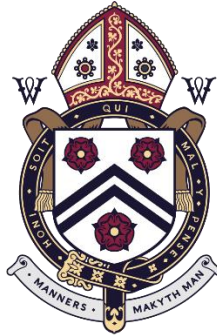


<i>School</i>	<i>Candidate's Name (PLEASE PRINT)</i>
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WINCHESTER
COLLEGE

WINCHESTER ELECTION

Biology Examination

2024

THEORY SECTION

Recommended time: 20 minutes

Total marks: 25

Write all your answers in the spaces on this question paper

1 (a) Draw a food chain with 5 trophic levels (stages) that you might find in the sea.

You do not need to draw pictures of the organisms – just write their names and draw the arrows.

[5]

(b) Explain why photosynthesis is one of the most important processes in nature.

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[4]

- (c) **Figure 1** is a graph of the absorption spectrum for a typical plant leaf. The visible light spectrum is a mixture of colours with wavelengths from 400 – 700 nm. Different wavelengths give different colours. Light of particular colours are absorbed by special molecules called pigments found in the chloroplasts of the leaf cells. They use this energy to carry out photosynthesis.

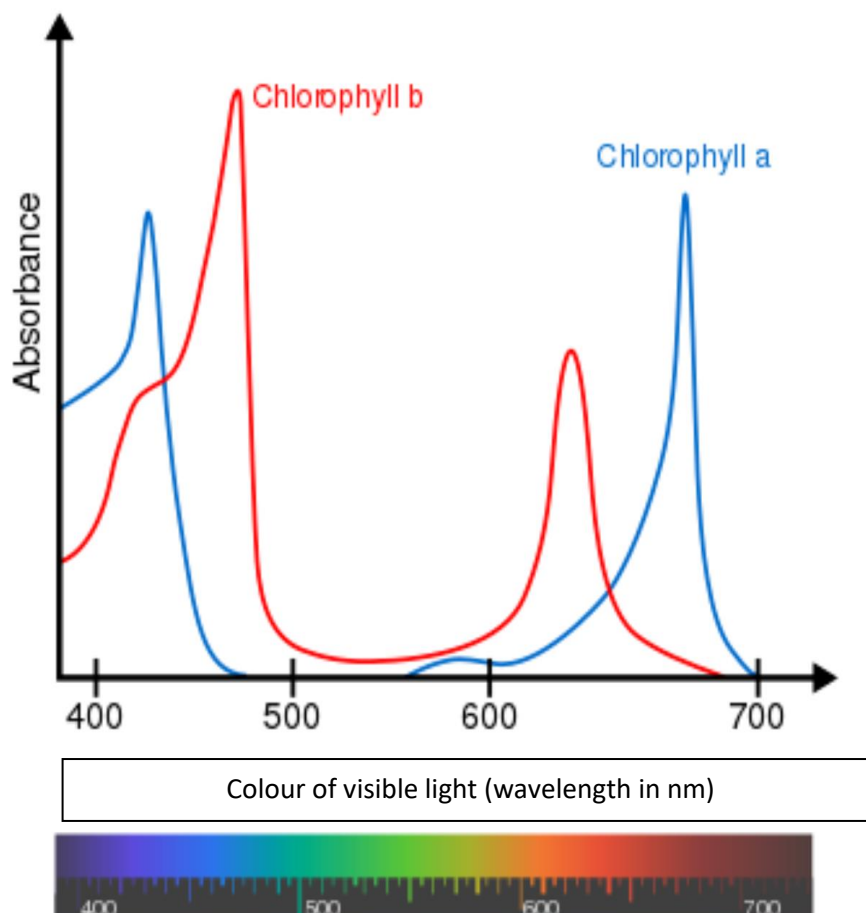


Figure 1

Use **Figure 1** to estimate the wavelength of light for each of the following colours:

Colour	Wavelength/nm
Violet	
Blue	
Green	
Yellow	
Orange	
Red	

- (d) (i) Chlorophyll is the name of one of the key pigments that plants use in this process of photosynthesis. Chlorophyll is typically green. Interpret the graph opposite to explain this:

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[2]

- (ii) Plants use photosynthesis as their means of obtaining nutrition. One product is glucose. Describe how plants use glucose.

