Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2018–2019

Single Award Science: Biology

Unit 1

Higher Tier

[GSA12]

GSA12

TUESDAY 14 MAY 2019, AFTERNOON

TIME

1 hour.

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 black ink only. **Do not write with a gel pen.**
Answer **all nine** questions.

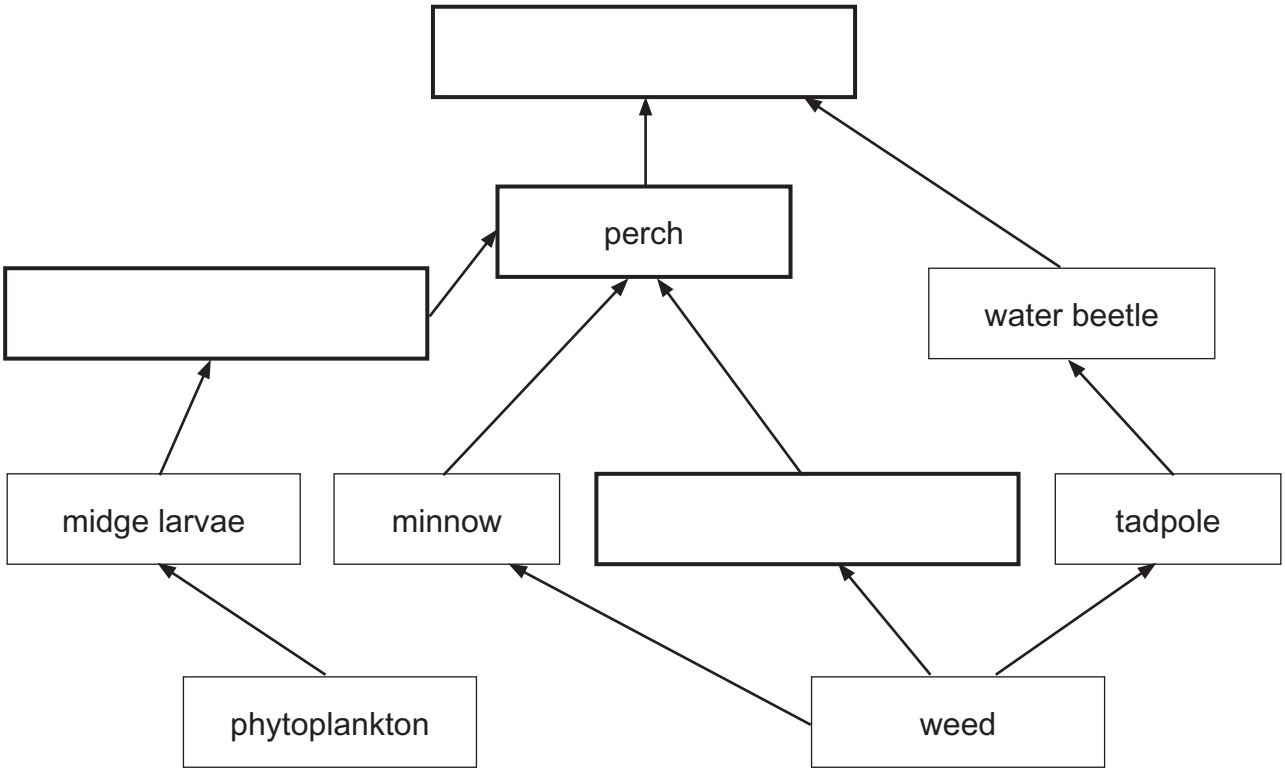
INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
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 **2**.

12222

20GSA1201

1 **(a)** The diagram below shows part of a food web.



(i) Use information from the table below to complete the food web. Write **one** animal name into each of the empty boxes.
Perch has been done for you.

Animal	What the animal eats
perch	leech, minnow, mollusc
pike	perch, water beetle
mollusc	weed
leech	midge larvae

[2]

(ii) What do the arrows in the food web represent?

_____ [1]

(iii) If the tadpoles were removed from this food web what effect, if any, would this have on the number of water beetles? Explain your answer.

_____

_____

_____ [2]

(b) The photograph below shows some lichen on a tree. Lichen is a biotic pollution monitor.

Source: Principal Examiner

(i) What is meant by the term **biotic**?

