

Cell Biology

Name the two main classes of cells.

Eukaryotes and prokaryotes

Cell Biology

Describe the main features found in prokaryotic cells.

Eukaryotes and prokaryotes

Cell Biology

Describe the main features found in eukaryotic cells.

Eukaryotes and prokaryotes

Cell Biology

Explain how a scientist could distinguish between a prokaryotic cell and a eukaryotic cell.

Eukaryotes and prokaryotes

Cell Biology

Give an example of a eukaryotic cell and a prokaryotic cell.

Eukaryotes and prokaryotes

Cell Biology

What is the function of the nucleus?

Animals and plant cells

Cell Biology

What is the function of the ribosome?

Animals and plant cells

Cell Biology

What is the function of the mitochondria?

Animals and plant cells

Cell Biology

What is the function of the chloroplast?

Animals and plant cells

Cell Biology

What is the function of the cell membrane?

Animals and plant cells

Cytoplasm, cell membrane, cell wall, loop of DNA and plasmids

Eukaryotic and prokaryotic

Eukaryotes are larger and have a nucleus. Prokaryotes are smaller and have no nucleus.

Cell membrane, cytoplasm and nucleus

Control the functions of the cell and is the location of chromosomes in eukaryotic cells.

Eukaryote: e.g. palisade cell, white blood cell, nerve cell etc. Prokaryote: bacteria.

Site of aerobic respiration.

Protein synthesis.

The selective transport of substances in and out of the cell.

Site of photosynthesis.

Cell Biology

What is the function of the cell wall?

Animals and plant cells

Cell Biology

What is the function of the vacuole?

Animals and plant cells

Cell Biology

Explain how a scientist could distinguish between an animal and plant cell.

Animals and plant cells

Cell Biology

Calculate the order of magnitude between a eukaryotic cell (100_μm) and a prokaryotic cell (1_μm).

Animals and plant cells

Cell Biology

Describe how the structure of a nerve cell relates to its function.

Cell specialisation

Cell Biology

Describe how the structure of a sperm cell relates to its function.

Cell specialisation

Cell Biology

Describe how the structure of a muscle cell relates to its function.

Cell specialisation

Cell Biology

Describe how the structure of a root hair cell relates to its function.

Cell specialisation

Cell Biology

Describe how the structure of xylem relates to its function.

Cell specialisation

Cell Biology

Describe how the structure of phloem relates to its function.

Cell specialisation

Involved with keeping plant cells turgid by osmosis.

Supports the cell.

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A plant cell has a cell wall, chloroplasts and a vacuole in addition to the parts of an animal cell.

The sperm cell has a tail to allow it to swim. It is packed with mitochondria to provide energy. The nucleus contains only half the chromosomes.

It is long to connect to the central nervous system. It is surrounded in fat to insulate the electrical signal.

The root hair cell has thin projections which increase the surface area to volume ratio of the cell to allow efficient transport of water by osmosis.

The muscle cells contain fibres to contract. It has many mitochondria to provide energy.

Phloem is composed of tubes of elongated cells with sieve plates. Cell sap can move from one phloem cell to another through the sieve plates in the end cell walls.

Xylem consists of hollow tubes strengthened by lignin to allow the transport of water.

Cell Biology

Describe the stages of the cell cycle and mitosis.

Cell differentiation

Cell Biology

Explain the importance of mitosis in a multicellular organism.

Cell differentiation

Cell Biology

Describe how technological advances in microscopes have improved our understanding of the cell.

Microscopy

Cell Biology

Compare the light microscope and electron microscope with regards to magnification and resolution.

Microscopy

Cell Biology

What is the formula to calculate magnification.

Microscopy

Cell Biology

Describe how the genetic material is organised in eukaryotic cells.

Chromosomes

Cell Biology

Describe the stages of the cell cycle and mitosis.

Mitosis and the cell cycle

Cell Biology

Explain the importance of mitosis in a multicellular organism.

Mitosis and the cell cycle

Cell Biology

What is a stem cell?

Stem cells

Cell Biology

Describe a use of human embryonic stem cells.

Stem cells

Mitosis is important in the growth and development of multicellular organisms.

The cell will grow and increase the sub cellular structures such as ribosomes and mitochondria. The DNA will divide to form two copies of each chromosome. In mitosis the chromosome pairs are pulled apart to each end of the cell. The cytoplasm and cell membrane then divide to form two identical cells.

Electron microscopes have high magnification and high resolution (detail). Light microscopes have low resolution and low magnification.

Light microscopes allowed for the discovery of cells and electron microscopes allowed for the discovery of organelles within the cell.

Genetic material is made from DNA and organised into chromosomes.

Magnification = size of image / size of real object

Mitosis is important in the growth and development of multicellular organisms.

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Stem cells from embryos can be cloned and made to differentiate into most different types of human cells

It is an undifferentiated cell of an organism which is capable of giving rise to many more cells of the same type, and from which certain other cells can develop by differentiation.

Cell Biology

Describe a use for adult stem cells from bone marrow.

Stem cells

Cell Biology

What is meristem tissue?

Stem cells

Cell Biology

Name two potential conditions that embryonic stem cells may help to treat in the future.

Stem cells

Cell Biology

Describe therapeutic cloning.

Stem cells

Cell Biology

Name some disadvantages of using embryonic stem cells.

Stem cells

Cell Biology

Name two uses of stem cells from meristems.

Stem cells

Cell Biology

What is diffusion?

Diffusion

Cell Biology

Give two examples of diffusion.

Diffusion

Cell Biology

Name three factors which affect the rate of diffusion.

Diffusion

Cell Biology

Describe the surface area to volume ratio of a single cell organism.

Diffusion

Meristems tissue is found in plants and can differentiate into any type of plant cell throughout the life of the plant.

Stem cells from bone marrow can form many different types of cells including blood cells.

An embryo is produced with the same genes as the patient. The stem cells removed from the embryo will not be rejected by the patient's body so may be used for medical treatment.

Diabetes and paralysis

Rare species can be cloned to protect from extinction and crop plants with special characteristics such as disease resistance or drought resistance, can be cloned to produce large numbers of identical plants for farmers.

Risk of transfer of viral infections. Religious or ethical objections to using embryos for research.

Gaseous exchange of carbon dioxide and oxygen in the lungs and muscles, the removal of urea from cells into the blood.

The net movement of particles from an area of higher concentration to an area of lower concentration.

A single cell organism has a large surface area to volume ratio. This allows the transport of substances in and out of the organism to meet its metabolic needs.

The difference in concentration (concentration gradient), the temperature and the surface area of the membrane.

Cell Biology

Name five exchange surfaces found in animals and plants.

Diffusion

Cell Biology

Name four ways the efficiency of an exchange surface can be increased.

Diffusion

Cell Biology

What is osmosis?

Osmosis

Cell Biology

What is the effect of placing a plant cell in a solution which has a higher concentration than inside the cell?

Osmosis

Cell Biology

What is the effect of placing a plant cell in a solution which has a lower concentration than inside the cell?

Osmosis

Cell Biology

What is the effect of placing a red blood cell in water?

