Ecology - Revision materials

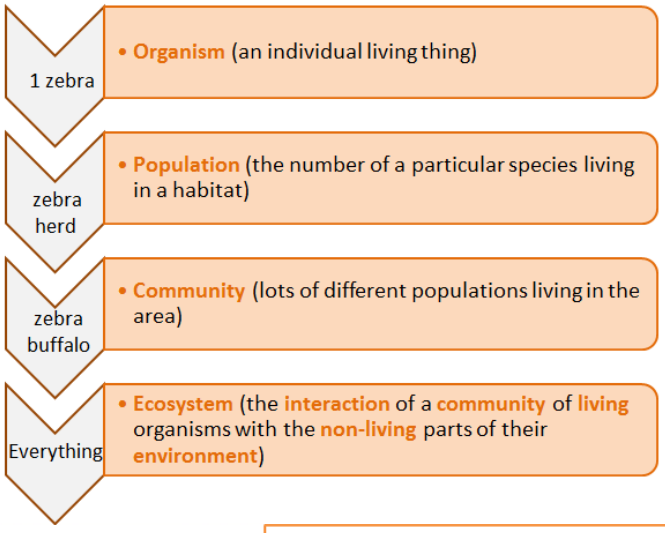
Content will be tested on Biology Paper 2

Checklist

Key Point	☺	☹
Ecology		
Describe and explain adaptations for animals and plants – especially ones that live in extreme conditions – deserts, poles etc		
Explain what 'extremophiles' are and give examples		
Define biotic and abiotic factors and explain how they can affect the organisms in a community		
Describe the flow of energy through food chains		
Describe methods of determining abundance of organisms within a habitat – using quadrats.		
Name the processes involved in the cycling of carbon and water and describe the importance of this		
Explain how waste, pollution, deforestation and global warming have impacted biodiversity		
Describe some of the biological consequences of global warming		
Describe measures to restore biodiversity and evaluate them		

4.7.1 Adaptations, interdependence and competition.

The different **levels of organisation** in an ecosystem are:



To **survive** and **reproduce**, organisms require a **supply of materials** from their **surroundings** and from **other living organisms** there.

Within a community each species **depends** on other species for their **survival**. This is called **interdependence.** If one species is removed it can affect the whole community.

Photosynthetic organisms are the producers of **biomass** for life on Earth.

Biomass is the mass of **living material** in an organism.

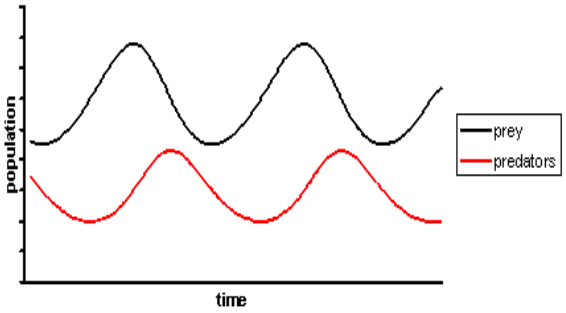
Food chains are used to represent the **feeding relationships** within a **community**. **All** food chains **begin** with a **producer** which **synthesises** molecules. Molecules are made when atoms are joined by chemical bonds. This is usually a **green plant** or **alga** which makes **glucose** molecules by **photosynthesis**.

Producers are eaten by **primary consumers** which in turn may be eaten by **secondary consumers** which may be eaten by **tertiary consumers**.

A **stable community** is one where **all** the **species** and **environmental factors** are in **balance** so that the **population** sizes remain fairly **constant**.

Consumers that **kill and eat** other animals are known as **predators** and those that are **eaten** are **prey.**

In a **stable community** the **numbers** of predators and prey **rise** and **fall** in **cycles**. The increases and decreases in predator population usually lag slightly behind that of the prey cycle.

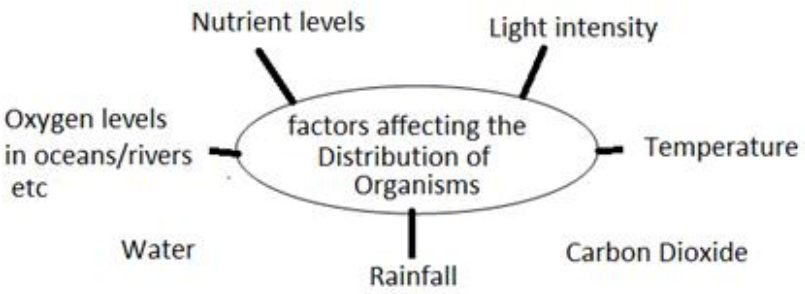


Competition is important in a community. It helps **maintain** the **balance**. When the weather is mild and **food is plentiful** in UK woodlands, rabbits **reproduce** and more **offspring survive** than is usual. This affects the amount of grass and vegetation being eaten by the increasing rabbit population leaving **less** for **other species**.

The fox population increases as there are plenty of rabbits for food and so more fox offspring survive. A greater number of foxes eat more rabbits and **reduce** their **population** back to normal. The fox population then slowly decreases as some foxes **starve** to death as they **compete** for food. The **balance returns** in the community.

Factor that may affect the distribution of organisms:

Biotic factors means **living** factors.	**Abiotic factor** is a **non-living factor**
New predators which organisms might not be able to defend against	**Temperature:** • Temperature affects the rate of an organisms metabolism i.e. effect enzyme activity. • Some organisms cannot maintain a constant high body temperature. • They cannot tolerate extreme temperatures. • Organisms that can maintain a constant high body temperature may also struggle to survive in extreme temperatures.
Low **food availability** means organisms find it harder to survive and breed.	**Availability of nutrients:** • Nutrients such as nitrates are essential for the growth of plants and microorganisms. • If there is a low concentration of these nutrients, these organisms struggle to grow and survive
New pathogens being introduced and organisms having no resistance.	**Light intensity** • Plants require light as an energy source for photosynthesis. • In low light intensities plants grow very slowly.
One species outcompeting another so the numbers are no longer sufficient to breed. In most of the UK, grey squirrels have outcompeted red squirrels	**Availability of water:** • All organisms require water. • It is essential because chemical reactions that occur inside and outside cells occur in solution in water. • In the absence of water, cells, and therefore organisms, die
	Availability of oxygen: • Oxygen is essential for aerobic respiration. • It can become limited in the soil, so plant roots cannot grow and absorb mineral ions and water. • It can also become **limited in water,** so **aquatic** organisms struggle to respire and survive.
	Availability of carbon dioxide (for plants): • Carbon dioxide is essential for photosynthesis. • This can become limited in an environment where there are many plants. • This will reduce the rate of growth of plants.



Q1. Green plants are found at the start of all food chains.

(a) Complete the sentences.

(i) The source of energy for green plants is radiation from the _____

(1)

(ii) Green plants absorb some of the light energy that reaches them for a process called _____

(1)

(b) Draw a ring around the correct answer to complete each sentence.

(i) This process transfers light energy into [chemical / sound / electrical] energy.

(1)

(ii) The process uses the gas [carbon dioxide. / oxygen. / water.]

(1)

(iii) The process produces carbon-containing compounds called [carbohydrates. / minerals. / salts.]

(1)

(c) The amount of living material (biomass) at each stage in a food chain is less than at the previous stage.

The diagram shows a food chain.

oak tree → **caterpillar** → **blue-tit** → **hawk**

Give **two** ways in which biomass is lost in this food chain.

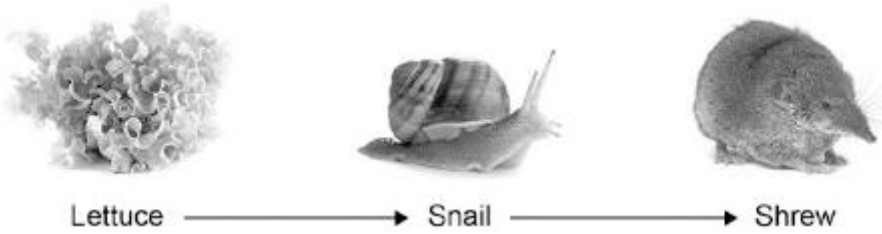
Tick (✓) **two** boxes.

- [ ] As carbon dioxide from the caterpillar
- [ ] As food eaten by the hawk
- [ ] As oxygen from the oak tree
- [ ] As faeces (droppings) from the blue-tit

(2)

(Total 7 marks)

Q2. The diagram below shows a food chain in a garden.



Lettuce © destillat/iStock/Thinkstock; Snail ©Valengilda/iStock/Thinkstock; Shrew © GlobalT/iStock/Thinkstock

(a) Name **one consumer** shown in the diagram above.

_____

(1)

(b) Name **one carnivore** shown in the diagram above.

_____

(1)

(c) A disease kills most of the shrews in the garden.

Suggest why the number of snails in the garden may then increase.

_____

_____

(1)

(d) What is the name given to all the snails in the garden shown in the diagram above?

Tick **one** box.

Community ☐

Ecosystem ☐

Population ☐

Territory ☐

(1)

(f) Some snails ate some lettuces.

The lettuces contained 11 000 kJ of energy.

Only 10% of this energy was transferred to the snails.

Calculate the energy transferred to the snails from the lettuces.