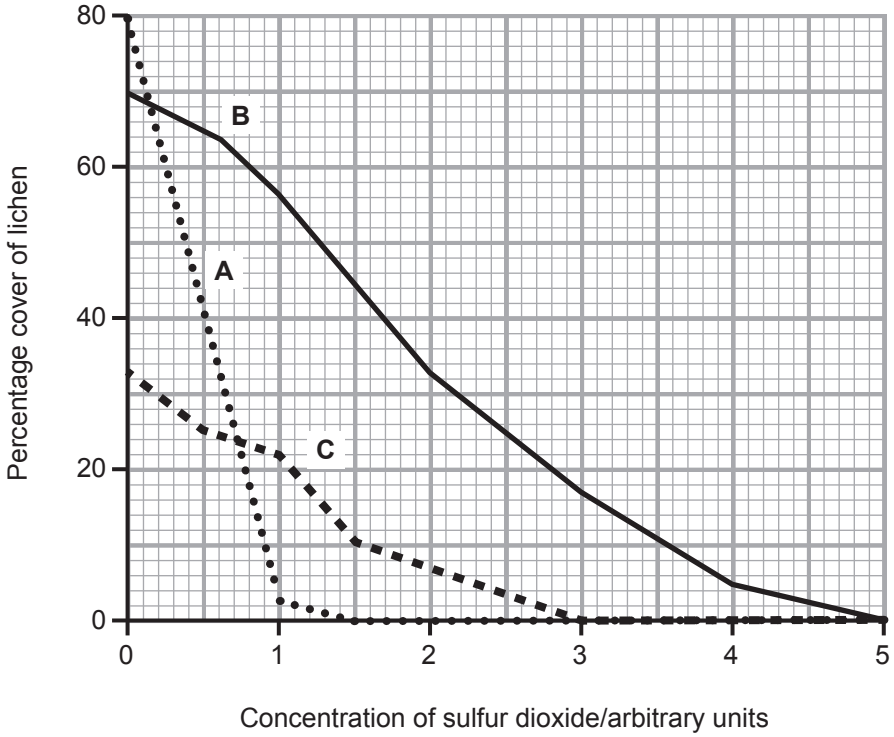
_____ [1]

(ii) Another way to monitor changes in the environment is to use an **abiotic** factor. Give one **abiotic** factor.

_____ [1]

[Turn over

The graph below shows the percentage cover of three species of lichen (**A**, **B** and **C**) at different concentrations of sulfur dioxide.



Use the information from the graph to answer the following questions.

(iii) What effect does the concentration of sulfur dioxide have on the percentage cover of lichen?

_____

_____ [1]

(iv) Which lichen (**A**, **B** or **C**) is the best indicator of the level of sulfur dioxide pollution? Explain your choice.

_____

_____ [2]

2 Adrian has been given a packet of seeds, some pots and some compost. Describe how he could investigate how the number of seeds in a pot affects the mass of each seedling.

Your answer should include:

