

Environmental
change

Competition in
animals and plants

Adaptation for survival

Adapt and survive

Adaptation in
plants

Adaptation in
animals

Adapt and survive

Living organisms need to survive and reproduce

- ***Plants need:*** light, carbon dioxide, water, oxygen, nutrients
- ***Animals need:*** food, water, oxygen
- ***Microorganisms*** needs depend - some are light plants, some like animals and some need no oxygen or light

Extremophiles – organisms adapted to extreme environments.

e.g. Bacteria can live at temperatures as low as -15 or up to 80C as their enzymes are adapted not to denature.

How do you survive?

- Each fig tree has its own type of pollinating wasp – the fig flowers are adapted to attract the specific wasp type. The wasps are adapted with specially shaped heads, ovipositors
- Star nose mole reacts and eats prey within 230milliseconds - they are blind and need to eat their prey as soon as they touch it or it might escape
- Venus fly traps have grow in bogs with little nutrients. Insects are attracted to their smell and colour, enzymes are digested and nutrients used

Adaptation in animals



Surface area: volume ratio

- Mammals in a cool climate grow to a large size (e.g. Whales) to keep their ratio as small as possible to maintain body heat

Cold Climates:

- Small surface area e.g. Ears
- Insulation – blubber (thick layer of fat under skin), fur coat
- Fat layer also provides a food supply during winter

Dry climates

- Deserts may be hot in day and freezing at night.
- Lack of water
- Often active at night rather than day
- Can't sweat or will lose water
- small – large surface area:volume to lose heat through skin
- Big ears- lose heat
- Thin fur, little body fat



Camouflage : Important in predators and prey

Dependent on environment (arctic hares brown in summer and white in winter)

Adaptation in plants

Water taken in through roots

Stoma in leaves allow gases in and out for **photosynthesis** and **respiration**

In dry climates:
– very wide root systems
– store water in leaves, stems or roots



Surface area:volume ratio

Curled leaves – traps layer of moist air, reduces surface area

Thick cuticle – stops evaporation

Or.. Broad leaves – large surface area to collect dew

Epiphytes – in rainforests live high above ground and collect water and nutrients from the air

Competition in animals and plants

Animals

- **Food** – more likely to be successful if eat a wide range. Competition between own species too, better adapted will survive
- **Territory** – compete for best space/ area
- **Mate** – males fight or display

Success depends on adaptations ...

Avoiding competition can also lead to success



Plants

- **Light** (photosynthesis) smaller plants may flower earlier in the year before the bigger plants to get more light
- **Water** (photosynthesis) different types of roots – spread along surface or deep underground
- **Nutrients**
- **Space** (roots and light)

*Spreading seeds –
sycamore, dandelion,
Fruits, sticky*



Environmental change

- Average temperature, wind, rainfall, light, pH, oxygen levels, other species, climate will affect where an organism lives
- If any of these change the **biodiversity** can be affected
- **Bioindicators** can be used to monitor change – lichen are sensitive to air pollution



Changing birds of Britain

Bird **habitats** and **migration** affected
Dartford warblers are more common due to increased temperatures, but less common in Spain where it is now too warm



Bees

Disease (CCD) affecting honey bees
Bees are important for **pollination** of plants – apples, raspberries, cucumbers etc
Cause unknown – pesticides? Climate?



Exam questions:

3

In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

Plants and animals have become adapted in many different ways to reduce the risk of being eaten by predators.

Describe these adaptations.

Give examples of animals and plants adapted in the ways you describe.

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[6 marks]

question	information			mark
3	Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 2, and apply a 'best-fit' approach to the marking.			6
0 marks	Level 1 (1-2 marks)	Level 2 (3-4 marks)	Level 3 (5-6 marks)	
No relevant content.	There is at least one example of an adaptation of either an animal or a plant. However it may not be clear how the adaptation helps the organism to avoid being eaten.	There is a description of an adaptation of at least one animal and at least one plant. It is clear how at least one of these adaptations helps the organism to avoid being eaten.	There are clear and detailed descriptions of a range of adaptations of named animals and named plants. It is clear how most of these adaptations help the organisms to avoid being eaten.	
<p>examples of clear and detailed biology points made in response:</p> <ul style="list-style-type: none"> • camouflage – the method of camouflage should be described plus a statement that the predator is less likely to see the prey • mimicry / warning colouration – the method should be described plus a statement that the predator is likely to confuse the prey with e.g. a poisonous organism • thorns / prickles / spines / horns – a statement that these are sharp and are likely to hurt a predator • long limbs / streamlining – a statement that these increase speed and make it more likely that prey will outrun predator • bad taste / poison – a statement that predator will find this unpleasant and 'spit out' prey / not attack same prey again • large ears / position of eyes – a statement that predators will be detected earlier so the prey can escape sooner 				
Total				6

Table 1 shows:

- the total area of England, Scotland and Wales
- the area of different types of woodland in these countries.

Table 1

Country	Total area of country in thousands of km ²	Area of woodland in thousands of km ²		
		Coniferous woodland	Broadleaf woodland	Total
England	130	3.6	7.8	11.4
Scotland	79	10.4	3.0	13.4
Wales	21	1.9	0.9	2.8

- 8 (a)** Look at the data for the three countries. Estimate which country has the greatest proportion of its area suitable as a habitat for squirrels.

Support your answer with relevant figures.