_____

Energy = _____ kJ

(1)

(g) Give **one** reason why only 10% of the energy in the lettuces is transferred to the snails.

Tick **one** box.

The lettuces carry out photosynthesis ☐

The snails do not eat the roots of the lettuces ☐

Not all parts of a snail can be eaten ☐

(1)

(h) **Abiotic** factors can affect the food chain.

Wind direction is one abiotic factor.

Name **one other** abiotic factor.

_____

(1)

(Total 8 marks)

Q3. A selective herbicide (a type of pesticide) can be used to kill weeds growing among crop plants.

The table shows the result of adding different amounts of a selective herbicide to a rice crop.

Herbicide added in kg per hectare	Amount of rice produced in tonnes per hectare	Percentage cover of weeds
0.0	50	85
1.7	70	32
3.4	76	24

(a) As more herbicide is applied, what happens to:

(i) the amount of rice produced;

_____

(1)

(ii) the percentage cover of weeds?

_____

(1)

(b) Suggest **two** reasons why rice does not grow well when there are a lot of weeds present.

1. _____

_____

2. _____

_____

(2)

Q4. Animals in a habitat compete with each other.

(a) Give **two** factors for which animals may compete.

1. _____

2. _____

(2)

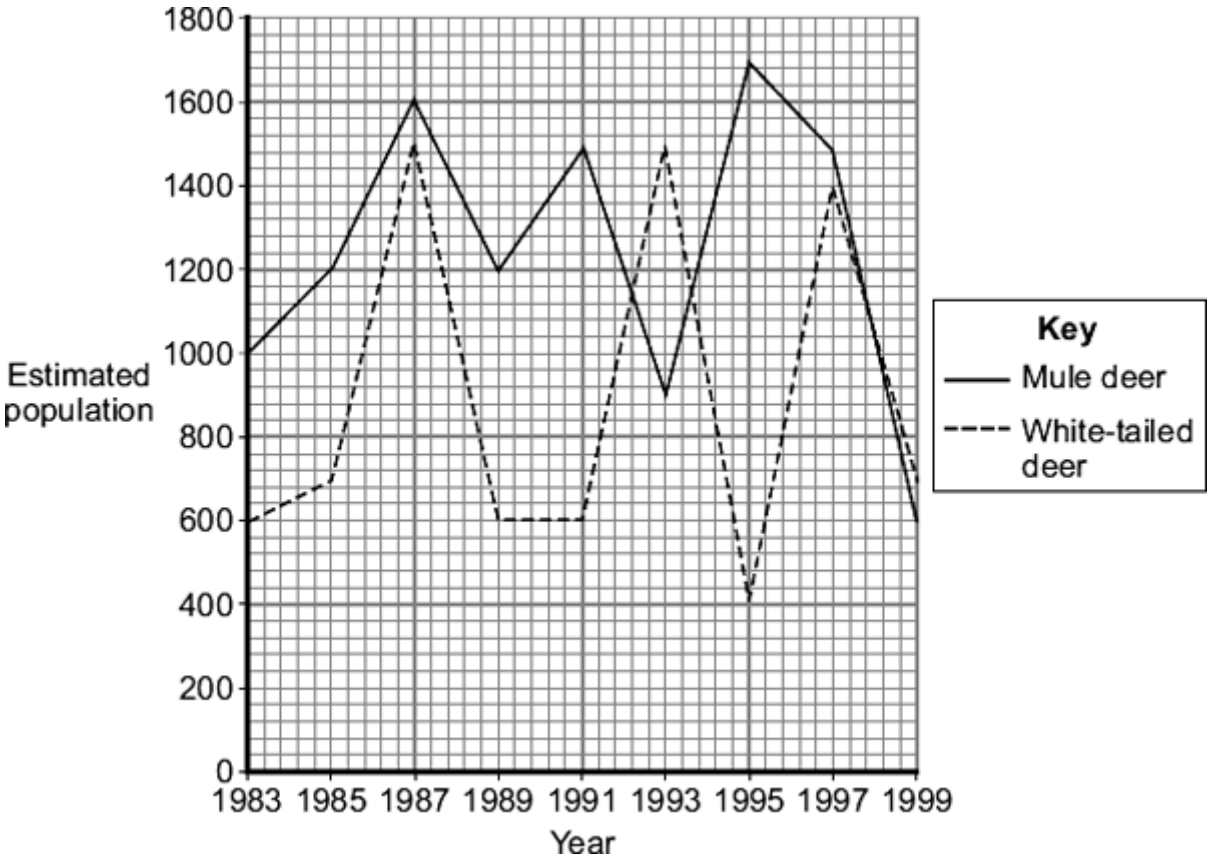
(b) The photographs show a mule deer and a white-tailed deer.

Mule deer **White-tailed deer**

Mule deer by Dcrjsr (Own work) [CC-BY-3.0], via Wikimedia Commons. White-tailed deer by Clay Heaton (Own work) [CC-BY-SA-3.0], via Wikimedia Commons

Mule deer and white-tailed deer live together in the same national park in the USA.

The graph shows changes in the populations of the two deer species between 1983 and 1999.



(i) Describe the changes in the population of white-tailed deer between 1991 and 1995.

_____

_____

_____

_____

(2)

(ii) Use information from the graph to suggest an explanation for changes in the population of white-tailed deer between 1991 and 1995.

_____

_____

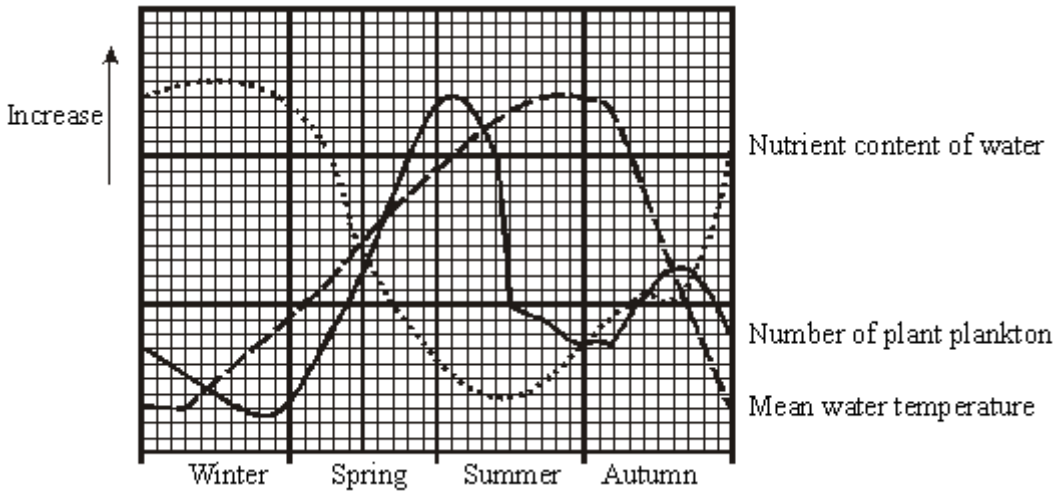
_____

_____

(2)

(Total 6 marks)

Q6. Plant plankton are aquatic microscopic organisms that photosynthesise. The graph shows the numbers of plant plankton in the North Sea at different times of the year.



Use the data and your knowledge of photosynthesis and growth to explain:

(a) why numbers of plant plankton were low in winter but increased rapidly during the spring,

_____

_____

_____

_____

_____

_____

(3)

(b) the reduction in numbers of plant plankton in the early summer.

_____

_____

_____

_____

(1)

(Total 4 marks)

4.7.2.1. Levels of organisation – and Required Practical 9: measuring population size.

It is important for ecologists to be able to determine the distribution and abundance (how many) of a species in an ecosystem. If one species is in decline, it can affect the whole ecosystem.

Sampling techniques are used to estimate the size of a population.

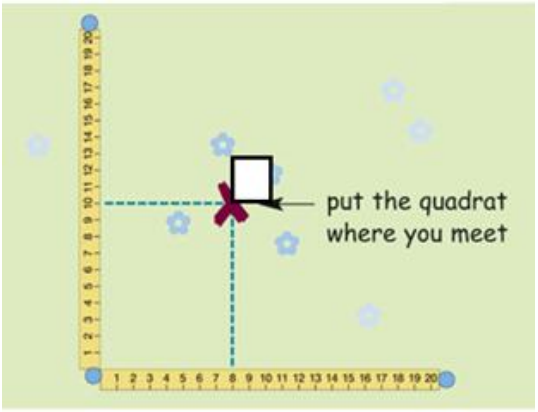
Collection of quantitative data:

Sampling:

- To study the distribution of a species you need to find out:
  - The size of the area being studied.
  - The number of organisms living there.
  - Where those organisms live.
- However, it would be very time consuming to count every individual organism:
  - They may move
  - There may be too many.
- Therefore, a sample of the organisms is counted.
- The techniques chosen should enable this sample to be representative of the whole area.
  - It should provide valid data.
  - The sample can be used to estimate the total population.
  - The technique should be reproducible; if it is carried out again the estimated population should be the same size.

Method 1: Quadrats: These are **square frames**, used to mark off specific areas of ground. Typically 0.5m X 0.5m with a grid of 10cm X 10 cm

- They can be used to survey:
  - which species are present, **numbers of each species**, or **percentage cover** of a species.