Osmosis

Cell Biology

What is active transport?

Active transport

Cell Biology

Compare active transport and diffusion.

Active transport

Cell Biology

Give two examples of active transport.

Active transport

Organisation

What do all living organisms consist of?

Principles of organisation

Having a large surface area, a thin membrane (for a short diffusion path), an efficient blood supply (animals), being ventilated (animals for gaseous exchange).

Small intestine, lungs, gills, roots and leaves.

Water will move from inside the cell (dilute solution) to outside the cell (concentrated solution).

Osmosis is the diffusion of water from a dilute solution to a concentrated solution through a partially permeable membrane.

Water will move inside the cell by osmosis. The blood cell will swell up and burst.

Water will move from outside the cell (dilute solution) to inside the cell (concentrated solution)

Active transport moves substances against the concentration gradient while diffusion moves substances down the concentration gradient. Active transport requires energy for the process, diffusion is a passive process and does not require energy.

The movement of substances from a dilute solution to a more concentrated solution, against the concentration gradient. This process requires energy from respiration.

Cells

Mineral ions are absorbed by root hair cells into the plant from low concentrations in the soil. Sugar are absorbed into the blood (which has a high concentration of sugar) from the small intestine (which has a lower concentration of sugar).

Organisation

What is a tissue?

Principles of organisation

Organisation

What are organs?

Principles of organisation

Organisation

Put the following in order of size (smallest first): palisade cell, mitochondria, ribosome, nucleus, vacuole,

Principles of organisation

Organisation

Name the parts of the digestive system.

The human digestive system

Organisation

What happens to enzymes at low temperature?

The human digestive system

Organisation

What happens to enzymes at high temperatures?

The human digestive system

Organisation

Explain the term optimal pH using a protease produced in the stomach as an example.

The human digestive system

Organisation

Explain enzyme action using the lock and key hypothesis.

The human digestive system

Organisation

Where is amylase produced?

The human digestive system

Organisation

Where is protease produced?

The human digestive system

Organs are aggregations of tissues which perform a similar function

A group of cells with a similar structure and function

Mouth, oesophagus, stomach, small intestine, large intestine, rectum, anus.

ribosome, mitochondria, nucleus, vacuole, palisade cell.

The enzyme loses its shape and the active site no longer binds to the substrate.

They have low kinetic energy and will rarely collide with substrate molecules which results in a low rate of reaction.

Enzymes action depends on the shape of the active site (the lock) fitting to substrate (the key). When the enzyme and substrate are joined together the enzyme can break-

Optimal pH is the pH at which the rate of reaction is the fastest. In the stomach the protease enzymes work best at pH3.

Stomach, pancreas and small intestine.

Salivary glands, pancreas and small intestine.

Organisation

Where is lipase produced?

The human digestive system

Organisation

What are the products of amylase digestion?

The human digestive system

Organisation

What are the products of protease digestion?

The human digestive system

Organisation

What are the products of lipase digestion?

The human digestive system

Organisation

Where is bile made?

The human digestive system

Organisation

Where is bile stored?

The human digestive system

Organisation

Name two functions of bile.

The human digestive system

Organisation

What is the food test for glucose?

The human digestive system

Organisation

What is the positive result for the test for glucose?

The human digestive system

Organisation

What is the food test for starch?

The human digestive system

Starch is broken down into glucose.

Pancreas and small intestine.

Lipids are broken down in fatty acids and glycerol

Protein is broken down into amino acids.

Gall bladder

Liver

Benedict's test

It is alkaline to neutralise hydrochloride acid from the stomach. Bile emulsified fat to form small droplets which increases the surface area of lipid for quicker digestion.

Iodine test

Green, orange or red.

Organisation

What is the positive result for the test for starch?

The human digestive system

Organisation

What is the food test for protein?

The human digestive system

Organisation

What is the positive result for the test for protein?

The human digestive system

Organisation

What is the food test for lipids?

The human digestive system

Organisation

What is the positive result for the test for lipids?

The human digestive system

Organisation

Name the two blood vessels which carry blood into the heart.

The heart and blood vessels

Organisation

Name the two blood vessels which carry blood away from the heart.

The heart and blood vessels

Organisation

Which blood vessels entering or leaving the heart contain oxygenated blood.

The heart and blood vessels

Organisation

Which blood vessels entering or leaving the heart contain deoxygenated blood.

The heart and blood vessels

Organisation

Which chamber of the heart pumps blood to the lungs?

The heart and blood vessels

Biuret test

Blue/black

Sudan III

Lilac

Vena cava and pulmonary vein

A red layer

Pulmonary vein and aorta.

Pulmonary artery and aorta

Right ventricle

Pulmonary artery and *vena cava*.

Organisation

Which chamber of the heart pumps blood to the body?

The heart and blood vessels

Organisation

Explain the term "double circulatory" system.

The heart and blood vessels

Organisation

How is the natural resting heart rate controlled.

The heart and blood vessels

Organisation

What is the function of an artificial pacemaker.

The heart and blood vessels

Organisation

Name the three types of blood vessels found in the body.

Blood

Organisation

Describe the structure of arteries.

Blood

Organisation

Describe the structure of capillaries.

Blood

Organisation

Describe the structure of veins

Blood

Organisation

What is blood made of? Red blood cells, white blood cells, platelets and plasma.

Blood

Organisation

What part of the blood carries oxygen?
Red blood cells

Blood

The circulatory system consists of a deoxygenated loop which passes through the lungs and an oxygenated loop which passes through the body. Blood passes through

Left ventricle

An artificial pacemaker is an electrical device used to correct irregularities in the heart.

It is controlled by a group of cells in the right atrium which act as a pacemaker.

Arteries have thick walls with large muscle layers.

Artery, vein and capillary.

Veins have thinner walls but contain valves to ensure blood flows in one direction.

Capillaries are much smaller than arteries and veins and are only one cell thick. They have gaps in their walls to allow plasma to leak out.

Red blood cells

Red blood cells, white blood cells, platelets and plasma.

Organisation

What part of the blood is involved with clotting?

Blood

Organisation

What part of the blood carries dissolved glucose?

Blood

Organisation

What part of the blood is involved with the immune response.

Blood

Organisation

What part of blood has granulated cytoplasm with an irregular shaped nucleus?

Blood

Organisation

What part of blood is made from cell fragments?

Blood

Organisation

What part of blood is a yellow liquid?

Blood

Organisation

What part of blood has no nucleus?

Blood

Organisation

What type of disease is coronary heart disease?

Coronary heart disease

Organisation

Describe how coronary heart disease develops.

Coronary heart disease

Organisation

Describe how a mechanical device can treat coronary heart disease.

Coronary heart disease

Plasma

Platelets

White blood cells

White blood cells

Plasma

Platelets

A non-communicable disease

Red blood cells

Stents are inserted through veins into the coronary arteries. A balloon is then inflated to open the stent which keeps the coronary artery open.

Layers of fatty material build up inside coronary arteries, narrowing them. This reduces the flow of blood through the coronary arteries, resulting in a lack of oxygen

Organisation

Describe how drugs can treat coronary heart disease.

