Question

How are these animals adapted to their surroundings: -

a) Polar bear
b) Camel
c) Cactus

Question

What do plants compete for?

What do animals compete for?

Question

What is a gamete and what do they carry?

Question

What is a gene?

Question

Where is DNA carried in most cells?

Question

What is sexual and asexual reproduction?

Answer

Plants – light; water; nutrients (from soil); space

Animals – food; mates; territory

Answer

Polar bear: white coat (camouflage); thick coat & small SA: volume (warmth); high body fat levels

Camel: hump (fat store); wide feet (reduce sinking into sand)

Cactus: spines (protection & reduced transpiration); long roots (increase water uptake); low leaf surface area

Answer

A gene is a section of DNA, coding for the development of one characteristic

Answer

Gametes are the sex cells (e.g. sperm and egg), which carry genetic information

Answer

Sexual reproduction – require 2x parents producing similar, but not identical offspring (fusing of male and female gametes)

Asexual reproduction – only 1x parent needed producing genetically identical offspring (no gametes so no mixing of genes)

Answer

In the nucleus

Question

How can plants be cloned?

Question

How can cells be cloned using tissue cultures?

Question

How can animals be cloned using embryo transplants?

Question

How can adult cells be cloned?

Question

What is genetic engineering and how is it done?

Question

What are the ethical implications of genetic engineering?

Answer

A small group of cells are removed and grown in a growth medium (such as agar)

Answer

Plants can be cloned by taking cuttings (small section of plant is cut off and placed in rooting powder – plant grown is genetically identical to the parent)

Answer

Nucleus of adult cell removed, and nucleus of ovum removed – original nucleus then inserted into ovum resulting in clone of adult

Answer

Chosen embryo is split into small bundles of cells at an early stage – bundles are placed into host mother resulting in genetically identical offspring to original embryo

Answer

Should we be playing God?

There has been no long-term testing

Answer

Genetic engineering is when the genes of one animal are inserted into another – e.g. human gene cut using enzymes and placed within DNA of bacterium

Question

What are the ethical considerations involved in cloning?

Question

What are GM crops and what concerns are associated with them?

Question

Why can scientists not be certain how life began on Earth?

Question

How did Darwin suggest animals and plants evolved from simple organisms?

Question

What are the differences between the ideas suggested by Darwin and Lamarck?

Question

What evidence is there for the theory of evolution?

Answer

GM crops have been genetically engineered to have the best genetic makeup (e.g. resistant to specific diseases) increasing yields

There is concern on the effect of wild flowers and insects as well as uncertainty on human health when GM crops are consumed

Answer

If we reduce the gene pool we may become more susceptible to diseases

Should we be allowed to clone organs / whole organisms?

Answer

Simple organisms evolved through natural selection (more than 3 billion years ago): -

- One organism has an advantage (mutation / change in environment)
- Organism now more likely to survive
- Organism more likely to breed and pass on their advantageous genes

Answer

We were not there / we cannot reproduce spontaneous life

Answer

Fossil records show how animals have changed over time

DNA and physiological similarities

Answer

Darwin suggested genetic information was passed from parent to offspring

Lamarck suggested environmental factors (causing changed in an organisms lifetime) were passed on, e.g. a giraffe stretches for food so their offspring's necks and bodies become larger

Question

What is the theory of evolution?

Question

What may cause an organism to become extinct?

Question

How does natural selection lead to evolution?

Question

What is a mutation and what can it lead to?

Question

What are the impacts caused by our rapidly increasing population?

Question

How does the rapidly increasing human population reduce the land available for animals?

Answer

- New diseases
- Changes to the environment
- New predators
- New competitors

Answer

That all organisms on Earth have evolved from simple single celled organisms millions of years ago

Answer

A mutation is a change in DNA – this can lead to a negative change / neutral change / positive change (leading to evolution)

Answer

Organisms evolved through natural selection: -

- Variation where one organism has an advantage (mutation / change in environment)
- Organism now more likely to survive
- Organism more likely to breed and pass on their advantageous genes

Answer

Building / quarrying / farming / waste

Answer

Raw materials are being used up (including non-renewable energy resources); more waste; and more pollution

Question

How can an increase in human waste pollute the Earth?

Question

Which organisms can be used as indicators of pollution?

Question

What is the equation for photosynthesis?

Question

Why is energy needed for photosynthesis and how does a plant obtain this energy?