Random Sampling:

Divide the area into a grid

Generate random number to use as coordinates (avoids bias)
Put the quadrat down and….

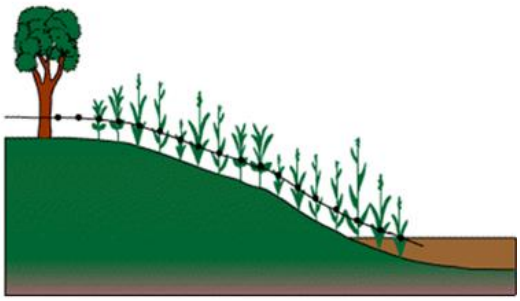
- Count the number of different species within
- The number of a particular species within
- Or the area covered by one/each species

Use a large sample to be representative of the area

.

Method 2: Transects: Use when:

- There are changes in the distribution of a population of an organism.
- There are two neighbouring habitat eg grassland to woodland
- Or, if a particular factor leads to zonation eg the effect of the tide and coverage by water on a rocky seashore.



Creating a transect
Use a **tape measure to create the transect**

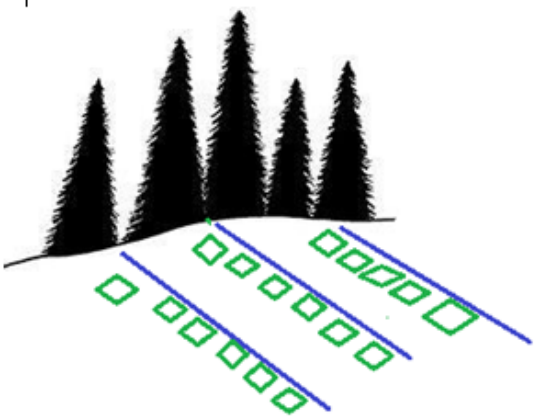
Place quadrats

At regular intervals along the transect

Record the number of different plants/number of each plant

Repeat the transect several times

At random/regular intervals along the habitat



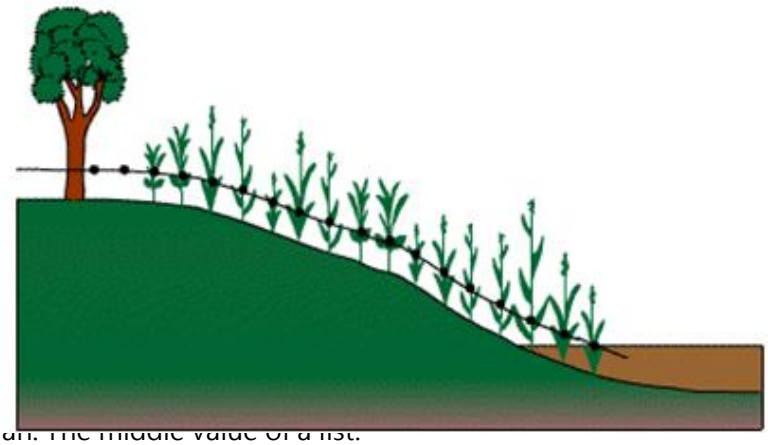
Vari

1 e, regular intervals.

2 . Place the subsequent quadrats

.

3 gular intervals along the transect.



Anal

Mea and dividing by the number of observations.

Median: The middle value of a list.

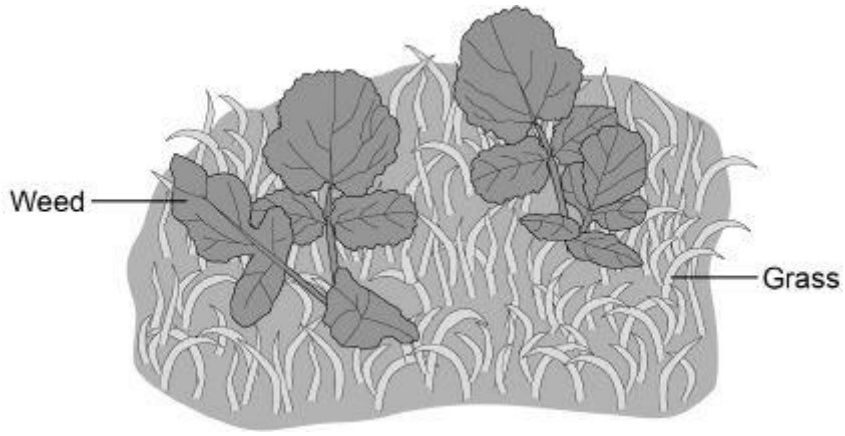
Mode: The most common value in a list.

Exam practice 2

Q1. Some weed killers are selective.

Selective weed killers kill broad-leaved weed plants, but do **not** kill narrow-leaved grass plants.

The diagram shows some weeds growing on a grassy lawn.



Some students investigated the effect of a selective weed killer on the weeds growing in a lawn. They used 0.5 m × 0.5 m quadrats.

The lawn was 20 metres long and 10 metres wide.

This is the method used.

1. Divide the lawn into two halves, side **A** and side **B**.
2. Place 5 quadrats in different positions on side **A**.
3. Place 5 more quadrats in different positions on side **B**.
4. Count the number of weed plants in each quadrat.
5. Spray side **A** with weed killer solution.
6. Spray side **B** with the same volume of water.
7. Repeat steps 2-4 after 2 weeks.

(a) Suggest a method the students should have used to place each quadrat.

_____

_____

_____

(1)

(b) Give the reason for the method you suggested in part **(a)**.

_____

_____

(1)

(c) Explain why the students used water on one side of the lawn instead of weed killer.

_____

_____

_____

_____

(2)

The table below shows the students' results.

	Number of weeds per quadrat			
	At start		After 2 weeks	
	Side A (Weed killer)	Side B (Water)	Side A (Weed killer)	Side B (Water)
	8	14	3	8
	2	9	4	15
	12	3	0	7
	15	16	2	12
	13	3	1	13
Mean	10	9	2	**X**

(d) Calculate the mean value, **X**, in the table above.

_____

_____

Mean value, **X** = _____

(1)

(e) Calculate the percentage decrease in the number of weeds on side **A** after 2 weeks.

Use the following equation:

$$\text{percentage decrease} = \frac{(\text{mean at start} - \text{mean after 2 weeks})}{\text{mean at start}} \times 100$$

_____

_____

_____

Percentage decrease = _____

(2)

(f) One student thought the results were **not** valid.

Suggest **one** improvement the students could have made to the method to make the results more valid.

Give the reason for your answer.

Improvement _____

_____

Reason _____

(2)

(Total 9 marks)

Q2. Some students investigated the distribution of dandelion plants in a grassy field. The grassy field was between two areas of woodland.

Figure 1 shows two students recording how many dandelion plants there are in a 1 metre x 1 metre quadrat.

Figure 1

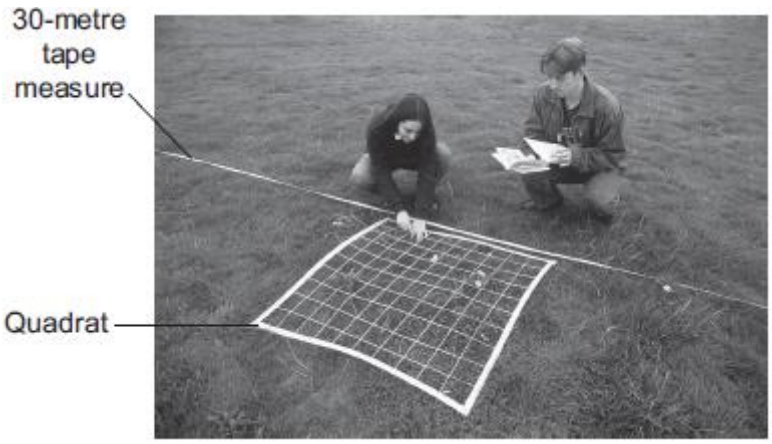


Figure 2 shows a section across the area studied and **Figure 3** shows a bar chart of the students' results.

Figure 2

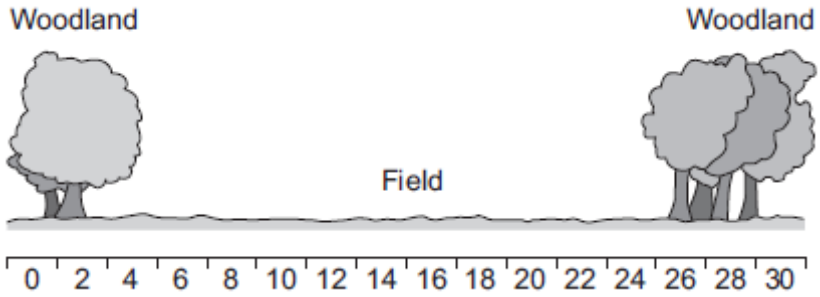
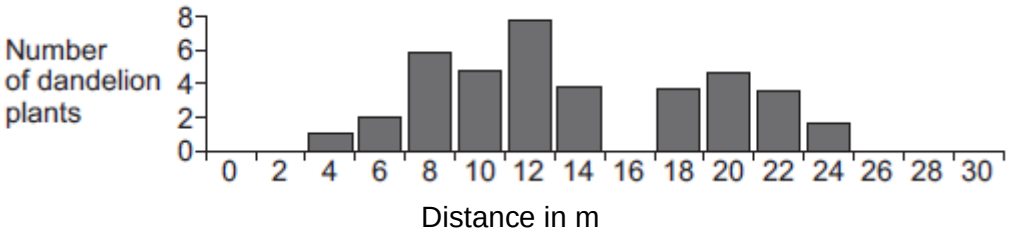


Figure 3



(a) How did the students use the quadrat and the 30-metre tape measure to get the results in **Figure 3**?