Coronary heart disease

Organisation

Describe how a heart may be replaced.

Coronary heart disease

Organisation

Describe the benefits and risks associated with mechanical device treatments.

Coronary heart disease

Organisation

Describe the benefits and risks associated with drug treatments.

Coronary heart disease

Organisation

Describe two problems which can occur with heart valves.

Coronary heart disease

Organisation

Describe the consequences of a faulty valve.

Coronary heart disease

Organisation

Describe the treatment for faulty valves.

Coronary heart disease

Organisation

What is health?

Health issues

Organisation

Name four factors which cause ill health.

Health issues

Organisation

Name two types of diseases.

Health issues

If heart failure occurs a heart can be transplanted. Sometimes an artificial heart can be used to keep patients alive while waiting for a transplant or to allow a heart

Statins are drugs which reduce blood cholesterol levels and slow down the rate of fatty material deposit.

Statins reduce the risk of strokes, heart disease and heart attacks. Can cause negative side effects such as headaches, kidney failure and liver damage. It can take

Stents lower the risk of coronary heart disease, are a long term solution and recovery from surgery is quick. There is a risk of infection from the surgery and for patients

Blood does not circulate as effectively. Lack of oxygen in circulation around the body.

Heart valves may not fully open or they may leak.

Health is the state of physical and mental well being.

Replacement with biological valves (from humans or other animals or synthetic valves (made from metal and plastic).

Communicable and non-communicable

Diseases, diet, stress and life situations.

Organisation

What can defects in the immune system lead to?

Health issues

Organisation

What may viral infections trigger?

Health issues

Organisation

What can immune reactions caused by pathogens trigger?

Health issues

Organisation

What can severe physical ill health lead to?

Health issues

Organisation

Discuss the human and financial cost of non-communicable disease to an individual, a local community and nationally.

The effect of lifestyle

Organisation

List three lifestyle factors which affect the incidence of non-communicable disease.

The effect of lifestyle

Organisation

Name three risk factors for cardiovascular disease.

The effect of lifestyle

Organisation

Name a risk factor for type 2 diabetes.

The effect of lifestyle

Organisation

Name a risk factor for liver disease.

The effect of lifestyle

Organisation

Name a risk factor for lung disease and cancer.

The effect of lifestyle

Cancer

Infectious disease

Depression and other mental illness

Allergies such as skin rashes or cancer

Diet, alcohol and smoking.

Many millions of human die each year from non-communicable disease. Their short life span and lower quality of life will also have an impact on their families. Treating illness

Obesity.

Diet, smoking and lack of exercise.

Smoking.

Alcohol.

Organisation

Name two risks factors which can affect the health of unborn children.

The effect of lifestyle

Organisation

Name two risk factors in cancer.

The effect of lifestyle

Organisation

What is cancer?

Cancer

Organisation

Describe benign tumours.

Cancer

Organisation

Describe malignant tumours.

Cancer

Organisation

Name six plant tissues.

Plant tissues

Organisation

Name a plant organ involved with photosynthesis.

Plant tissues

Organisation

Starting from the top, name the layers of the leaf in order.

Plant tissues

Organisation

Describe the process of transpiration.

Plant organ system

Organisation

Explain the effects of changing temperature on the rate of transpiration in plants.

Plant organ system

Carcinogens (in chemicals) and ionising radiation.

Smoking and alcohol.

Growths of abnormal cells that are contained in one area usually within a membrane. They do not move to other parts of the body.

Cancer is a result of changes (mutations) in cells which lead to uncontrolled growth and division.

Epidermal, palisade mesophyll, spongy mesophyll, xylem, phloem and meristem.

Malignant tumour cells are cancerous. They invade neighbouring tissue and spread to different parts of the body through the blood where they grow to form secondary

Waxy cuticle (not a tissue), upper epidermis, palisade mesophyll, spongy mesophyll, lower epidermis (containing guard cells).

Leaf

Increasing the temperature will increase the rate of transpiration in a plant (more water evaporates from the stomata).

Root hairs cells take up water from the soil by osmosis. Xylem vessels transport the water up the plant to the leaves. Water evaporates from the stomata of leaves. It

Organisation

Explain the effects of changing humidity on the rate of transpiration in plants.

Plant organ system

Organisation

Explain the effects of changing air movement on the rate of transpiration in plants.

Plant organ system

Organisation

Explain the effects of changing light intensity on the rate of transpiration in plants.

Plant organ system

Organisation

Where are stomata located in leaves?

Plant organ system

Organisation

Which plant organs are involved in the transport of substances.

Plant organ system

Organisation

What is translocation?

Plant organ system

Organisation

Describe the role of stomata in transpiration.

Plant organ system

Organisation

How are root hair cells adapted for their function?

Plant organ system

Organisation

What is phloem?

Plant organ system

Organisation

What is xylem?

Plant organ system

Increasing air movement (wind) will increase the rate of transpiration in a plant (more water evaporates from the stomata).

Increasing humidity will decrease the rate of transpiration (less water evaporates from the stomata).

Stomata are located in the lower epidermis of the leaf in most terrestrial plants. Water lily leaves float on water, so their stomata are on the upper epidermis of the leaf.

The stomata open during the day (transpiration) but close at night (no transpiration)

This is the process where phloem tissue transports dissolved sugars from the leaves to the rest of the plant for immediate use or storage.

Xylem (water and mineral ions) and phloem (sugar)

Root hair cells have a long thread like structure which increases the surface area to volume ratio of the cell. This allows for the efficient uptake of water and mineral

The role of stomata and guard cells is to control gas exchange and water loss (transpiration)

Hollow tubes strengthened by lignin adapted for the transport of water in the transpiration stream

Phloem is composed of tubes of elongated cells with sieve plates. Cell sap can move from one phloem cell to another through the sieve plates in the end cell walls.

Organisation

How do root hair cells absorb water and mineral ions?

Plant organ system

Infection and response

What are pathogens?

Communicable diseases

Infection and response

Name four types of pathogens.

Communicable diseases

Infection and response

Name three ways pathogens can be spread.

Communicable diseases

Infection and response

How do bacteria cause disease?

Communicable diseases

Infection and response

How do viruses cause disease?

Communicable diseases

Infection and response

Name three viral diseases.

Viral diseases

Infection and response

What are the symptoms of measles?

Viral diseases

Infection and response

What are the effects of measles?

Viral diseases

Infection and response

How is the measles virus spread?

Viral diseases

Pathogens are microorganisms that cause infectious disease.

Water is absorbed by osmosis and mineral ions are absorbed by active transport.

Direct contact, by water or by air.

Viruses, bacteria, protists and fungi.

They live and reproduce inside cells, causing cell damage.

They reproduce rapidly inside the body. They may produce toxins (poison) that damage tissue and cause illness.

Fever and a red skin rash.

Measles, HIV and tobacco mosaic virus.

Inhalation of droplets from coughing and sneezing.

Measles can be fatal if there are complications.

Infection and response

How can the measles virus be controlled?

Viral diseases

Infection and response

What are the symptoms of HIV?

Viral diseases

Infection and response

What are the effects of HIV?