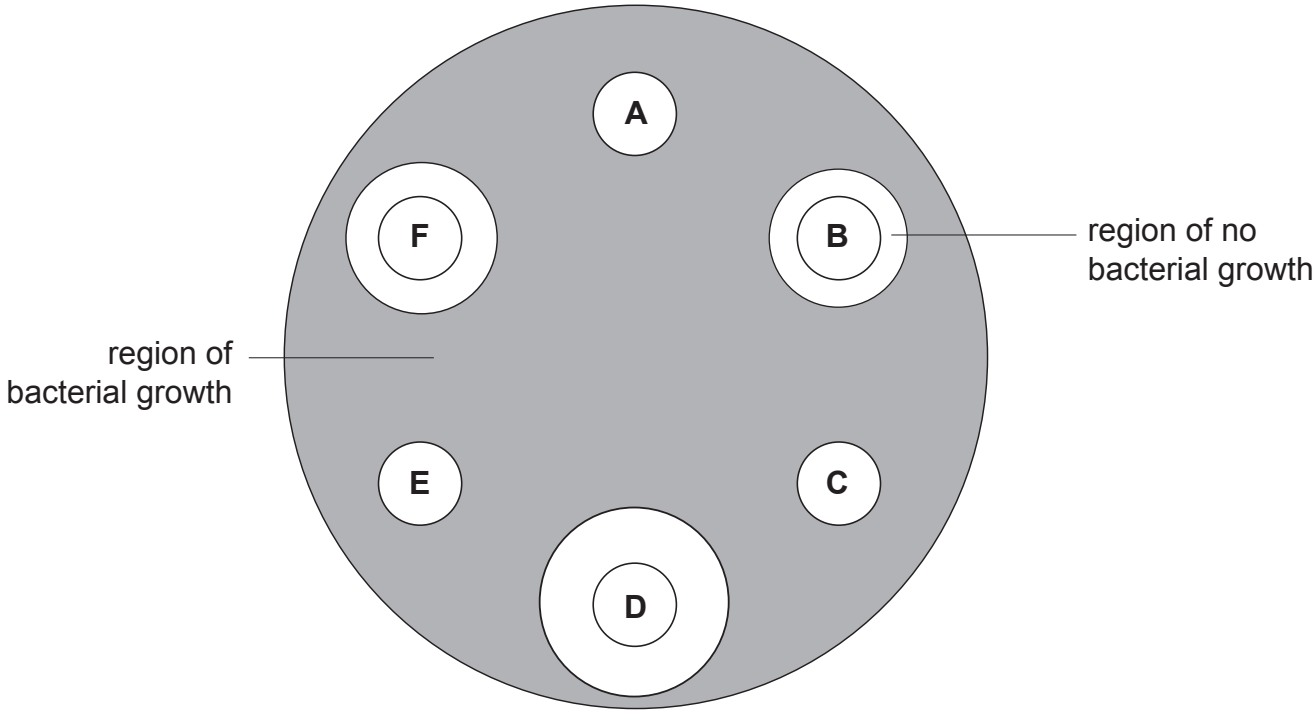
- a description of the method
- the results he needs to record
- **two** things that make the investigation valid (fair test)
- an explanation of the expected results.

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

[6]

[Turn over

3 The diagram below shows the effect of six antibiotics on bacterial growth.



Source: Principal Examiner

(a) Which antibiotic **A**, **B**, **C**, **D**, **E** or **F** is the most effective? Explain your answer.

_____

_____ [2]

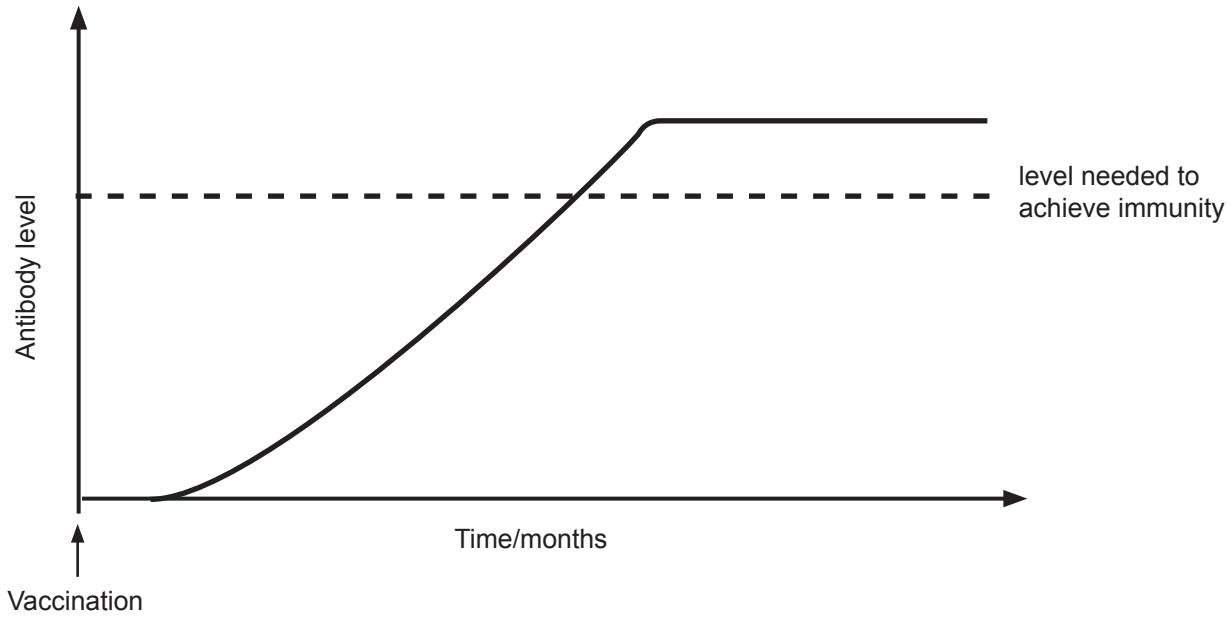
There are many different strains (types) of virus that cause flu, these can mutate easily making many new strains.