Use information from **Figure 1**.

_____

_____

_____ **(3)**

(b) (i) Suggest **one** reason why the students found no dandelion plants under the trees.

_____

_____

(1)

(ii) Suggest **one** reason why the students found no dandelion plants at 16 metres.

_____

_____

(1)

(c) The teacher suggested that it was **not** possible to make a valid conclusion from these results.

Describe how the students could improve the investigation so that they could make a valid conclusion.

_____

_____

_____

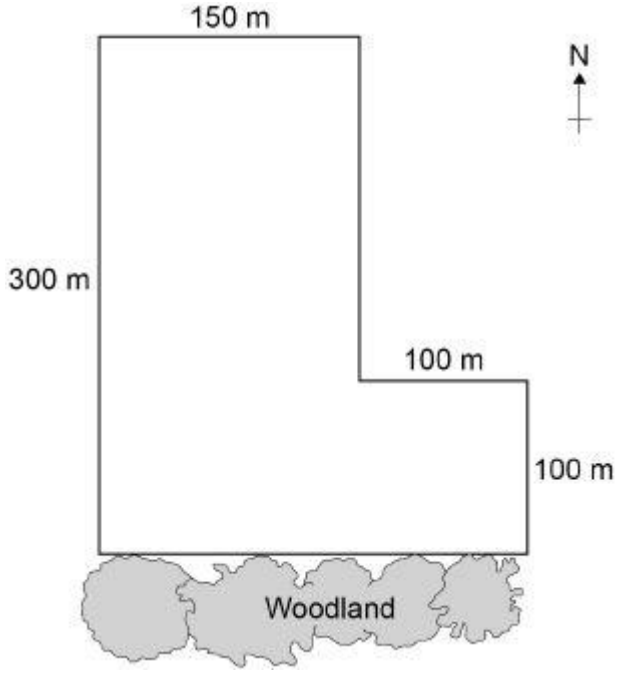
_____

(2)

(Total 7 marks)

Q3. Some students investigated the size of a population of dandelion plants in a field.

The diagram below shows the field.



The students:

- placed a 1 m × 1 m square quadrat at 10 random positions in the field
- counted the number of dandelion plants in each quadrat.

The table below shows the students' results.

Quadrat number	Number of dandelion plants
1	6
2	9
3	5
4	8
5	0
6	10
7	2
8	1
9	8
10	11

(a) Why did the students place the quadrats at random positions?

_____

_____

(1)

(b) Estimate the total number of dandelion plants in the field.

Calculate your answer using information from the diagram and the table above.

Give your answer in standard form.

_____

_____

_____

_____

_____

_____

_____

_____

_____

Total number of dandelion plants = _____

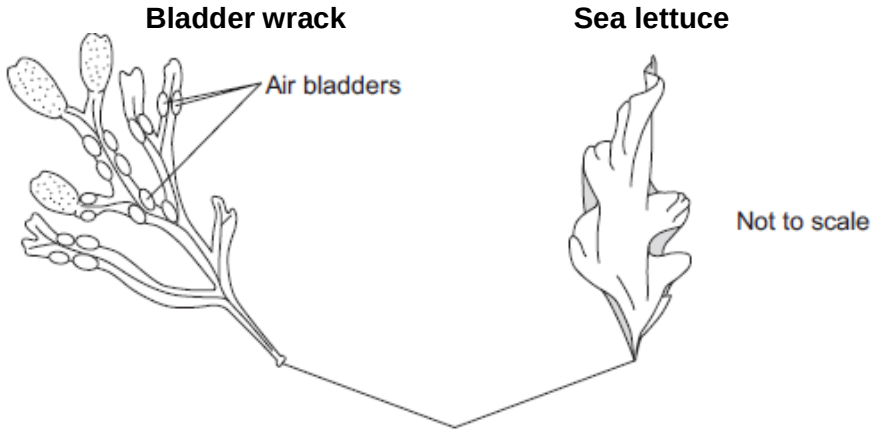
(5)

Q4. At the seashore, the tide comes in and goes out twice each day.

Some students investigated whether two different species of seaweed could live only at certain positions on a rocky shore.
Seaweeds are plant-like organisms that make their food by photosynthesis.

Figure 1 shows the two species of seaweed that the students investigated.

Figure 1



(a) The students:

1 placed a 50-metre tape measure on the rocks at right angles to the sea

2 placed a quadrat next to the tape measure

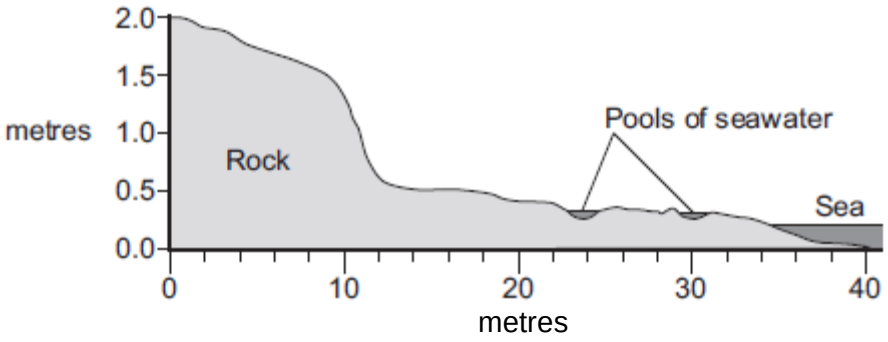
3 recorded whether each species was present or not.

The students repeated steps 2 and 3 every metre down the shore.

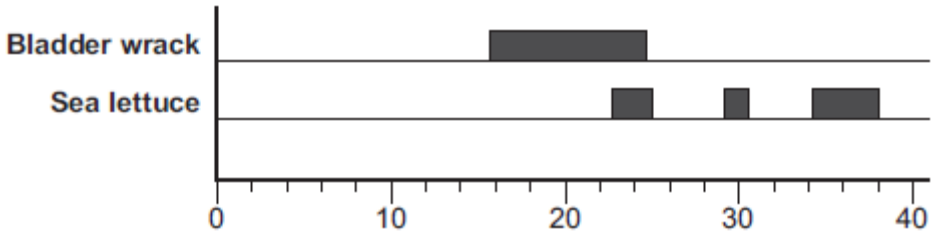
Figure 2 shows a section of the seashore and the students' results.

Figure 2

Section of the seashore



Students' results



(i) The students placed the quadrat at regular intervals along a transect line rather than placing the quadrat at random positions anywhere on the rocky shore.

Explain why.

_____

_____

_____

(2)

(ii) How could the students have improved their investigation to ensure that they produced valid data?

_____

_____

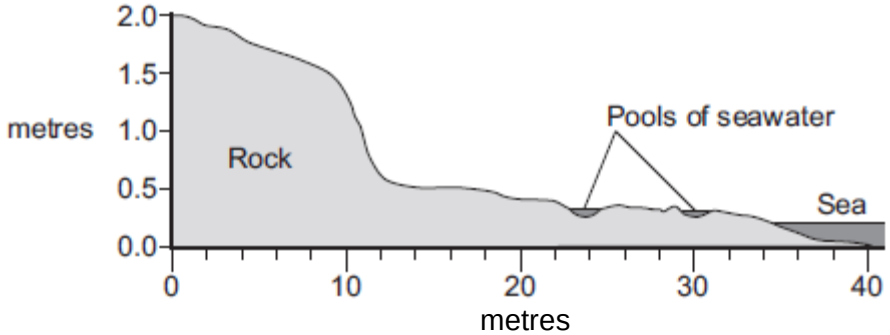
_____

(2)

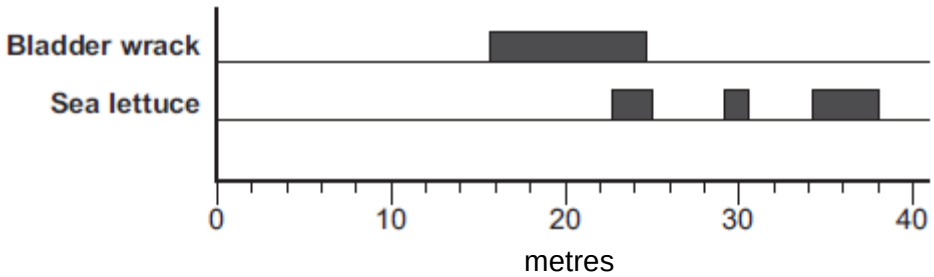
(iii) **Figure 2** is repeated here to help you answer this question.