Viral diseases

Infection and response

What is AIDS?

Viral diseases

Infection and response

How is the HIV spread?

Viral diseases

Infection and response

How can the HIV virus be controlled?

Viral diseases

Infection and response

What organisms does tobacco mosaic virus (TMV) infect?

Viral diseases

Infection and response

What are the symptoms of TMV?

Viral diseases

Infection and response

What are the effects of TMV?

Viral diseases

Infection and response

Name two bacterial diseases?

Bacterial diseases

Flu-like illness.

Vaccination of young children.

The late stage of HIV when the body's immune system is so badly damaged it can no longer cope with other infections or cancers.

The virus attacks and destroys the cells of the body's immune system.

By the use of antiretroviral drugs which slow down the replication of the virus.

HIV is spread by sexual contact or the exchange of body fluids (e.g. blood when drug users share needles)

A distinctive mosaic pattern of discoloration on the leaves.

Many species of plants, including tomatoes.

Salmonella food poisoning and gonorrhoea.

TMV affects the growth of a plant due to the lack of photosynthesis.

Infection and response

What are the symptoms of salmonella food poisoning?

Bacterial diseases

Infection and response

What causes the symptoms of salmonella food poisoning?

Bacterial diseases

Infection and response

How is the salmonella bacteria spread?

Bacterial diseases

Infection and response

How can the salmonella bacteria be controlled?

Bacterial diseases

Infection and response

What are the symptoms of gonorrhoea?

Bacterial diseases

Infection and response

How is the gonorrhoea bacteria spread?

Bacterial diseases

Infection and response

How can the gonorrhoea bacteria be controlled?

Bacterial diseases

Infection and response

Why is the treatment for gonorrhoea no longer as effective?

Bacterial diseases

Infection and response

Name a fungal disease.

Fungal diseases

Infection and response

What are the symptoms of rose black spot?

Fungal diseases

The bacteria and the toxins they produce.

Fever, abdominal cramps, vomiting and diarrhoea.

In the UK poultry (chickens) are vaccinated against salmonella.

By ingesting contaminated food or on food prepared in unhygienic conditions (dirty hands and surfaces).

Gonorrhoea is a sexually transmitted disease (STD).

A thick yellow or green discharge from the vagina or penis and pain when urinating.

Many antibiotic resistant strains have appeared.

Gonorrhoea is treated with antibiotics. The risk of transmission can be reduced by using barrier methods of contraception such as condoms.

Purple or black spots develop on leaves which turn yellow and drop early.

Rose black spot.

Infection and response

What are the effects of rose black spot?

Fungal diseases

Infection and response

How is rose black spot spread?

Fungal diseases

Infection and response

How can rose black spot be controlled?

Fungal diseases

Infection and response

Name a protist disease.

Protist diseases

Infection and response

What are the symptoms of malaria?

Protist diseases

Infection and response

What are the effects of malaria?

Protist diseases

Infection and response

What is a vector?

Protist diseases

Infection and response

How is the malaria protist spread?

Protist diseases

Infection and response

How can the malaria protist be controlled?

Protist diseases

Infection and response

Name four non-specific defence systems of the human body against pathogens.

Human defence systems

The fungal spores are spread by water or wind.

The growth of plants is affected as photosynthesis is reduced.

Malaria

It can be treated using fungicides and by removing and destroying (by burning) the affected leaves.

It can be fatal.

Recurrent episodes of fever.

It is spread from host to host by a mosquito.

An organism that transports the pathogen from one host to another.

Skin, nose, trachea and bronchi and stomach.

By targeting the mosquito. This is achieved by disrupting its habitat (draining swamps), disrupting its breeding and using mosquito nets to prevent being bitten.

Infection and response

How does the skin help prevent infection?

Human defence systems

Infection and response

How does the nose help prevent infection?

Human defence systems

Infection and response

How do the trachea and bronchi help prevent infection?

Human defence systems

Infection and response

How does the stomach help prevent infection?

Human defence systems

Infection and response

What is the role of the immune system?

Human defence systems

Infection and response

Name three methods by which white blood cells defend against pathogens?

Human defence systems

Infection and response

Describe vaccination.

Vaccination

Infection and response

What has been the effect of vaccination in reducing disease?

Vaccination

Infection and response

What are antibiotics?

Antibiotics and painkillers

Infection and response

What has been the effect of antibiotics?

Antibiotics and painkillers

Hairs and mucus prevent pathogens entering the lungs.

A layer of dead cells which cannot be infected.

The acid in the stomach kills pathogens.

Cilia and mucus, in the trachea and bronchi, trap then remove pathogens.

phagocytosis, antibody production and anti-toxin production.

The immune system detects and destroys pathogens that enter the blood and tissues.

Vaccination on a global scale has helped to eradicate a number of diseases. This only happens when the majority of the population is vaccinated.

Vaccination involves the introduction of dead or inactive pathogens into an organism which stimulates the white blood cells to produce antibodies.

The overall effect of antibiotics has been to significantly reduce death from infections. However misuse of antibiotics has led to the emergence of resistant strains.

Antibiotics are medicines used to treat bacterial infections by killing the bacteria inside the body.

Infection and response

What do antibiotics target?

Antibiotics and painkillers

Infection and response

What are painkillers?

Antibiotics and painkillers

Infection and response

Why is it difficult to develop drugs that target viruses.

Antibiotics and painkillers

Infection and response

Name three drugs that were extracted from plants or microorganisms.

Discovery and development of drugs

Infection and response

Who discovered penicillin?

Discovery and development of drugs

Infection and response

How are most new drugs made today?

Discovery and development of drugs

Infection and response

Why do drugs have to be tested?

Discovery and development of drugs

Infection and response

Name three factors which drugs are tested for.

Discovery and development of drugs

Infection and response

What is preclinical testing?

Discovery and development of drugs

Infection and response

Describe the process of clinical testing.

Discovery and development of drugs

A type of drug that treats symptoms of a disease but does not affect the pathogens themselves.

They target bacteria (prokaryotic cells) only. They do not kill viruses.

Digitalis, aspirin and penicillin.

Viruses live inside cells so any treatment can also damage host cells as well.

Most pharmaceuticals (drugs) are synthesised by chemists in laboratories.

Alexander Fleming.

Drugs are tested for toxicity (side effects), efficacy (effectiveness) and dose (most effective amount which balances maximum efficacy with minimal toxicity).

Drugs are tested to ensure that they are safe and effective.

Clinical trials are carried out in healthy volunteers and patients. Low doses are given at the start of testing to ensure toxicity is low. Further trials are then carried out

Preclinical testing occurs in the laboratory and can use cells, tissues and live animals.

Infection and response

What is a placebo?

Discovery and development of drugs

Bioenergetics

Write the word equation for photosynthesis?

Photosynthesis

Bioenergetics

What is the symbol for carbon dioxide?

Photosynthesis

Bioenergetics

What is the symbol for water?

Photosynthesis

Bioenergetics

What is the symbol for oxygen?

Photosynthesis

Bioenergetics

What is the symbol for glucose?

