified Bt corn as it would be more effective against European corn borer larvae rather than spraying unmodified corn with Bt toxin.

Which method would you recommend to the farmer? Justify your answer.

[1]

- (c)\* Some students investigated the different ways of protecting maize plants against the corn borer moth. In each of **three** separate but close-together square plots, in the same field, they planted several hundred maize seedlings.

**Plot A: untreated (control).**

**Plot B: sprayed daily with Bt toxin.**

**Plot C: the seedlings planted were genetically modified Bt corn.**

On the first day of each week, one student would walk around the edge of a plot and count the number of maize plants that had collapsed in that plot. Each plot had a student responsible for counting. The results are shown in **Table 20.1**.

Week number	Number of maize plants collapsed since the last weekly count		
	Plot A	Plot B	Plot C
1	0	0	1
2	0	0	0
3	18	22	21
4	0	0	0
5	5	1	0
6	14	11	12
7	5	2	1
8	12	0	1
9	17	1	0
10	30	6	0
11	32	13	1
12	41	17	0
13	38	26	1
14	47	31	1
15	50	44	2
16	49	47	0

**Table 20.1**

The students' tutor raised a number of concerns about the investigation. In summary:

- **The methods were not a valid test of what was being investigated.**
- **The results may not be accurate.**
- **Some variables were not controlled.**

Explain why these concerns are justified and suggest improvements to the investigation.

**[6]**

- (d) Many plants can produce natural clones of themselves. Gardeners and farmers take advantage of this natural process by taking cuttings.

When a genetically modified plant is created, it may be cloned into many plantlets in the process called micropropagation.

Compare the equipment and techniques of taking cuttings with those used for micropropagation.

[2]

[Total: 12]



Fig. 2.1 shows a drawing of a part of the lung.

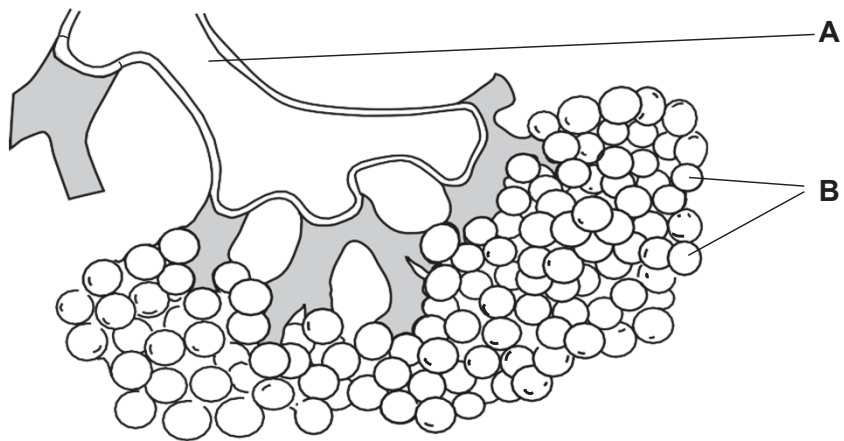


Fig. 2.1

(a) Name the structures labelled **A** and **B**. [2]

**A**

**B**

(b) State **two** features of the structures labelled **B** that enable efficient gaseous exchange. [2]

(c) As part of an allergic response, certain cells in the lungs release histamine.

Histamine is a cell signalling molecule that stimulates smooth muscle in the wall of structure **A** to contract.

Suggest how histamine stimulates smooth muscle contraction. [2]

(d) Another action of histamine is to make capillary walls more permeable.

Suggest **two** effects this increased permeability may have on the surrounding tissues. [2]

## Question 4

A breed of cattle, known as Chillingham cattle, is thought to resemble the wild cattle from which modern domestic breeds have been produced.

Fig. 7.1 shows one of the Chillingham cows and Fig. 7.2 shows a modern cow.



**Fig. 7.1** Chillingham cow



**Fig. 7.2** modern cow

- (a) (i) Suggest **one** feature of the Chillingham cow that is likely to have changed during selective breeding to increase productivity. **[1]**
- (ii) Describe how modern cattle have been produced from less productive wild cattle ancestors. **[4]**

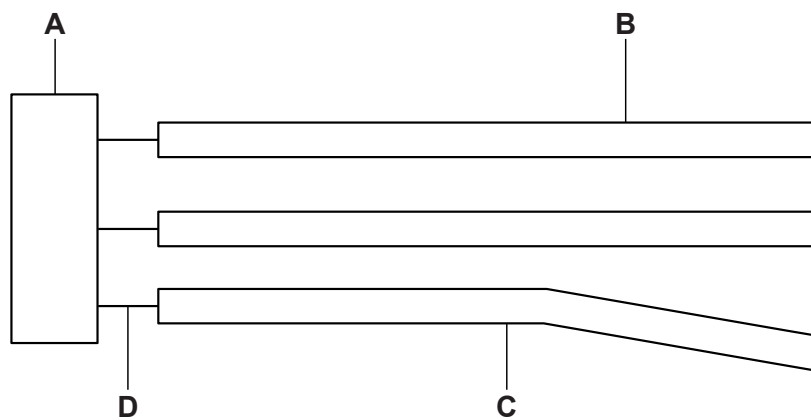
**(b)** Many people in the UK consume large amounts of milk and beef.

Over-consumption of milk and beef can lead to an unbalanced diet and malnutrition.

**(i)** Define the term *balanced diet*. **[2]**

**(ii)** Milk and beef both contain triglyceride molecules.

Fig. 7.3 represents a triglyceride molecule.



**Fig. 7.3**

Identify **A**, **C** and **D** on Fig. 7.3. **[3]**

**(iii)** Suggest and explain why over-consumption of milk and beef can lead to malnutrition. **[3]**

**(c)** In the past, beef was preserved by adding salt.

Explain how salting preserves food. **[3]**

**[Total: 16]**