Figure 2

Section of the seashore



Students' results



The students concluded that bladder wrack is better adapted than sea lettuce to survive in dry conditions.

What is the evidence for this conclusion?

Use information from **Figure 2**.

_____

_____

(2)

(b) The bladder wrack has many air bladders.

The air bladders help the bladder wrack to float upwards when the sea covers it.

Suggest how this helps the bladder wrack to survive.

_____

_____

_____

(2)

4.7.1.4 Adaptations

Organisms have **features** (adaptations) which enable them to **survive** the conditions in which they normally live.

Adaptations can be:

- **behavioural** (actions an organisms takes)
- **structural** (how an organism is built)
- **functional** (how the organism works).

Migration or hibernation are examples of behavioural adaptation. They **increase** the **chances** of **survival** when food availability decreases in a habitat.

A duck with webbed feet, or trees having thick bark to resist fire, or cacti having needle like leaves to reduce water loss, are examples of **structural adaptations**.

Functional adaptations are not always easy to see. An example is a desert lizard producing very concentrated urine to conserve water.

Some organisms live in environments which are very extreme, such as at **high temperature**, **pressure** or **salt** concentration.

These organisms are called **extremophiles.**

Exam practice 3

Q1. Animals and plants are adapted in different ways in order to survive.

(a) Plants may have to compete with other plants.

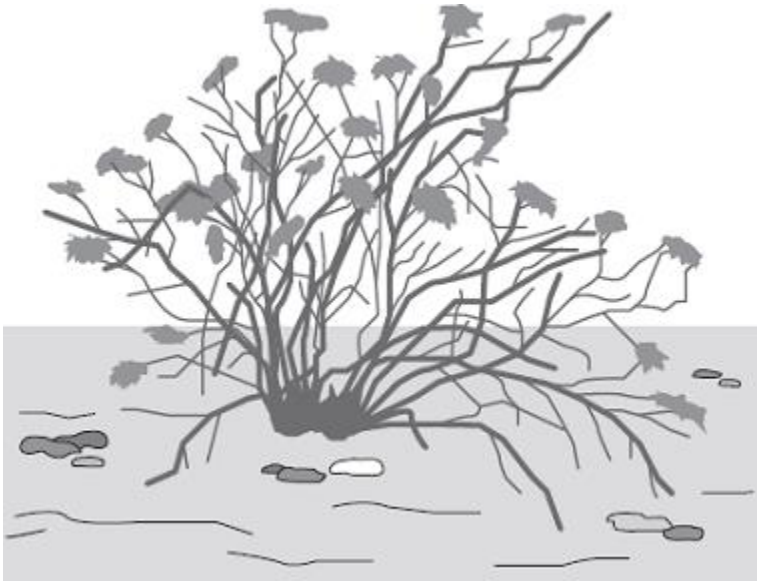
(i) Name **two** things for which plants compete.

1. _____

2. _____

(2)

(ii) The drawing shows a creosote bush.



This bush lives in a desert.

The creosote bush produces a poison that kills the roots of other plants.

How does this poison help the creosote bush to survive in the desert?

_____

_____

(1)

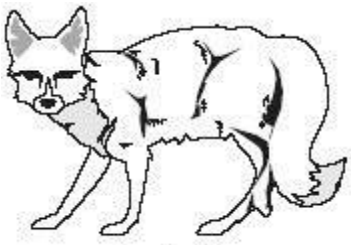
Q2.(a) Which term describes organisms that can tolerate very hot or very cold places?

Draw a ring around the correct answer.

an environmental species	**an extremophile species**	**an indicator species**

(1)

Q3. The drawings show an arctic fox and a fennec fox.



Arctic fox

Fennec fox

(a) The arctic fox lives in cold, snowy conditions.

Explain how each of the following helps the arctic fox to survive in these conditions.

1 Long, thick fur

_____

2 A white coat

(2)

(b) The fennec fox lives in hot deserts.

Explain how each of the following helps it to survive in hot conditions.

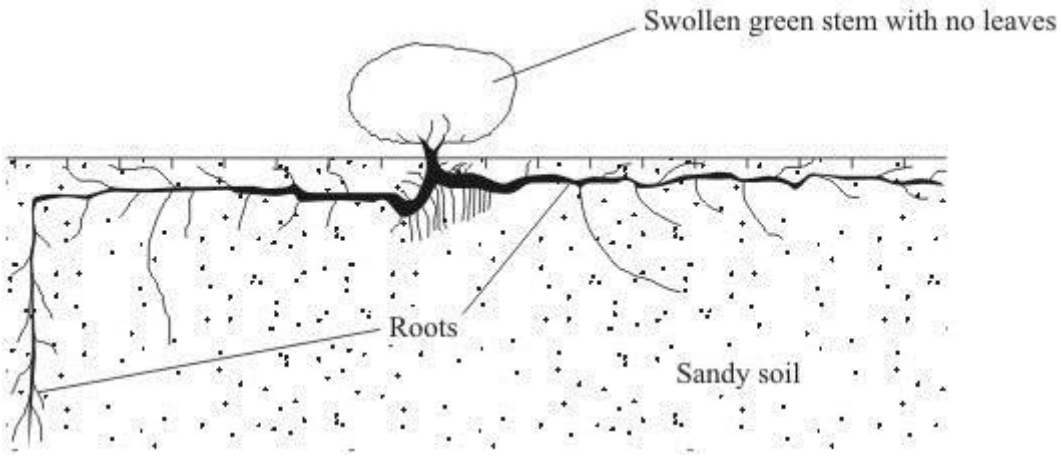
1 Very large ear flaps

2 Hairs on the soles of its feet

(2)

(Total 4 marks)

Q4. The drawing shows a bean caper plant.



The bean caper plant lives in hot desert conditions.

Explain two ways in which the bean caper is adapted for life in a hot desert.

Adaptation 1 _____

How this adaptation helps the bean caper to survive

Adaptation 2 _____

_____

How this adaptation helps the bean caper to survive

_____

_____

(Total 4 marks)

Q5.In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

Animals and plants have features (adaptations) that allow them to survive in the conditions in which they normally live.

Describe how animals and plants are adapted to survive in dry conditions such as deserts.

For each adaptation that you give, describe how the adaptation helps the animal or plant to survive in dry conditions.

To obtain full marks you should refer to **both** animals and plants.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Extra space _____

_____

_____

_____

_____

_____

(Total 6 marks)

4.7.2.2. How materials are cycled

The carbon cycle:

All materials in the living world are recycled to provide the building blocks for future organisms

Key processes:

- **Photosynthesis:** is the chemical process which uses light energy to form glucose, its food sources. Glucose is then converted into other biological molecules thereby increasing plant biomass.

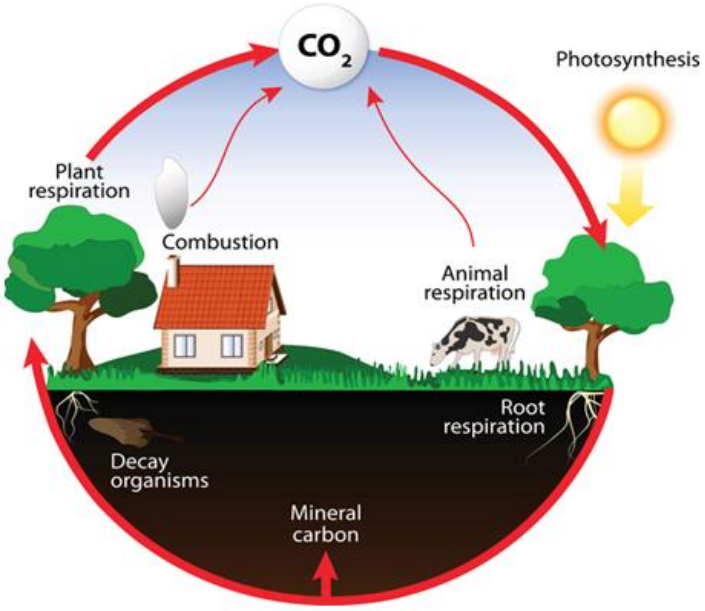
  Carbon dioxide + water → glucose + oxygen

- **Respiration:** is a chemical process that release energy from glucose in muscle cells. In Microorganism this is also known as **decomposition**.

  Glucose + oxygen → water + carbon dioxide

- **Combustion:** the process of burning something. E.g. wood or a fossil fuel.