Photosynthesis

Bioenergetics

Write the balanced chemical equation for photosynthesis.

Photosynthesis

Bioenergetics

Describe the process of photosynthesis.

Photosynthesis

Bioenergetics

Name four factors which affect the rate of photosynthesis.

Rate of photosynthesis

Bioenergetics

How does temperature affect photosynthesis?

Rate of photosynthesis

Carbon dioxide + water → glucose + oxygen

A placebo is a pill or injection which contains no active chemical (e.g. sugar or saline)

H₂O

CO₂

C₆H₁₂O₆

O₂

Photosynthesis is an endothermic reaction in which energy from sunlight is transferred to chloroplasts.



Photosynthesis is controlled by enzymes. Temperature affects the rate of collisions between the enzymes and the substrates. If the temperature is too high the enzymes

Temperature, light intensity, carbon dioxide concentration and chlorophyll.

Bioenergetics

How does carbon dioxide affect photosynthesis?

Rate of photosynthesis

Bioenergetics

How does light affect photosynthesis?

Rate of photosynthesis

Bioenergetics

What is a limiting factor? (HT only)

Rate of photosynthesis

Bioenergetics

Use the inverse square to calculate the light intensity of a lamp when placed 10cm away from a plant. Use the formula $\text{light intensity} = 1 / \text{distance}^2$. (HT only)

Rate of photosynthesis

Bioenergetics

Describe what happens to the light intensity when you half the distance between lamp and the plant. (HT only)

Rate of photosynthesis

Bioenergetics

Explain how the conditions of a commercial greenhouse can be maintained to gain maximum rate of growth and maintain a profit. (HT only)

Rate of photosynthesis

Bioenergetics

State five uses of glucose produced by photosynthesis.

Uses of glucose from photosynthesis

Bioenergetics

As well as glucose, what else do plants need to make proteins?

Uses of glucose from photosynthesis

Bioenergetics

Describe the process of cellular respiration.

Respiration

Bioenergetics

Which type of respiration requires oxygen?

Respiration

Light transfers energy to the chloroplasts for the reactions. A reduction in light intensity will reduce the energy available for the reaction.

Carbon dioxide is required to make the glucose. If the carbon dioxide concentration is too low the amount of glucose that can be produced is reduced.

light intensity = $1 / 10^2$: light intensity = 0.01 au (arbitrary units)

A limiting factor is a resource or environmental factor whose absence prevents an increase in the rate of a reaction. If the limiting factor is increased, the rate of

Greenhouses control light intensity (artificial light), temperature (heating) and carbon dioxide concentration (ventilation). The cost effectiveness of each factor is related to

if you halve the distance the light intensity will be four times greater.

Plants absorb nitrate ions from the soil which are used to make proteins.

Respiration, converted to starch for storage, converted to fat or oil for storage, converted to cellulose to make the cell wall, used to make amino acids for protein syn-

Aerobic respiration.

Cellular respiration is an exothermic reaction which is continually happening inside all living cells.

Bioenergetics

Which type of respiration does not require oxygen?

Respiration

Bioenergetics

What is the word equation for aerobic respiration?

Respiration

Bioenergetics

What is the balanced symbol equation for aerobic respiration?

Respiration

Bioenergetics

What is the word equation for anaerobic respiration in muscles?

Respiration

Bioenergetics

What is the word equation for anaerobic respiration in plant cells and yeast?

Respiration

Bioenergetics

What is another term to describe anaerobic respiration in plant cells and yeast?

Respiration

Bioenergetics

Give three uses for the energy transferred by cellular respiration.

Respiration

Bioenergetics

Compare the processes of anaerobic and aerobic respiration with regard to oxygen.

Respiration

Bioenergetics

Compare the processes of anaerobic and aerobic respiration with regard to their products.

Respiration

Bioenergetics

Compare the processes of anaerobic and aerobic respiration with regard to the relative amounts of energy transferred.

Respiration

Glucose + oxygen → carbon dioxide + water

Anaerobic respiration.

Glucose → lactic acid



Fermentation

Glucose → ethanol and carbon dioxide

Aerobic respiration requires oxygen, anaerobic respiration does not require oxygen.

Chemical reactions to synthesise large molecules (eg proteins), movement and keeping warm.

Aerobic respiration produces large amounts of energy slowly, from a molecule of glucose. Anaerobic respiration produces a small amount of energy quickly, from a

Anaerobic respiration will produce lactic acid in humans or ethanol and carbon dioxide in yeast. Aerobic respiration produces carbon dioxide and water.

Bioenergetics

What is the economic importance of anaerobic respiration in yeast?

Respiration

Bioenergetics

What three processes will increase during exercise to provide the muscles with an increase in oxygenated blood?

Response to exercise

Bioenergetics

What will happen if there is insufficient oxygen in the blood?

Response to exercise

Bioenergetics

Describe the consequences of the incomplete oxidation of glucose in anaerobic respiration in the muscles.

Response to exercise

Bioenergetics

What is the effect on the muscles of long periods of vigorous activity?

Response to exercise

Bioenergetics

What is the metabolic fate of the lactic acid produced during anaerobic respiration? (HT only)

Response to exercise

Bioenergetics

Define oxygen debt. (HT only)

Response to exercise

Bioenergetics

What is metabolism?

Metabolism

Bioenergetics

How is the energy transferred by cellular respiration used by organisms?

Metabolism

Bioenergetics

Name three compounds that glucose can be converted into in plants and animals.

Metabolism

Heart rate, breathing rate and breath volume.

Anaerobic respiration is important in the manufacture of bread and alcoholic drinks.

Incomplete oxidation of glucose will lead to a build up of lactic acid in the muscles and creates an oxygen debt.

Anaerobic respiration will take place in muscles.

Lactic acid is removed from the muscles and transported via the circulatory system to the liver. The liver converts the lactic acid back to glucose.

The muscles will become fatigued and will stop contracting efficiently.

The sum of all the reactions in a cell or organism.

Oxygen debt is the amount of extra oxygen the liver uses after exercise to convert lactic acid back to glucose.

Starch and cellulose in plants and glycogen in humans.

The energy transferred by respiration, is used by a cell or organism for enzyme controlled processes of metabolism that synthesise new molecules.

Bioenergetics

What are lipid molecules formed from?

Metabolism

Bioenergetics

What are amino acids formed from?

Metabolism

Bioenergetics

How are proteins synthesised?

Metabolism

Bioenergetics

What happens to excess proteins in the body?

Metabolism

Bioenergetics

What products are formed by the breakdown of carbohydrates?

Metabolism

Bioenergetics

What products are formed by the breakdown of protein?

Metabolism

Bioenergetics

What products are formed by the breakdown of lipids?

Metabolism

Homeostasis and response

What is homeostasis?

Homeostasis

Homeostasis and response

Name three factors which need to be controlled by the human body.

Homeostasis

Homeostasis and response

Name the three parts of a control system.

Homeostasis

Glucose and nitrate ions.

One molecule of glycerol and three molecules of fatty acids.

They are broken down to form urea which is removed by excretion.

From amino acids.

Amino acids.

Glucose.