(b) Describe fully what is meant by the term **mutation**.

_____

_____ [2]

(c) The graph below shows the effect of a flu vaccination on a person's antibody level.



(i) The flu vaccine contains weakened microorganisms.
Explain why the microorganisms are weakened.

_____

_____ [1]

(ii) Explain fully, using evidence from the graph, why the immunity achieved is active immunity.

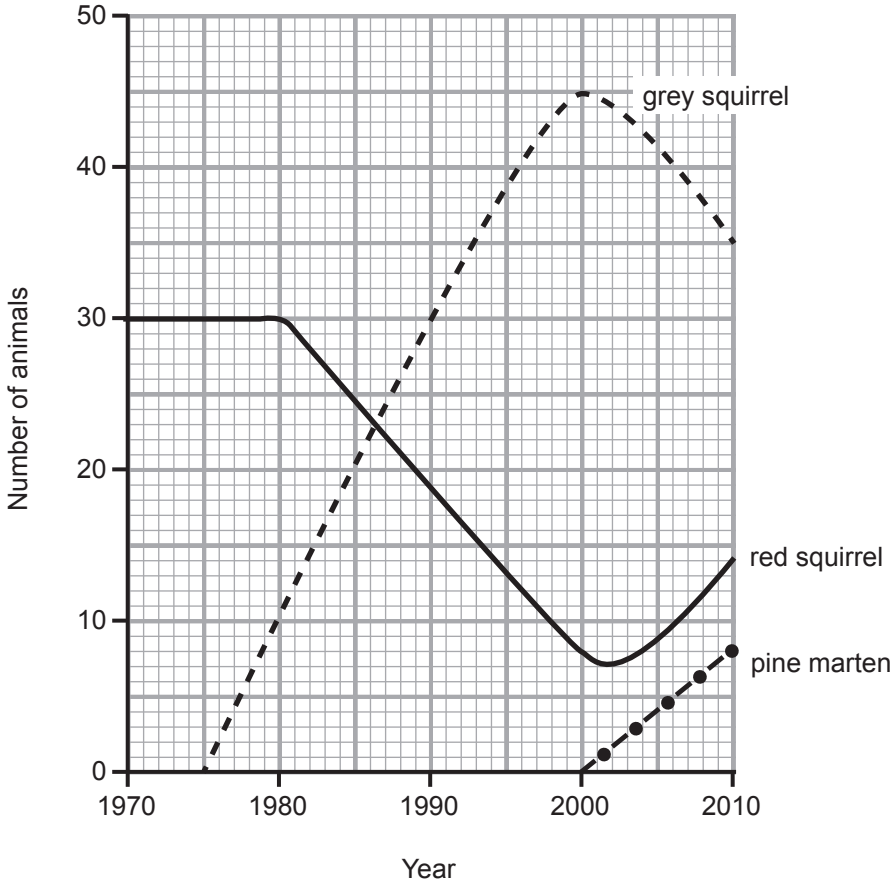
_____

_____

_____ [2]

[Turn over

4 The graph below shows how the number of squirrels and pine martens in a wood has changed over a forty year period.



(a) It has been suggested that the grey squirrels are responsible for the change in red squirrel numbers. Give **one** piece of evidence from the graph that supports this.

_____

_____ [1]

(b) Using evidence from the graph, describe how the introduction of pine martens has affected the number of each type of squirrel.

_____

_____ [1]

(c) The grey squirrel is an example of a competitive invasive species. State **two** effects of introducing a competitive invasive species to an area.