Question

What happens to the mass of living material (biomass) as you go up the stages of a food chain?

Question

What is a pyramid of biomass?

Answer

Lichens: air pollution indicators (particularly SO_2)

Invertebrates: water pollution indicators varying in species found due to differing amounts of O2 in the water

Answer

Water: sewage; fertilisers and toxic chemicals

Air: smoke; gases (sulfur dioxide (acid rain))

Land: toxic chemical (pesticides and herbicides which can be washed from land to water)

Answer

Energy is needed to convert carbon dioxide and water into sugar (glucose)

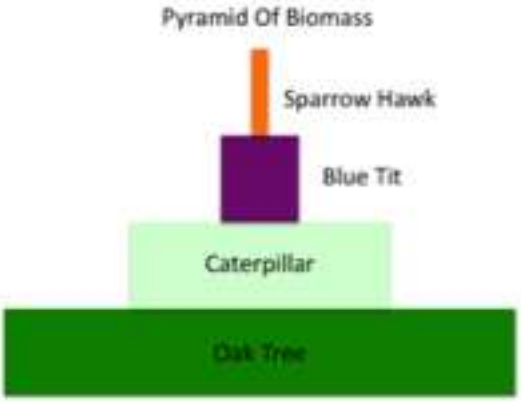
The energy is light energy – this is trapped by the chlorophyll in the chloroplasts

Answer

$$6CO_2 + 6H_2O \xrightarrow{\text{Light}} C_6H_{12}O_6 + 6O_2$$

Answer

The biomass at each stage is drawn to scale and shown as a pyramid



Answer

It is reduced

Question

What happens to the energy as you move up the stages of a food chain?

Question

How can food production be made more energy efficient?

Question

Why is the energy and biomass reduced as you move up the stages of a food chain?

Question

Why do materials decay?

Question

What conditions do materials decay fastest in?

Question

Draw a diagram of the carbon cycle

Answer

If the stages in the food chain are reduced less energy is lost

Answer

It is reduced

Answer

They are broken down (digested) by microorganisms and returned to the environment

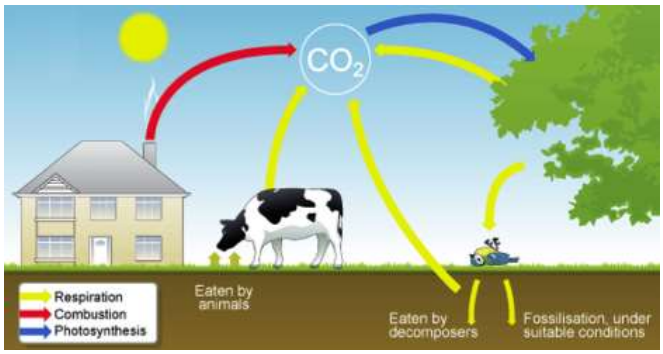
Answer

Energy is lost due to: -

- Some materials and energy are lost by the organism as waste
- Energy is used for movement etc… (lost to the surroundings)
- Mammals and birds maintain a constant temperature, which is usually higher than the surroundings

Answer

Carbon Cycle



Answer

Warm

Moist

Oxygen rich

Question

Why is the decay process so important to food chains?

Question

Explain the carbon cycle

Question

Plants remove carbon dioxide from the environment during photosynthesis – what do they use this to make?

Question

What are extremophiles?

Question

What is eutrophication, how is it caused and what are the associated dangers?

Question

Why was the theory of natural selection only gradually accepted?

Answer

CO_2 is removed by photosynthesis (used to make carbohydrates, fats and proteins)

Some CO_2 is returned by respiration of the plants

Animals eat plants, and the carbon becomes part of the fats and proteins, which make up the animal

Plants and animals die – microorganisms feed on them, respiring as they do, returning some carbon

Answer

Decay releases substances, which plants need to grow

Answer

Organisms that live in very extreme environments, e.g. high temperature / pH / pressure / salinity

Answer

Carbon dioxide is needed for carbohydrates, fats and proteins (which make up the plant bodies)

Answer

Natural selection challenged the idea of God – initially there was thought to be insufficient evidence (this was subsequently found ~50 years after publication)

Answer

Eutrophication occurs when excess nitrates may their way into rivers causing algae growth

Some plants then start dying due to increased competition for light which result in micro-organisms decomposing them (which respiring, using oxygen)

The lack of oxygen causes larger organisms such as fish to die