



GCSE

3445U20-1A



Z22-3445U20-1A

APPLIED SCIENCE (Double Award)

UNIT 2: Space, Health and Life

**Pre-Release Article for use in the following examinations on
WEDNESDAY, 15 JUNE 2022 – MORNING:**

GCSE Applied Science (D/A) Unit 2 Foundation Tier (3445U20-1)

GCSE Applied Science (D/A) Unit 2 Higher Tier (3445UB0-1)

To be opened on 11 MAY 2022.

A new copy of this Article will be given out in the examination.

This Article booklet should be distributed to candidates well in advance of the examination. Its contents may be freely discussed. A clean copy of this booklet will be available for candidates during the examination. Booklets with annotations may **NOT** be taken into the examination.

The Red Admiral butterfly

Red Admiral is the common name for one species of butterfly that visits the UK.



It has the scientific name *Vanessa atalanta*. Its classification is shown in **Table 1**.

Table 1: Scientific classification of the Red Admiral

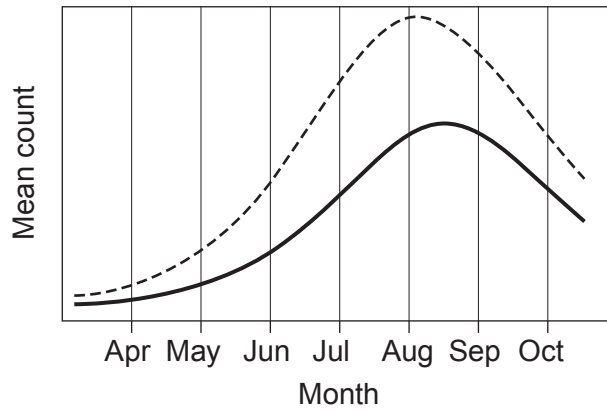
Scientific classification	
Kingdom:	Animalia
Phylum:	Arthropoda
Class:	Insecta
Order:	Lepidoptera
Family:	Nymphalidae
Genus:	<i>Vanessa</i>
Species:	<i>atalanta</i>
Scientific name:	<i>Vanessa atalanta</i>

Adult Red Admirals may be seen in the UK throughout the year. There is a seasonal increase in number in May and June as more travel from southern Europe. The Red Admirals breed and give rise to the next generation of adults which peak between mid-August and early October. They breed once a year. In autumn the offspring travel southwards.

The variation in the adult population at Oxwich Bay is shown in **Figure 1** below.

The solid line gives the mean count from 1976 to 2019, and the dashed line gives the mean count for 2019.

Figure 1



Food webs

Table 2 shows the feeding relationships in a typical woodland habitat.

Table 2

Food source	Eaten by
berries	greenfly, butterfly, titmouse, grasshopper
plantain	grasshopper, mouse, rabbit
greenfly	ladybird
butterfly	frog
grasshopper	frog
titmouse	snake, buzzard, fox
mouse	buzzard, fox
rabbit	buzzard, fox
ladybird	dragonfly, titmouse
dragonfly	frog
frog	snake
snake	buzzard

Food chains and a food web can be drawn using this information. The food web shows how each living thing is linked to the others.

The living things are also grouped into **trophic levels**.

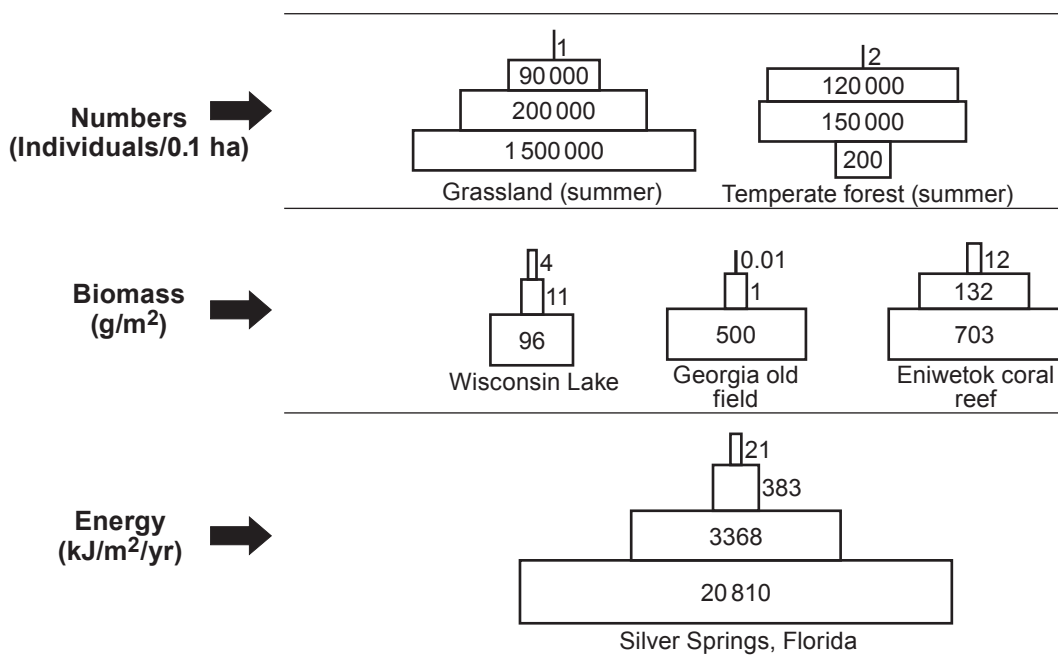
In the simplest scheme, the first trophic level is usually plants, the second trophic level is usually herbivores, and subsequent levels are carnivores. In a food web some organisms can appear in more than one trophic level.

Ecological pyramids

These are pyramid-shaped diagrams representing the numbers of organisms, energy levels, and biomass of an ecosystem. Values are usually high for the lowest trophic level and low for the highest trophic level.

Figure 2 shows different types of ecological pyramids from various habitats throughout the world.

Figure 2: Ecological pyramids



The efficiency of transferring energy between trophic levels can be calculated using the equation

$$\% \text{ efficiency} = \frac{\text{useful energy at a trophic level}}{\text{available energy at previous trophic level}} \times 100$$