1. _____

_____

2. _____

_____ [2]

[Turn over

5 The table below shows the total mass of four species of adult fish in the North Sea.

Year	Mass of adult fish/arbitrary units			
	Cod	**Haddock**	**Herring**	**Plaice**
2000	30	32	44	65
2001	25	76	67	77
2002	26	126	83	56
2003	23	124	91	64
2004	21	107	97	59
2005	20	93	94	69
2006	17	74	76	72
2007	22	53	62	73
2008	25	54	60	101
2009	31	46	72	108
2010	32	44	65	129

(a) Which fish has shown the lowest change in mass of adult fish over the ten year period?

_____ [1]

(b) Calculate the percentage increase in the mass of adult haddock between 2000 and 2010.

(Show your working out.)

_____ % [2]

(c) Government fishing policy states that fishing nets must have a large mesh size. Suggest how this has helped increase the mass of adult fish in the North Sea.

_____

_____

_____ [2]

6 Hormones are important chemicals in plants and animals.

(a) Describe fully the role of the hormone oestrogen in the female menstrual cycle.

_____

_____

_____ [2]

(b) A hormone in plants can cause them to bend towards light. This response to light is called phototropism.

(i) Explain the process of phototropism.

_____

_____

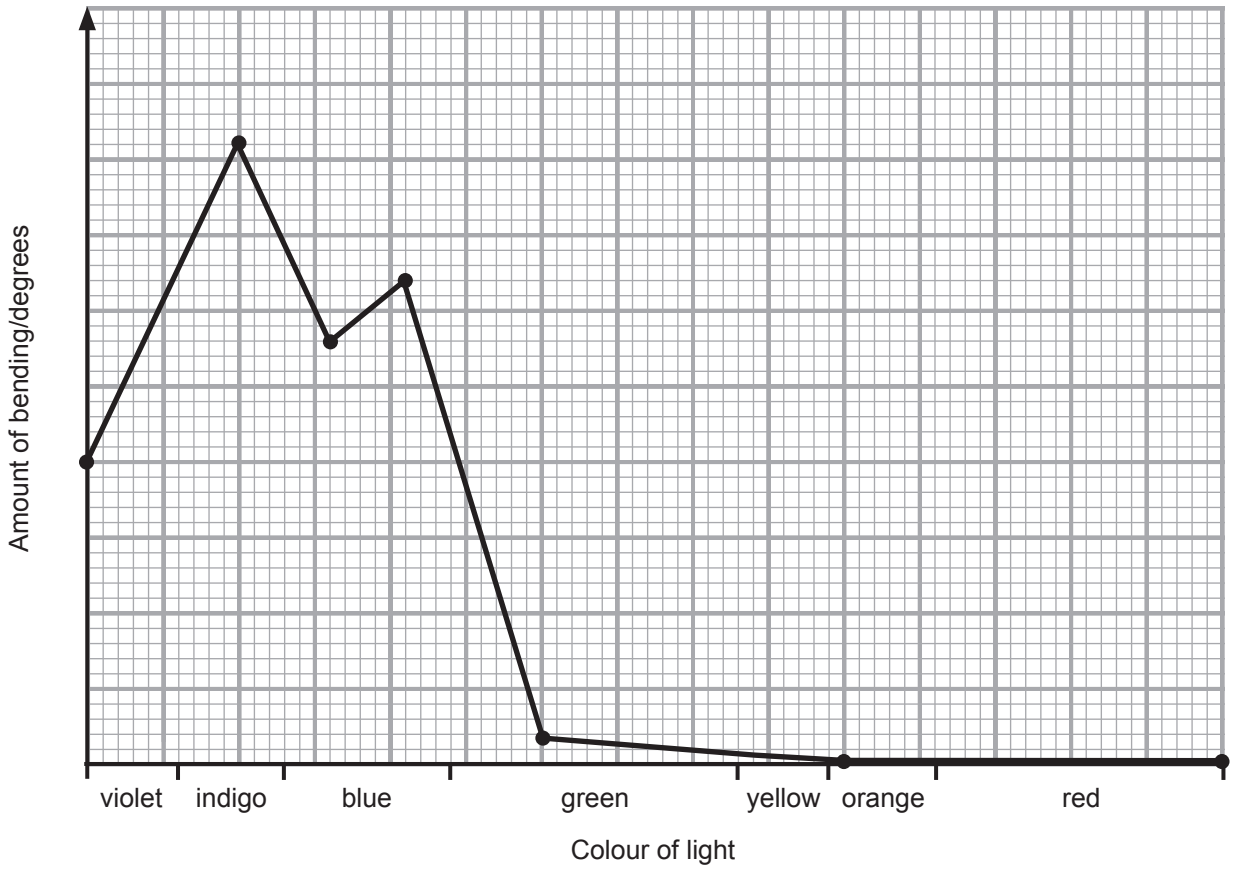
_____ [3]

(ii) Suggest the advantage of phototropism to a plant.