  Fuel + oxygen → carbon dioxide + water



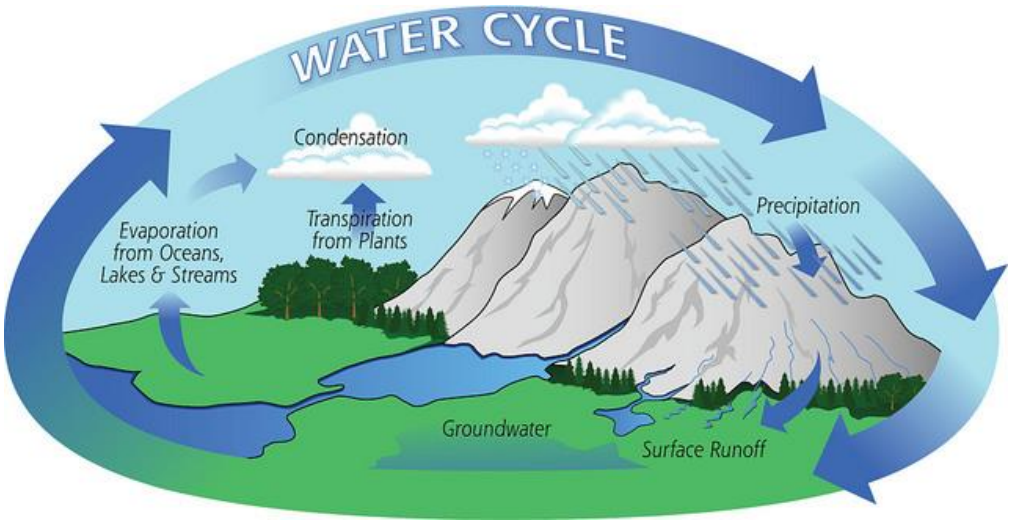
Remember ONLY photosynthesis and respiration occurs in living organisms.

Plant biomass is transferred to animal biomass through consumption (eating) and assimilation of the organic material.

The water cycle:

The water cycle is important as it provides fresh water for plants and animals on land before draining into the seas.

Fresh water is needed for animals to drink and for plants to carry out **photosynthesis**. Water diffuses from the top of surfaces of a plant by **transpiration** (Paper 1 link)



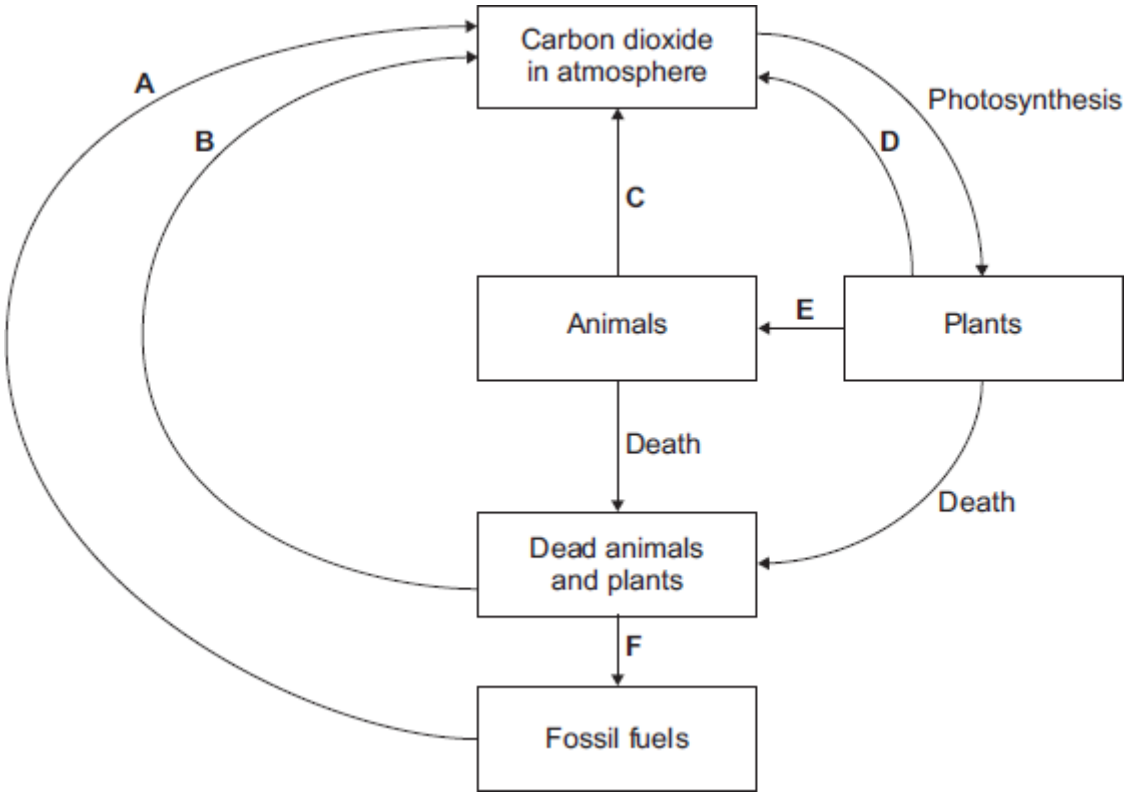
Water is continuously **evaporated** and **precipitated**.

Other Key terms:

- **Precipitation** = Rain, hail, sleet and snow that falls from the clouds
- **Condensation = When water vapour cools and turns into clouds**
- **Evaporation = When the sun heats up water from the sea and it goes into the air.**

Q1.

(a) The diagram shows the carbon cycle.



(i) The concentration of carbon dioxide in the atmosphere has increased over the last 100 years.

Give **two** human activities that might have caused this increase.

1. _____

2. _____

(2)

(ii) Give the letters of **two** arrows in the diagram which show respiration.

☐ and ☐

(2)

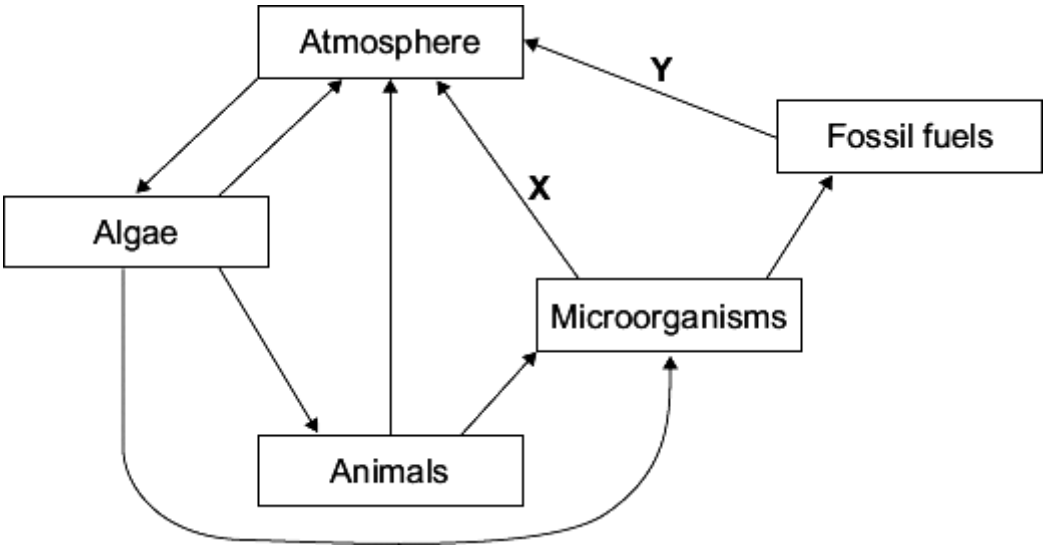
(iii) Give the letter of **one** arrow which shows decay.

☐

(1)

Q2.

The diagram shows part of a carbon cycle in a habitat.



(a) Name the processes shown by arrows **X** and **Y**.

X _____

Y _____

(2)

(b) Describe the part played by algae in this carbon cycle.

_____

_____

_____

_____

_____

_____

(3)

(c) In tropical rainforests process **X** is much faster than in most other habitats.

Suggest why.

_____

_____

_____

_____

(2)

(Total 7 marks)

Q3.

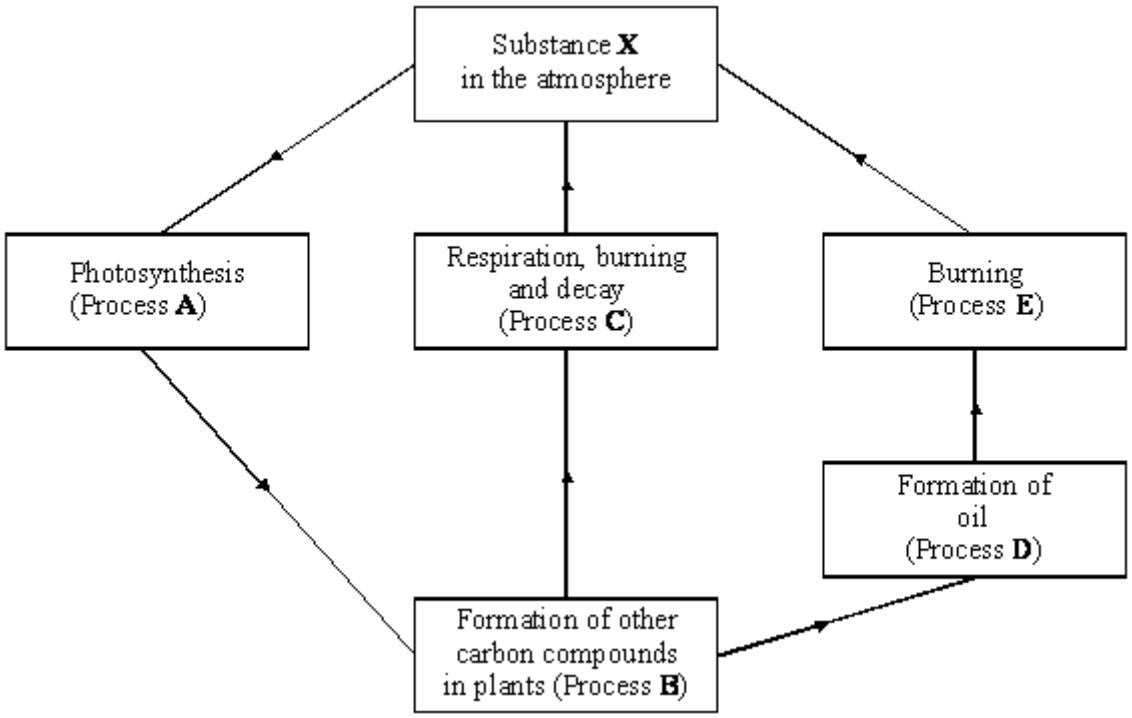
(a) Use words from the box to complete the sentences about the water cycle.

boils	**condenses**	**evaporates**	**freezes**	
melts	**rain**	**sea**	**Sun**	**wind**

Water _____ from the surface of the _____ . Heat from the _____ speeds up this process and so does the _____ . Water vapour in the atmosphere cools down and _____ to form billions of tiny water droplets. Some of the droplets join together and fall as _____ .

