WESTMINSTER SCHOOL
THE CHALLENGE 2015

BIOLOGY

Thursday 30 April 2015

Time allowed: 30 minutes

Please write in black or blue ink.

Write your answers in the spaces provided.

For examiner use only

Total Mark	

Answer **all** the questions.

B1 Fig. 1.1 shows some notes pinned to a noticeboard in the office of a garden centre to remind staff of jobs that needed to be done.

A Cut off the anthers from the chilli plant flowers and pollinate these flowers with pollen from different chilli plants.

B Bring carnivorous ladybirds into the greenhouse to reduce the numbers of plant-eating pests.

C Keep lights and gas burners in greenhouses switched on overnight.

D Collect the pollen from geranium plants that are frost-resistant and use this pollen to pollinate other frost-resistant geranium plants.

E Add fertiliser to soil of plants growing in raised beds so all plants have access to mineral ions.

F Pin any trailing blackberry shoots onto the soil so that they grow roots and form new plants.

Fig. 1.1

Match the notes, **A** to **F**, with the biological principles on which they are based.

Write the correct letter next to the description of each principle.

Biological principle	**Letter**
selective breeding	……..……
minimising competition	……..……
predator-prey interactions	……..……
preventing inbreeding	……..……
increasing the rate of photosynthesis	……..……
asexual reproduction	……..……

[3]

B2 Cattle farmers take care to ensure the livestock they raise have a suitable diet.

Suggest reasons for the following:

(a) Cattle feed is often rich in protein.

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…… [2]

(b) The enzyme amylase is sometimes added to cattle feed.

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…… [3]

(c) Antibiotics are sometimes added to cattle feed.

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…… [2]

[Turn over]

B3 At the beginning of the nineteenth century, one species of squirrel, *Sciurus vulgaris*, the red squirrel, inhabited Great Britain.

In 1879, some individuals of *Sciurus carolinensis*, the grey squirrel, were introduced to southern England from the USA. Since then, the number and range of grey squirrels have increased and the number and range of red squirrels have decreases dramatically.

Grey squirrels are larger, spend more time on the ground and are less frightened of people than red squirrels.

(a) Suggest why the introduction of the grey squirrel has reduced the number and range of red squirrels.

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…… [2]

(b) Northumberland is one the few areas of England that still has a large population of red squirrels.

In an attempt to preserve the population of red squirrels the government has funded a cull (trapping and killing) of grey squirrels in Northumberland.

(i) Suggest **two** specific reasons why the government feels it is important to conserve red squirrels in particular areas, such as Northumberland.

1 ……

……

……

2 ……

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……..… [2]

(ii) Some local residents have objected to the culling of grey squirrels.

Give **one** reason why people might disagree with the culling of grey squirrels.

……

……

……..… [1]

(c) Environmental groups have asked members of the public to report sightings of grey and red squirrels. In some parts of Northumberland, the **reported number of sightings** of grey squirrels is higher than that of red squirrels.

(i) Suggest **two** reasons why the **actual number** of grey squirrels might **not** be higher than the actual number of red squirrels.

1 .....

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2 .....

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..... [2]

(ii) **Outline** how you would go about estimating the population of grey and red squirrels in one woodland.

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..... [4]

[Turn over]

B4 A study was carried out on a large number of people, some of whom were smokers. The study investigated the link between percentage of deaths due to lung cancer in smokers and their smoking habits. The age at which they started smoking and the number of cigarettes smoked per day were recorded. The results of the study are shown in Fig. 4.1.

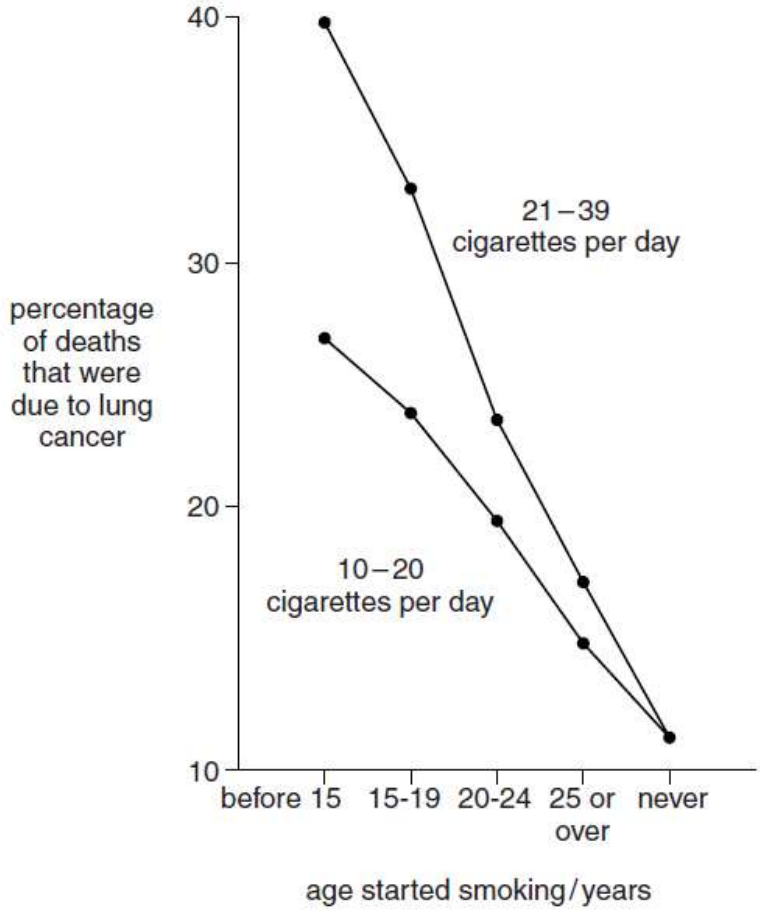


Fig. 4.1

(a) Explain what the results in Fig. 4.1 show about the link between cigarette smoking and percentage of deaths due to lung cancer.

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…… [3]

(b) Complete the following paragraph by inserting appropriate terms.

Lung cancer can be caused by chemicals present in tar called carcinogens. When a smoker inhales tobacco smoke, the tar present in the smoke sticks to the ciliated …….. cells in the gas exchange system. The carcinogens diffuse through the cell surface ……. of the cells and bind to the ……. present in the nucleus. In the nucleus the carcinogens can cause a mutation that leads to the cells dividing out of control, forming a mass of cells called a tumour. [3]

(c) Suggest **two** factors, **other than number of cigarettes smoked** and **age**, which might increase the likelihood of death from lung cancer.

1 ……

2 …… [2]

(d) Explain why smoking tobacco can lead to breathing difficulties.

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…… [2]

(e) The molecule nicotine is present in tobacco smoke and can affect the development of the fetus in a pregnant woman.

Explain how nicotine is transported from the lungs of a pregnant smoker to her fetus.

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…… [2]

[Total: 33]

END OF BIOLOGY SECTION

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