Homeostasis is the regulation of the internal environment of an organism to maintain optimal conditions for life processes (e.g. enzyme action).

Glycerol and fatty acids.

Receptors, coordination centres and effectors

Blood glucose concentration, body temperature and water levels.

Homeostasis and response

What is the function of a receptor?

Homeostasis

Homeostasis and response

Give three examples of coordination centres.

Homeostasis

Homeostasis and response

What is the function of a coordination centre?

Homeostasis

Homeostasis and response

Give two examples of effectors.

Homeostasis

Homeostasis and response

What is the function of an effector?

Homeostasis

Homeostasis and response

What is the function of the nervous system?

The human nervous system

Homeostasis and response

Name the two parts of the nervous system.

The human nervous system

Homeostasis and response

Name the two parts of the CNS.

The human nervous system

Homeostasis and response

What is the role of the CNS?

The human nervous system

Homeostasis and response

What is the reflex arc?

The human nervous system

Brain, spinal cord and pancreas

To detect stimuli (a change in the internal or external environment)

Muscles and glands

To receive and process information from receptors.

To enable organisms to react to changes in the environment and to coordinate their behaviour.

To bring about responses which restore the internal environment to optimal levels.

Brain and spinal cord

Neurones and central nervous system (CNS)

A protective nervous pathway.

To process information from receptors and coordinate responses by the effectors (e.g. contracting muscles or glands secreting hormones).

Homeostasis and response

What neurone connects the receptor to the coordinator?

The human nervous system

Homeostasis and response

What neurone connects the coordinator to the effector?

The human nervous system

Homeostasis and response

Where is the relay neurone found?

The human nervous system

Homeostasis and response

What neurone does the sensory neurone connect to?

The human nervous system

Homeostasis and response

What neurone connects to the motor neurone?

The human nervous system

Homeostasis and response

What neurones does the relay neurone connect to?

The human nervous system

Homeostasis and response

What is the gap between neurones called?

The human nervous system

Homeostasis and response

How is information transmitted across the gaps between the neurones?

The human nervous system

Homeostasis and response

What are the properties of a reflex action?

The human nervous system

Homeostasis and response

What is the endocrine system?

Human endocrine system

Motor neurone.

Sensory neurone.

The relay neurone.

In the spinal cord.

The sensory neurone and the motor neurone.

The relay neurone.

By the release of chemicals called neurotransmitters.

Synapses

The endocrine system is made up of different glands which release chemical messengers called hormones into the blood.

They are rapid and automatic. They are involuntary (they do not involve the conscious part of the brain)

Homeostasis and response

What is a target organ?

Human endocrine system

Homeostasis and response

Compare the effects of the endocrine system to the nervous system.

Human endocrine system

Homeostasis and response

What is the master gland?

Human endocrine system

Homeostasis and response

Where is the master gland found?

Human endocrine system

Homeostasis and response

Describe the role of the master gland.

Human endocrine system

Homeostasis and response

Name six endocrine glands found in the human body.

Human endocrine system

Homeostasis and response

State where each of the glands are found in the human body. Pituitary, pancreas, thyroid, adrenal gland, ovary and testes.

Human endocrine system

Homeostasis and response

Which organ monitors and controls blood glucose concentration?

Control of blood glucose concentration

Homeostasis and response

Name the two carbohydrates involved in the control of blood sugar concentration.

Control of blood glucose concentration

Homeostasis and response

Name the two hormones involved in the control of blood sugar concentration.

Control of blood glucose concentration

The endocrine system is slower than the nervous system but it has a longer lasting effect.

The target organ is the organ where the hormone has an effect.

The brain.

The pituitary.

Pituitary, pancreas, thyroid, adrenal gland, ovary and testes

In response to changes in the body, the pituitary secretes a number of hormones into the blood. These hormones then stimulate other glands to release hormones and bring

Pancreas

Pituitary - brain, pancreas - abdomen, thyroid - neck, adrenal gland - on top of kidney, ovary - female lower abdomen and testes - male scrotum.

Insulin and glucagon

Glucose and glycogen

Homeostasis and response

Name three of the organs involved in the control of blood sugar concentration.

Control of blood glucose concentration

Homeostasis and response

If blood glucose concentration is too high, what hormone is released by the pancreas?

Control of blood glucose concentration

Homeostasis and response

What are the target organs for the hormone released?

Control of blood glucose concentration

Homeostasis and response

What is the effect of this hormone on the target organs?

Control of blood glucose concentration

Homeostasis and response

How do the target organs process the excess glucose?

Control of blood glucose concentration

Homeostasis and response

What is type 1 diabetes?

Control of blood glucose concentration

Homeostasis and response

How is type 1 diabetes characterised?

Control of blood glucose concentration

Homeostasis and response

How is type 1 diabetes treated?

Control of blood glucose concentration

Homeostasis and response

What is type 2 diabetes?

Control of blood glucose concentration

Homeostasis and response

How is type 2 diabetes treated?

Control of blood glucose concentration

Insulin.

Pancreas, liver and muscle.

Insulin triggers the liver and muscle to take up the excess glucose in the blood.

Liver and muscle.

A disorder where the pancreas does not produce enough insulin.

The liver and muscle convert the glucose into glycogen for storage.

Insulin injections.

High levels of blood glucose concentration.

A carbohydrate controlled diet and more exercise.

A condition where the body cells (target organs) no longer respond to insulin.

Homeostasis and response

What is a risk factor for type 2 diabetes?

Control of blood glucose concentration

Homeostasis and response

If blood glucose concentration is too low, what hormone is released by the pancreas? (HT only)

Control of blood glucose concentration

Homeostasis and response

What are the target organs for the hormone released? (HT only)

Control of blood glucose concentration

Homeostasis and response

What is the effect of this hormone on the target organs? (HT only)

Control of blood glucose concentration

Homeostasis and response

What is the role of reproductive hormones during puberty?

Hormones in human reproduction

Homeostasis and response

Name the main female reproductive hormone.

Hormones in human reproduction

Homeostasis and response

Where is the main female reproductive hormone made?

Hormones in human reproduction

Homeostasis and response

Name the main male reproductive hormone.

Hormones in human reproduction

Homeostasis and response

Where is the main male reproductive hormone made?

Hormones in human reproduction

Homeostasis and response

What is ovulation?

Hormones in human reproduction

Glucagon.

Obesity

It stimulates the liver and muscles cells to breakdown glycogen into glucose and release the glucose into the blood.

Liver and muscle.

Oestrogen.

To stimulate the development of the secondary sexual characteristics

Testosterone.

Ovary.

The release of an egg cell from the ovary.

Testes.

Homeostasis and response

When does ovulation start?

Hormones in human reproduction

Homeostasis and response

How often does ovulation occur?

Hormones in human reproduction

Homeostasis and response

Give the full names of the four hormones involved the menstrual cycle of a woman?

Hormones in human reproduction

Homeostasis and response

What is the function of FSH?

Hormones in human reproduction

Homeostasis and response

What is the function of LH?

Hormones in human reproduction

Homeostasis and response

What is function of oestrogen and progesterone.