_____

_____ [1]

(c) A scientist used different colours of light shining on one side of a plant to investigate how much the shoot bends towards the light.
His results are shown below.



(i) Which colour of light is most effective in causing a phototrophic response?

_____ [1]

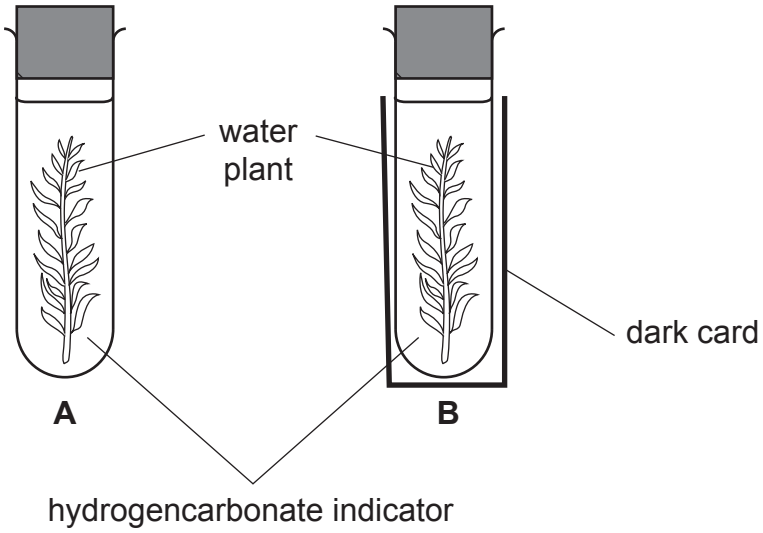
(ii) What would the scientist have observed when he investigated the effect of red light on the plant?

_____

_____ [1]

[Turn over

7 The experiment shown below was set up in bright light to investigate photosynthesis and respiration in plants.



Source: Principal Examiner

Both test tubes were set up with hydrogencarbonate indicator and left for 6 hours. The hydrogencarbonate indicator changes colour depending on the level of carbon dioxide as shown below.

Yellow ⟷	Red ⟷	Purple
high carbon dioxide	normal carbon dioxide	low carbon dioxide

(a) What colour would you expect the hydrogencarbonate indicator to be in each test tube after 6 hours?

A _____

B _____ [2]

(b) Complete the balanced symbol equation for photosynthesis.

$$____ + CO_2 \longrightarrow ____ + O_2$$

[3]

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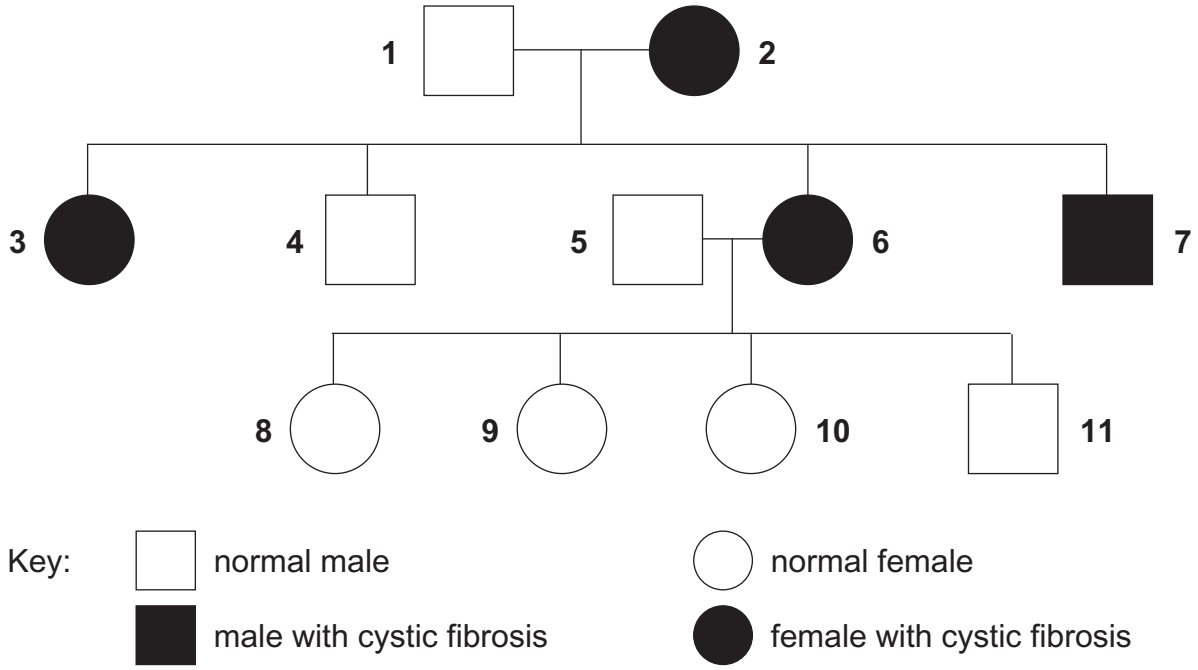
(Questions continue overleaf)