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[2]

- (e) Describe how plants exchange the gases they need with their environment.

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[2]



Red Squirrel – *Sciurus vulgaris*

Eastern Grey Squirrel – *Sciurus carolinensis*

Figure 2.1

Figure 2.1 shows the two species of squirrel which live in the UK.

The red squirrel is native to the UK and came to Britain with the last ice age 20,000 years ago. It lives in woodland and feeds on nuts, seeds and pine cones. It cannot eat acorns however, because they contain a toxin that it cannot digest. The grey squirrel is native to North America and was introduced to the UK in 1879 by the Duke of Bedford. It also eats seeds and nuts, but does not eat pine cones and it can digest acorns. Grey squirrels also eat birds' eggs and chicks in the spring and summer.

Before 1879 the red squirrel was found all over the UK but since the introduction of the grey squirrel the numbers of red squirrels have steadily declined and it is now only found in the far north of the UK on islands and isolated mainland areas.

Figure 2.2 shows a historical map of the UK showing the distribution of both squirrel species in 1945 and 2010.

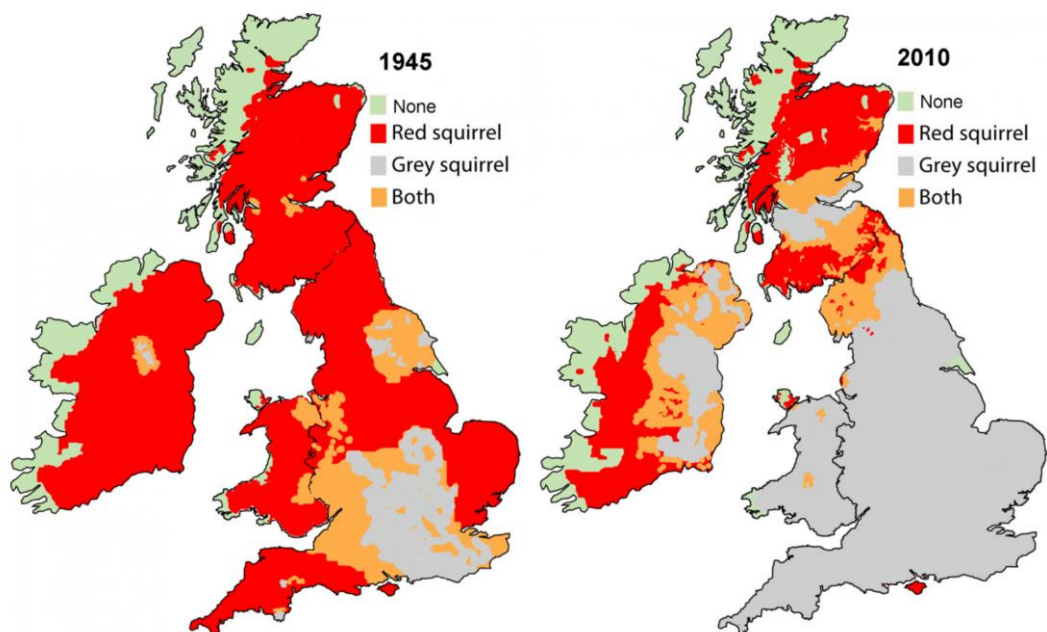


Figure 2.2

- (a) Analyse the maps and explain the change suggesting reasons for the change in population over time.

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[5]

- (b) Suggest why the green area has remained unchanged in the two maps.

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[2]

References:

Figure 1 Absorption spectrum

<https://www.alamy.com/absorption-spectrum-of-chlorophyll-a-and-b-image231072505.html>

Figure 2.1 Squirrels

<https://www.thetimes.co.uk/article/first-they-cloned-dolly-the-sheep-now-they-are-targeting-grey-squirrels-xdjzm3rgb>

Figure 2.2 Squirrel distribution map

<https://www.wildlifetrusts.org/on-land/red-squirrels>