(6)

(b) The diagram shows some processes in the carbon cycle.



(i) What is the name of substance **X**?

_____

(1)

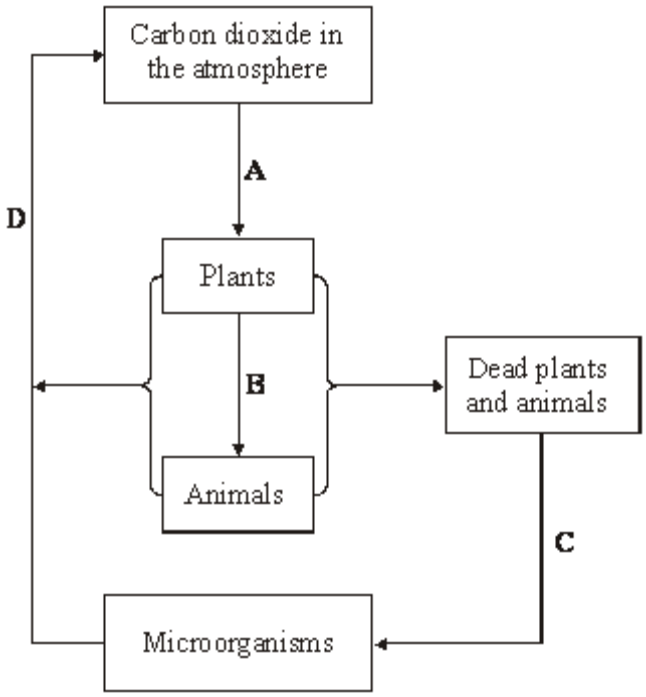
(ii) Which process, **A**, **B, C**, **D** or **E**, takes the **longest** and approximately how long does it take?

_____

(2)

(Total 9 marks)

Q4. The diagram shows part of the carbon cycle.



(a) Which letter, **A**, **B**, **C** or **D**, represents:

(i) respiration _____

(1)

(ii) photosynthesis? _____

(1)

(b) Local authorities are encouraging people to recycle vegetable waste by converting it into compost.

Compost is made by mixing the vegetable waste with soil in a large container.

(i) Decay occurs more quickly if the container has holes in the sides.

Explain why.

_____

_____

_____

_____

(2)

(ii) Spreading compost on the soil between plants leads to better growth of the plants.

Explain why.

_____

_____

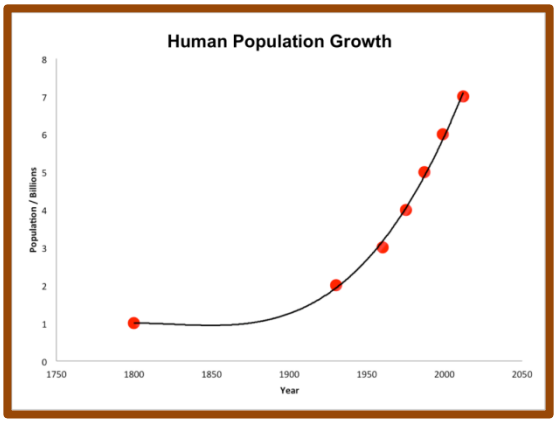
(1)

(Total 5 marks)

Biodiversity is the variety of all the different species of organisms on Earth, or within an ecosystem.

A **high biodiversity** ensures the **stability** of ecosystems by reducing the dependence of one species on another for food, shelter and the maintenance of the physical environment.

Many **human activities** are reducing biodiversity and only recently have measures been taken to try to stop this reduction.



Human population growth and Human activities:

The **human population** has been **growing rapidly** along with the standards of living (**exponential growth**). As a consequence, **more resources** are used to produce materials for humans and so **more waste** is also produced.

The amount of pollution caused also increases unless the waste and chemical materials are properly handled.

Pollution kills plants and animals which can reduce biodiversity. Pollution can occur on land, in the air and water.

Human activity	What is happening?	Impact
Land use and pollution	• Humans reduce the amount of land available for other animals and plants by **building**, **quarrying**, **farming** and **dumping waste** (landfill).	• Reduce biodiversity as less habitats and food sources.
	• **Peat bogs** are burned to make compost for gardening. This process releases CO_2 into the atmosphere as **peat is a carbon store**.	• CO2 is a greenhouse gas. More CO2 in the atmosphere increases global warming.
	• **Deforestation** is occurring in tropical areas to: • Provide land for **cattle** and **rice fields** • Grow crops for **biofuels**	• Less CO2 is removed from the atmosphere, as less photosynthesis, which contributes to global warming. • More cattle = more methane releases, which contributes to global warming. • More rice fields = more methane releases, which contributes to global warming.
Water pollution	• **Sewage** or **toxic chemicals** may enter lakes, • rivers or the sea. • The use of **artificial fertiliser** to improve • plant growth in farming may enter • waterways via **run off** from the fields.	• This can lead to **eutrophication**. • **Algae** in the water **grow rapidly** due to the • fertiliser. The algae **reduce** the amount of **light** • available for plants and so they die. • The decay process uses up **oxygen** and • so other living organisms such as **fish die** as well.
Combustion and Air pollution	• Fossil fuels contain **impurities** such as **sulfur,** which reacts with oxygen to form **sulfur dioxide**. • Smoke, carbon monoxide and carbon dioxide is also released.	• Acid rain is formed when Sulphur and Nitrogen are released into the atmosphere. Acid rain damages and pollutes the environment • High concentrations of sulphur dioxide can cause **breathing difficulties**.

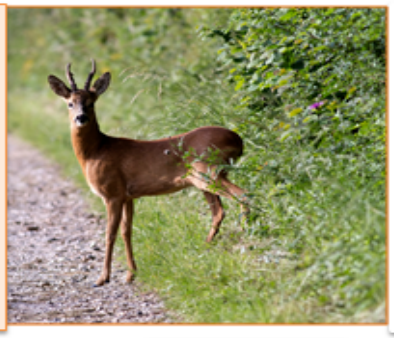
Global warming:

- Levels of carbon dioxide and methane (greenhouse gases) in the atmosphere are increasing, and contribute to 'global warming'.
- Greenhouse gases allows short-wavelength radiation to pass into the Earth's atmosphere and absorbs long-wavelength causing the Earth to warm.
- Biological consequences of global warming:
    - Sea ice is melting, causing sea levels to rise.
    - Bird migratory paths are changing.
    - Increased global temperatures, causing species to become extinct.

Maintaining biodiversity:

Scientists and concerned citizens have put in place programmes to reduce the negative effects of humans on ecosystems and biodiversity.

Reintroduction of field margins (the land between the crop and the field boundary) and **hedgerows** in agricultural areas where farmers grow one type of crop. This encourages diversity of wildlife as there is a variety of food.



Protection and regeneration of rare habitats. These are often designated as SSSI and managed by conservation organisations.

SSSI = site of special scientific interest.

Breeding programmes for endangered species to guard against extinction and be able to increase numbers in the wild.