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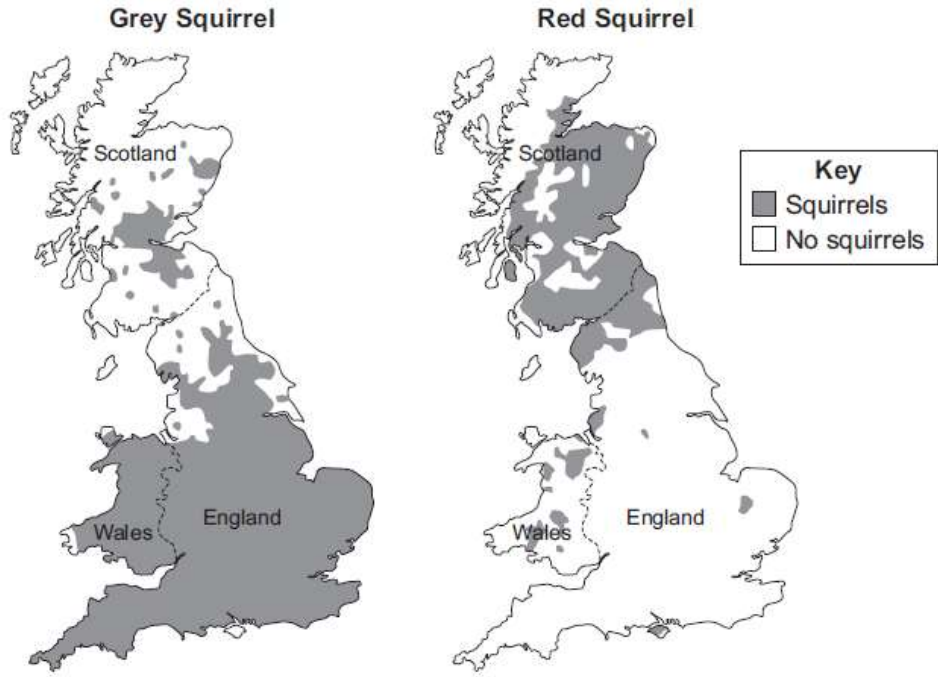
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(2 marks)

8 (b) The maps show the distribution of grey squirrels and red squirrels in England, Scotland and Wales.



Scientists suggested that the distribution of grey squirrels and red squirrels is linked to the type of trees in woodlands.

8 (b) (i) The information for England and Scotland supports this suggestion.

How?

.....
.....

(1 mark)

8 (b) (ii) Give **one** piece of evidence that contradicts this suggestion.

.....
.....

(1 mark)

8(a)	<p>Scotland</p> <p>any one from</p> <ul style="list-style-type: none"> Scotland 15 to 20% / about 1/5th to 1/7th but England and Wales / the others are less / lower / reasonable estimated figures $\frac{13.4}{79}$ is greater than England / $\frac{11.4}{130}$ and Wales / $\frac{2.8}{21}$ 		<p>1</p> <p>1</p>
8(b)(i)	broadleaf woodlands have more grey squirrels or broadleaf woodlands have less red squirrels	allow converse referring to conifers	1
8(b)(ii)	Wales has more conifers and / but more grey squirrels or Wales has less broadleaf and / but more grey squirrels	allow converse for red squirrels	1
8(c)	<p>any three from:</p> <p>grey squirrels</p> <ul style="list-style-type: none"> have wider range/ more types of food are resistant to parapox (virus) but reds are not have more young each year / litter young more likely to survive (in mixed populations) 	<p>answers must be comparative they = grey squirrels</p> <p>allow converse arguments for red squirrels</p> <p>ignore reference to other disease</p>	3

5 (b) (iii) The small periwinkle can survive much nearer to the high tide level than the flat periwinkle.

Suggest **two** reasons why the flat periwinkle cannot survive near to the high tide level.

1

2

.....
(2 marks)

5 On a rocky shore, when the tide goes in and out, organisms are exposed to the air for different amounts of time.

5 (a) On hot, windy days when the tide is out the concentration of the salt solution in rock pools may become very high.

What term is used to describe organisms that can survive in severe conditions such as very high concentrations of salt solution?

.....
(1 mark)

5 (b) Periwinkles are types of snail.
Students surveyed the different types of periwinkle living on a rocky shore.

The diagram shows the results of the students' survey.
The highest position that the sea water reaches on the shore is called the high tide level.
Each bar represents the range of habitats for each type of periwinkle.

Position on shore	Small periwinkle	Rough periwinkle	Common periwinkle	Flat periwinkle
High tide level ↓ Low tide level	I	I	I	I

5 (b) (i) Which **two** types of periwinkle are likely to compete with each other to the greatest extent?

.....
(1 mark)

5 (b) (ii) Explain your answer to part (b)(i).

.....
.....
(1 mark)

5(a)	extremophile(s)		1
5(b)(i)	common (periwinkle) and flat (periwinkle)	either order, both required	1
5(b)(ii)	(common and flat) both live in the same habitat / area / named area	allow habitats overlap the most	1
5(b)(iii)	<p>any two from:</p> <ul style="list-style-type: none"> • would have wrong food • would otherwise be exposed to (specific) predators • cannot tolerate extended exposure to air or reduced submersion in seawater • cannot tolerate high salt concentration (in rock pools) • cannot compete with small periwinkle 	<p>allow cannot tolerate temperature / dehydration</p> <p>allow low salt concentration (in rock pools)</p>	2