



WESTMINSTER SCHOOL  
THE CHALLENGE 2024  
**BIOLOGY**

Thursday 2 May 2024

**Time allowed: 30 minutes**

**Please write in black or blue ink.**

**Calculators are allowed.**

**Write your answers in the spaces provided.**

**For examiner use only**

Total		
Mark		

1. Steve is a gardener. He grows some plants.



(a) (i) Steve's plants use photosynthesis to produce glucose.

Complete the **word equation** for photosynthesis.

water + ..... → glucose + .....

[2]

(ii) What is the source of energy for this process?

.....

[1]

(b) Glucose is produced by photosynthesis.

Steve writes down **three** things that his plants will do with the glucose.

- |   |                                          |
|---|------------------------------------------|
| 1 | use some glucose for respiration         |
| 2 | change some glucose into starch          |
| 3 | change some glucose into other chemicals |

Explain why plants do these three things.

use some glucose for respiration .....

.....

change some glucose into starch .....

.....

change some glucose into other chemicals .....

..... [3]

(c) Steve knows that dim light limits the rate of photosynthesis in his plants.

(i) Explain what is meant by **limits the rate of photosynthesis**.

.....  
.....  
..... [1]

(ii) How could Steve prevent dim light limiting photosynthesis in his plants?

.....  
..... [1]

(iii) Dim light is not the only limiting factor for photosynthesis.

What **two** other things could Steve do to increase the rate of photosynthesis in his plants?

Choose from this list.

- increase the temperature
- increase the oxygen concentration
- give the plants more glucose
- increase the carbon dioxide concentration
- reduce the amount of water

1 .....  
2 ..... [2]

[Total: 10]

# Invasive Species

Foreign species of plants and animals are being found in Europe.

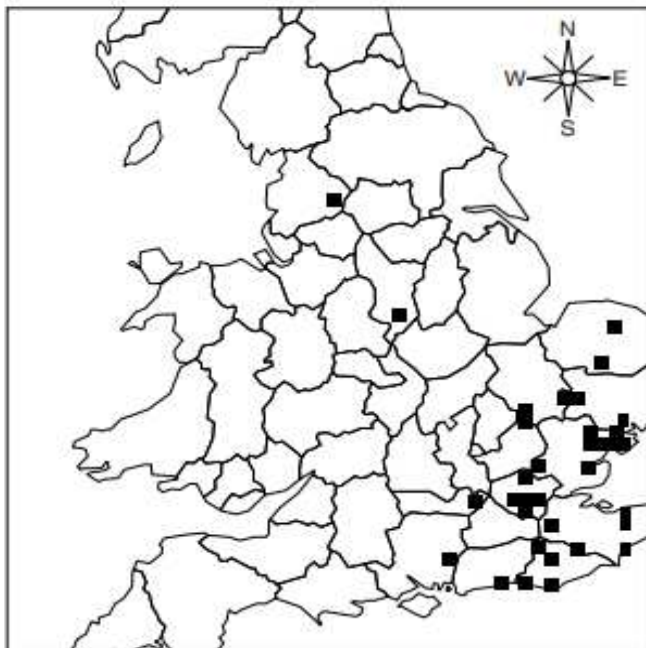
These are invasive species. They have been introduced either deliberately or by accident into an environment where they are not normally found. One such example is the ruddy duck. The ruddy duck is just one of many species that have been introduced into Europe that are threatening biodiversity.



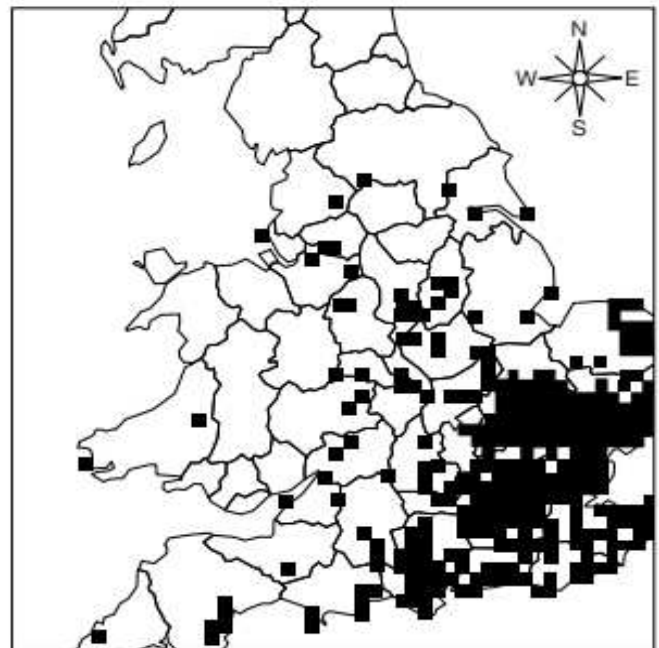
Thirty years ago, 600 invasive species were identified in Europe. The number of invasive species has increased by 75% since then. The overall effect of this has been to reduce biodiversity.

Some species have been introduced intentionally. The ruddy duck was introduced into Europe as an ornamental species. It is now one of the worst invaders. This is because it has a very aggressive courting behaviour and it interbreeds with endangered native duck species.

Another invader is the harlequin ladybird. It entered the UK in the summer of 2004 and rapidly spread across the country. Because it is bigger and more aggressive than the native ladybirds, it soon began to replace them.



reports of harlequin ladybirds in 2004



reports of harlequin ladybirds in 2006

It is not just biodiversity that is being affected. Human health is also at risk. The Asian tiger mosquito carries a virus which causes illness in humans. It was originally native to South East Asia but in the last twenty years it has invaded many countries throughout the world. Scientists think that this is because of increasing international travel and transport of goods around the world. This mosquito has now invaded Europe. It can cause a severe illness in humans consisting of fever and painful joints. The symptoms can last for many years.



It has been estimated that invasive species cause more than £12 billion worth of damage in Europe every year. Scientists are demanding Europe-wide legislation to protect native species from these alien invaders.

Scientists are considering using biological control to reduce the numbers of these **invasive species**. Japanese knotweed is an invader that is now growing across the UK. It replaces native plant species and can even grow through concrete. In Japan the plant is common but does not grow out of control like it does in the UK. Scientists are releasing an insect from Japan that feeds on Japanese knotweed. The insect does not eat any other plants and only feeds on knotweed. It is hoped that the insect will reduce the spread of this **invasive species** across the UK.



**2. This question is based on the article 'Invasive Species'.**

- (a)** The article states that **invasive species** are reducing biodiversity in Europe.

Explain what biodiversity means.

..... [1]

- (b)** Thirty years ago there were **600** **invasive species** in Europe.

- (i)** Use the article to help you calculate the number of **invasive species** that are present in Europe today.

Show your working.

answer = ..... [2]

- (ii)** It is not possible to know the true number of **invasive species** now present in Europe.

A student suggests a range in which the true value lies.  
The student's lower value is 600.

Suggest why the student's range is incorrect.

.....  
..... [1]

**(iii)** Suggest **two** reasons why it is important that we know which invasive species are living in Europe today.

.....  
.....  
.....  
..... [2]

**(iv)** Explain why it is not possible to know the true numbers of invasive species present in Europe.

.....  
.....  
..... [2]

**(c)** Scientists are now considering using biological control to reduce the numbers of invasive species.

**(i)** Suggest what is meant by biological control.

.....  
..... [2]

**(ii)** Suggest how using biological control could have disastrous consequences for the environment.

.....  
.....  
..... [2]

**[Total: 12]**