Hormones in human reproduction

Homeostasis and response

What is the order of secretion of the four hormones during the menstrual cycle?

Hormones in human reproduction

Homeostasis and response

What event occurs between days 1 and 4 of the menstrual cycle?

Hormones in human reproduction

Homeostasis and response

What event occurs at approximately 14 days of the menstrual cycle?

Hormones in human reproduction

Homeostasis and response

Name the hormone that inhibits FSH at the start of the cycle.

Hormones in human reproduction

Approximately every 28 days.

At puberty.

It causes the maturation of an egg cell from a follicle in the ovary.

Oestrogen, progesterone, Luteinising hormone and follicle stimulating hormone.

They are involved in stimulating and maintaining the thickness of the uterine lining.

It stimulates ovulation.

Breakdown of the uterine lining (menstruation).

FSH _ oestrogen _ LH _ progesterone

Oestrogen

Ovulation.

Homeostasis and response

How does oestrogen affect the uterine lining?

Hormones in human reproduction

Homeostasis and response

Which hormone does oestrogen stimulate?

Hormones in human reproduction

Homeostasis and response

How does progesterone affect the uterine lining?

Hormones in human reproduction

Homeostasis and response

What are the two main methods of contraception?

Contraception

Homeostasis and response

How does the contraceptive pill work?

Contraception

Homeostasis and response

How do methods of slow release progesterone work?

Contraception

Homeostasis and response

Name two barrier methods.

Contraception

Homeostasis and response

How do barrier methods work?

Contraception

Homeostasis and response

How do IUDs work?

Contraception

Homeostasis and response

How do spermicidal agents work?

Contraception

LH

It stimulates the uterine lining to thicken.

Hormonal and non-hormonal

It maintains the thickness of the uterine lining.

These inhibit FSH and prevent eggs maturing for months or even years.

It contains progesterone which inhibits the production of FSH so no eggs can mature and be released.

They prevent the sperm from reaching the egg.

Condoms and the diaphragm

They kill or disable sperm.

They prevent the implantation of an embryo into the uterine lining.

Homeostasis and response

How does abstinence work?

Contraception

Homeostasis and response

How do surgical methods for male and female sterilisation work?

Contraception

Homeostasis and response

Name two hormones which can be used as fertility drugs?

The uses of hormones to treat infertility (HT only)

Homeostasis and response

What does IVF stand for?

The uses of hormones to treat infertility (HT only)

Homeostasis and response

Describe the process of IVF.

The uses of hormones to treat infertility (HT only)

Homeostasis and response

What are negative effects of IVF.

The uses of hormones to treat infertility (HT only)

Homeostasis and response

What is the basal metabolic rate?

Negative feedback (HT only)

Homeostasis and response

Where is thyroxine produced?

Negative feedback (HT only)

Homeostasis and response

What is the role of thyroxine in the body?

Negative feedback (HT only)

Homeostasis and response

How are thyroxine levels controlled?

Negative feedback (HT only)

Tubes which transport sperm or eggs are tied off or cut to prevent passage.

Couples refrain from sex during the most fertile days of the cycle.

In vitro fertilisation

LH and FSH.

The success rate is not very high. It is very emotional and physical stressful for the prospective parents. It can lead to multiple births which are a risk to both the babies

The prospective mother is given FSH and LH to stimulate the maturing of several eggs. The eggs are collected from the prospective mother and fertilised with sperm

Thyroid gland.

The sum of all the reactions in the body when it is at rest.

Thyroxine levels are controlled by negative feedback.

Stimulates the basal metabolic rate. Thyroxine also plays a role in growth and development.

Homeostasis and response

Where is adrenaline produced?

Negative feedback (HT only)

Homeostasis and response

When is adrenaline produced?

Negative feedback (HT only)

Homeostasis and response

What is the effect of adrenaline on the body?

Negative feedback (HT only)

Inheritance, variation and evolution

What does meiosis lead to the formation of?

Reproduction

Inheritance, variation and evolution

What does mitosis lead to the formation of?

Reproduction

Inheritance, variation and evolution

What is sexual reproduction?

Reproduction

Inheritance, variation and evolution

Name the two gametes involved in sexual reproduction in flowering plants.

Reproduction

Inheritance, variation and evolution

Name the two gametes involved in the sexual reproduction in animals.

Reproduction

Inheritance, variation and evolution

Describe how variation occurs in sexual reproduction.

Reproduction

Inheritance, variation and evolution

Describe why clones are formed in asexual reproduction.

Reproduction

It is produced at times of fear or stress (fight or flight response)

Adrenal glands

Non identical cells.

Adrenaline increases the heart rate and increases the oxygen and glucose delivered to the muscles.

The fusing of male and female gametes.

Identical cells.

Egg (female) and sperm (male).

Egg (female) and pollen (male).

There is only one parent cell and there is no fusion of gametes. As a result there is no mixing of genetic information.

During the formation of gametes by meiosis and the mixing of genetic material during sexual reproduction.

Inheritance, variation and evolution

Describe what happens to the number of chromosomes during meiosis and fertilisation?

Meiosis

Inheritance, variation and evolution

How are gametes formed?

Meiosis

Inheritance, variation and evolution

Describe the process of gamete formation?

Meiosis

Inheritance, variation and evolution

Describe how an embryo develops from gametes?

Meiosis

Inheritance, variation and evolution

Where is the genetic material found in the cell?

DNA and the genome

Inheritance, variation and evolution

What is the genetic material made of?

DNA and the genome

Inheritance, variation and evolution

Describe the structure of DNA.

DNA and the genome

Inheritance, variation and evolution

What structures in the nucleus are made from DNA?

DNA and the genome

Inheritance, variation and evolution

What is a gene?

DNA and the genome

Inheritance, variation and evolution

What does a gene code for?

DNA and the genome

By meiosis.

Meiosis halves the number of chromosomes during the formation of the gametes. During fertilisation the full number of chromosomes is restored in the fertilised egg.

Gametes fuse during fertilisation and restore the normal number of chromosomes. The new cell divides by mitosis. This increases the number of cells. Once the cells

Genetic information is copied. The cell divides twice to form single cells with half the number of chromosomes. All the gametes are genetically different.

DNA.

Nucleus.

Chromosomes.

A polymer made of two strands forming a double helix.

A sequence of amino acids which make a specific protein.

A small section of DNA on a chromosome.

Inheritance, variation and evolution

What is the genome of an organism?

DNA and the genome

Inheritance, variation and evolution

List three ways which demonstrate the importance of understanding the human genome.

DNA and the genome

Inheritance, variation and evolution

Define gamete.

Genetic inheritance

Inheritance, variation and evolution

Define chromosome.

Genetic inheritance

Inheritance, variation and evolution

Define gene.

Genetic inheritance

Inheritance, variation and evolution

Define allele.

Genetic inheritance

Inheritance, variation and evolution

Define dominant.

Genetic inheritance

Inheritance, variation and evolution

Define recessive.

Genetic inheritance

Inheritance, variation and evolution

Define homozygous.

Genetic inheritance

Inheritance, variation and evolution

Define heterozygous.