8 Cystic fibrosis is an inherited genetic condition. The cystic fibrosis allele (f) is recessive to the normal allele (F).

(a) The diagram below shows how cystic fibrosis is inherited in a family.



(i) What is the relationship of person **5** to person **6**?

_____ [1]

(ii) How many male offspring do person **1** and person **2** have?

_____ [1]

(iii) What is the genotype of person **1**?

_____ [1]

(b) **(i)** Complete the Punnett square below to show how two parents who do **not** have cystic fibrosis can have a child who has cystic fibrosis.

[2]

(ii) What is the percentage probability of the offspring from these parents **not** having cystic fibrosis?

_____ % [1]

(c) Name **one** other genetic inherited disease.

_____ [1]

9 The photograph below shows clover. This is a plant often eaten by slugs.

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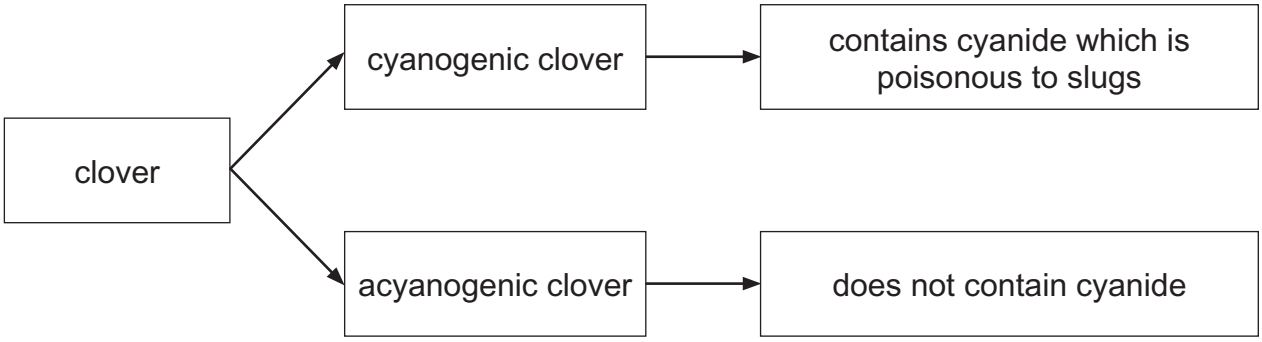
There are two types of clover, the diagram below gives some information about each type.



A field was planted with 50 of each of the clover plants and some slugs were introduced to the field.
Six months later, there were 73 cyanogenic clover plants and 21 acyanogenic clover plants.

(a) Use the information given and your knowledge of natural selection to explain the increase in the number of cyanogenic clover plants.

_____

_____

_____

_____

_____ [3]

(b) Explain how natural selection can lead to evolution.

_____

_____

_____ [2]

(c) Fossils provide evidence for evolution.

(i) What is a fossil?

_____

_____

_____ [2]

(ii) Explain how fossils can be used to provide evidence for evolution.

_____

_____ [1]

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	
Total Marks	

Examiner Number

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