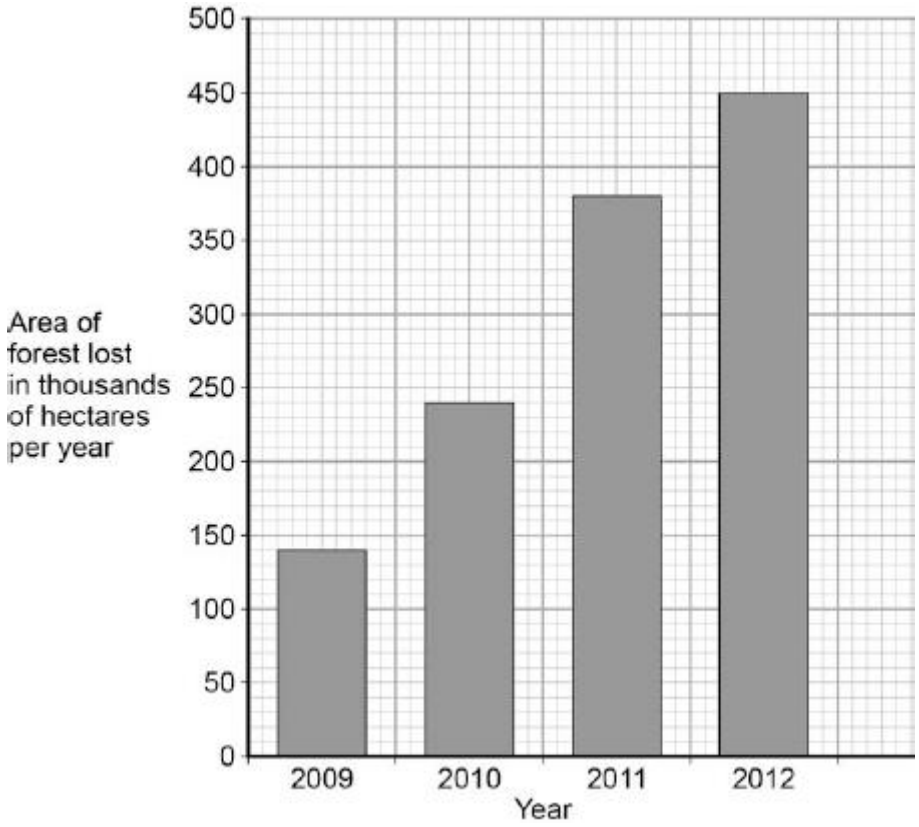
endangered list

Recycling resources instead of dumping waste in landfill.

Reduction of deforestation and carbon dioxide emissions by some governments across the world. Almost 200 governments have signed the Kyoto protocol.

Exam practice 5

Q1. The graph below shows the area of forest lost in Madagascar from 2009 to 2012.



(a) The area of forest lost each year in Madagascar increased between 2009 and 2012.

Determine the total area of forest lost from the start of 2009 to the end of 2012.

_____

_____

Total area of forest lost = _____ thousand hectares

(1)

(b) What are the possible reasons for the change in the area of forest lost per year between 2009 and 2012?

Tick **two** boxes.

The local people stop growing rice	☐
Fewer new houses are needed for the population	☐
The local people decided to farm cattle	☐
More trees have been planted	☐
A company starts growing plants for biofuels	☐

(2)

(c) More forest was lost in 2012 than in 2009.

Use words from the box to complete the sentences.

carbon dioxide	**excretion**	**nitrogen**
oxygen	**photosynthesis**	**respiration**

The increase in the area of forest lost has caused an increase in the gas

_____

The increase of this gas has been caused because less of the gas is being

absorbed by plants for the process of _____ .

(2)

(d) Deforestation can have negative effects on our ecosystems.

What are the negative effects of deforestation?

Tick **two** boxes.

Animals and birds migrate because there is less food	☐
More habitats are destroyed	☐
There is less acid rain	☐
There is more biodiversity	☐
The global temperature decreases	☐

(2)

(e) Scientists try to reduce the negative effects of human activity on our ecosystems.

One way is to protect rare habitats.

Give **one other** way of reducing the negative effects of human activity on our ecosystems.

_____

_____

(1)

(Total 8 marks)

Q2. Human activity affects ecosystems.

(a) Draw **one** line from each human activity to the effect on ecosystems.

Human activity	Effect on ecosystems
Increase in rice fields	Increases the amount of methane in the atmosphere
Destruction of peat bogs	Increases the amount of carbon dioxide that is released into the atmosphere
	Reduces the rate at which carbon dioxide is locked up as wood

(2)

(b) (i) Deforestation also affects the atmosphere.

Give **two** reasons why deforestation takes place.

1. _____

_____

2. _____

_____

(2)

(ii) Changes in the gases in our atmosphere can cause global warming.

Give **two** possible effects of a rise in the Earth's temperature.

1. _____

_____

2. _____

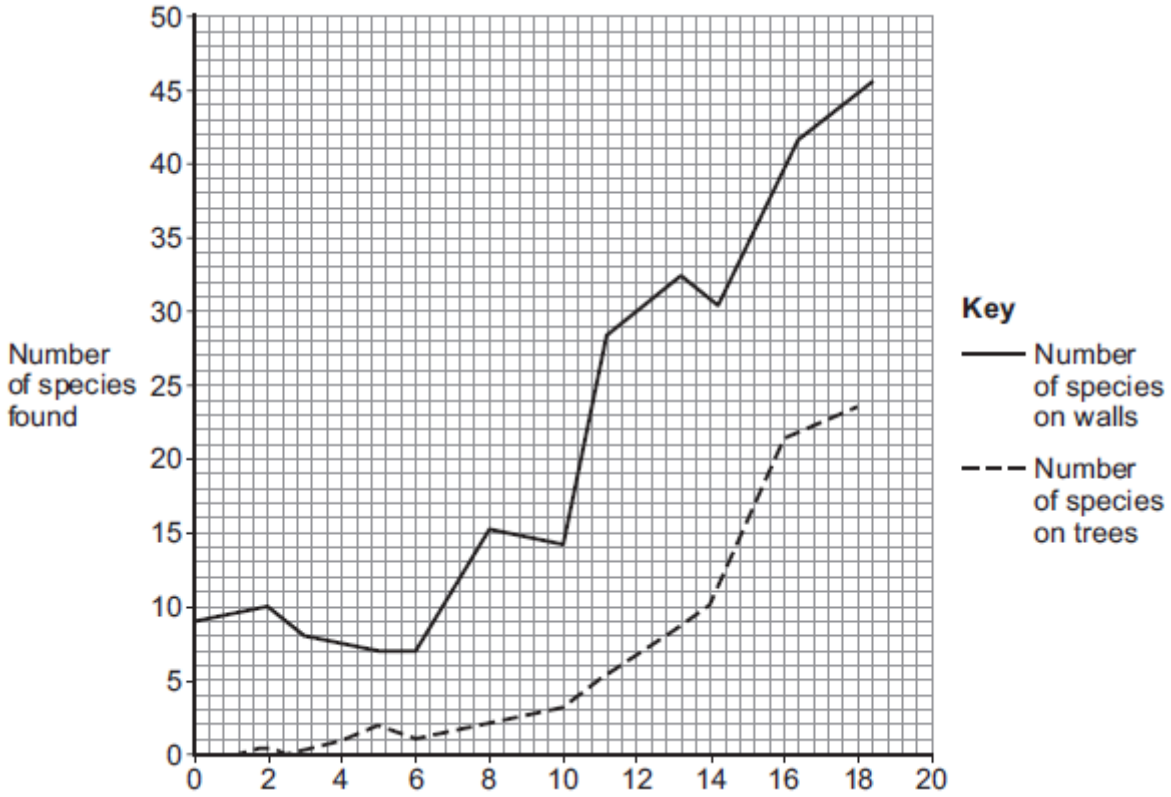
_____

(2)

(Total 6 marks)

Q3. Lichens can be used as air pollution indicators.

The graph below shows the number of lichen species found growing on walls and trees at increasing distances from a city centre.



(a) (i) How many species of lichen are found on walls 2 km from the city centre?

_____

(1)

(ii) Describe the patterns in the data.

_____

_____

_____

_____

_____

_____

(3)

(b) The table below shows the concentration of sulfur dioxide (SO_2) in the air at different distances from the same city centre.

Distance from city centre in km	SO_2 concentration in g per m^3
0	200
3	160
8	110
13	85
18	65

Suggest how the data in the table could explain the patterns in the graph above.

_____

_____

_____

_____

(2)

(c) Nitrogen oxides are also air pollutants.

The main source of nitrogen oxide pollution comes from road vehicles.

Different lichen species vary in their tolerance of the levels of nitrogen oxides in the air.

Some lichens can only grow in very clean air where there are low levels of nitrogen oxides. They are nitrogen-sensitive.

Some lichens grow very well in high levels of nitrogen oxides. They are nitrogen-loving.

The table below shows one lichen species which is nitrogen-sensitive and one lichen species which is nitrogen-loving.

Nitrogen-sensitive	Nitrogen-loving
Usnea 	*Xanthoria* 

Usnea © epantha/iStock/Thinkstock;
Xanthoria By Zakwitnij!pl Ejdzej + Iric (CC BY-SA.2.0) via wikicommons

(i) Describe how you would investigate the distribution of the two lichens at different

distances into a wood from a main road.

_____

_____

_____

_____

_____

_____

(3)

(ii) Predict the results from the experiment you described in your answer to part **(c)(i)**. Explain why you made this prediction.

_____

_____

_____

_____

_____

_____

_____

(3)

(Total 12 marks)

Q4. Scientists have discovered that curry spices affect sheep and cattle. Curry spices can reduce the amount of methane that grazing animals give off.

'Bad' bacteria in the animal's stomach produce methane. About 12% of the animal's food is changed into methane.

The curry spice coriander works like an antibiotic. Adding coriander to animal food reduces methane production by about 40%.

(a) (i) Why does adding coriander to an animal's food reduce methane production?

_____

_____

(1)

(ii) Explain **one** advantage to a farmer of adding coriander to the animal's food.

_____

_____

_____

_____**(2)**

(b) Farm animals give off large amounts of methane.

Explain the effects of adding large amounts of methane to the atmosphere.

_____

_____

_____

_____

_____

_____

(3)

(Total 6 marks)