8 **(a)** Palm oil is the most widely used vegetable oil. It is obtained from the African oil palm, *Elaeis guineensis*. Oil palms are the highest yielding vegetable oil crop, needing only 10% of the land area required by other crops to produce the same quantity of oil.

On the island of Borneo, tropical rainforests are cut down and cleared to create oil palm plantations. This has a large effect on biodiversity.

The Bornean orangutan, *Pongo pygmaeus,* is only found on the island of Borneo and is classified as critically endangered on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species™.

Fig. 8.1 shows Bornean orangutans.

Fig. 8.1

Suggest ways in which the Bornean orangutan may be conserved.

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..... [4]

(b) Biodiversity can be assessed at different levels.

Outline the main levels at which biodiversity can be assessed.

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..... [3]

(c) The biodiversity of a habitat can be measured by calculating Simpson's index of diversity (*D*).

The formula for Simpson's index of diversity (*D*) is:

$$D = 1 - \left(\Sigma\left(\frac{n}{N}\right)^2\right)$$

Key to symbols:

n = number of individuals of each type present in the sample

N = the total number of all individuals of all types present in the sample

A survey of shrubs and trees in a temperate woodland was carried out. The results are shown in Table 8.1.

Table 8.1

common name	n	$\frac{n}{N}$	$\left(\frac{n}{N}\right)^2$
maple	807	0.196	0.0384
alder	6	0.001	0.0000
hazel	1856	0.451	.....
hawthorn	82	0.020	0.0004
blackthorn	40	0.010	0.0001
willow	101	0.025	0.0006
birch	78	0.019	0.0004
wild rose	84	0.020	0.0004
oak	1036	0.252	0.0635
dogwood	29	0.007	0.0000
N =	4119	Total =	.....

(i) Complete Table 8.1. [2]

(ii) Calculate the value for Simpson's index of diversity (*D*).

D = ...
[1]

(iii) Using your value for *D*, comment on the biodiversity of this temperate woodland.

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..... [2]

[Total: 12]