Genetic inheritance

Search for genes linked to disease, understanding and treating inherited diseases and tracing human migration patterns from the past.

The entire genetic material of an organism.

A long strand of DNA folded into structure.

A sex cell.

A different form of the same gene (e.g. blue and brown alleles for eye colour).

A section of DNA that codes for a specific protein.

A recessive allele is only expressed if two copies are present.

A dominant allele is always expressed in the phenotype even if only one copy is present.

Different copies of an allele.

Two copies of the same allele.

Inheritance, variation and evolution

Define genotype.

Genetic inheritance

Inheritance, variation and evolution

Define phenotype.

Genetic inheritance

Inheritance, variation and evolution

Give two examples of characteristics governed by a single gene?

Genetic inheritance

Inheritance, variation and evolution

At what level do alleles operate?

Genetic inheritance

Inheritance, variation and evolution

Name an inherited disorder caused by a dominant allele.

Inherited disorders

Inheritance, variation and evolution

Name an inherited disorder caused by a recessive allele.

Inherited disorders

Inheritance, variation and evolution

Name two methods that could alleviate suffering caused by genetic disorders.

Inherited disorders

Inheritance, variation and evolution

Discuss a social and an ethical issue around the issue of embryo screening.

Inherited disorders

Inheritance, variation and evolution

How many chromosomes do ordinary human body cells contain?

Sex determination

Inheritance, variation and evolution

What are the two sex chromosomes?

Sex determination

The physical expression of the genotype.
E.g. Tall or short.

The alleles present in an organism. e.g. TT
or Tt.

Molecular level.

Fur colour in mice and red-green colour
blindness in humans.

Cystic fibrosis.

Polydactyl.

Embryonic screening can be used to terminate an unwanted foetus due to gender.
E.g. some societies value male children more than female children for economic

Embryonic screening and gene therapy.

X and Y.

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Inheritance, variation and evolution

What combination of sex chromosomes produce a female?

Sex determination

Inheritance, variation and evolution

What combination of sex chromosomes produce a male?

Sex determination

Inheritance, variation and evolution

What is variation?

Variation

Inheritance, variation and evolution

Name three causes of differences in characteristics of individuals in a population.

Variation

Inheritance, variation and evolution

Describe the variation usually found in a population of a species.

Variation

Inheritance, variation and evolution

What causes variants in a genome?

Variation

Inheritance, variation and evolution

How do mutations affect the phenotype?

Variation

Inheritance, variation and evolution

How often do mutations occur?

Variation

Inheritance, variation and evolution

What will happen if a new phenotype is suited to an environmental change?

Variation

Inheritance, variation and evolution

What is evolution?

Evolution

XY

XX

Genes, the environment in which the individual developed or a combination of both.

The difference of characteristics of individuals in a population.

Mutation.

There is usually extensive variation within a population of a species.

Continuously.

Most have no effect, some influence the phenotype and a small proportion determine the phenotype.

A change in the inherited characteristics of a population over time.

It will lead to a rapid change in the species.

Inheritance, variation and evolution

By what process is evolution thought to occur?

Evolution

Inheritance, variation and evolution

What does the theory of evolution by natural selection state?

Evolution

Inheritance, variation and evolution

How does natural selection occur?

Evolution

Inheritance, variation and evolution

What is a species?

Evolution

Inheritance, variation and evolution

Describe how two populations of one species could form two new species.

Evolution

Inheritance, variation and evolution

What is another term for selective breeding?

Selective breeding

Inheritance, variation and evolution

Why do humans carry out selective breeding?

Selective breeding

Inheritance, variation and evolution

For how long have humans carried out selective breeding?

Selective breeding

Inheritance, variation and evolution

Describe the process of selective breeding.

Selective breeding

Inheritance, variation and evolution

List four examples of selective breeding.

Selective breeding

All species of living organisms have evolved from simple life forms that first developed 3 billion years ago.

Natural selection.

A group of individuals which can interbreed and produce fertile offspring.

By the selection of variants with phenotypes that are best suited to their environment.

Artificial selection.

The phenotypes of a species may become so different that the population can no longer interbreed.

Thousands of years.

To select useful genetic characteristics.

Disease resistance in food crops, animals which produce more milk or meat, domestic dogs with a gentle nature and large or unusual flowers.

Parents with the desired characteristics are bred together. The offspring which show the desired characteristics are then bred together. This happens over many

Inheritance, variation and evolution

What problems can arise from selective breeding?

Selective breeding

Inheritance, variation and evolution

What is genetic engineering?

Genetic engineering

Inheritance, variation and evolution

Give two examples of how plant crops have been genetically engineered.

Genetic engineering

Inheritance, variation and evolution

Give an example of how bacteria have been genetically engineered.

Genetic engineering

Inheritance, variation and evolution

How are useful genes used in genetic engineering?

Genetic engineering

Inheritance, variation and evolution

What is a genetically modified (GM) crop?

Genetic engineering

Inheritance, variation and evolution

Give three examples of GM crops.

Genetic engineering

Inheritance, variation and evolution

Describe the concerns about the use of GM crops.

Genetic engineering

Inheritance, variation and evolution

How could genetic modification be useful in humans?

Genetic engineering

Inheritance, variation and evolution

Describe the main steps in the process of genetic engineering (HT).

Genetic engineering

The process of modifying the genome of an organism by introducing a gene from another organism to transfer a desired characteristic.

Problems can arise from inbreeding and lead to some breeds which are prone to disease or inherited defects.

Bacteria are used to produce human insulin to treat diabetes.

Disease resistant and to produce larger fruit.

Crop plants (e.g. wheat or rice) which have had genes from other organisms transferred into them.

Genes are cut out of chromosomes and transferred to the cells of other organisms.

Their effect on wild populations of animals, plants and insects. The effect of eating GM crops on human health.

Resistant to insects, resistant to herbicides and increased yields.

Enzymes are used to cut out the required gene. This gene is then inserted into a vector (a plasmid or virus). The vector then inserts the gene into the required

To treat inherited disorders.

Inheritance, variation and evolution

Name two pieces of evidence for evolution.

Evidence for evolution

Inheritance, variation and evolution

What are fossils?

Fossils

Inheritance, variation and evolution

Describe three ways fossils may be formed.

Fossils

Inheritance, variation and evolution

Explain why the fossil record is incomplete.

Fossils

Inheritance, variation and evolution

Why are fossils useful?

Fossils

Inheritance, variation and evolution

What is extinction?

Extinction

Inheritance, variation and evolution

Describe the factors which may contribute to the extinction of a species.

Extinction

Inheritance, variation and evolution

Why can evolution in bacteria be studied?

Resistant bacteria

Inheritance, variation and evolution

Describe how an antibiotic resistant strain of bacteria could arise.

Resistant bacteria

Inheritance, variation and evolution

What is MRSA?

Resistant bacteria

The remains of organisms from millions of years ago found buried in rocks.

Fossils and antibiotic resistance in bacteria.

Early forms of life were soft bodied which left behind few traces. Many of these traces were destroyed by geologic activity.

From parts of organisms that have not decayed, when parts of organisms are replaced by minerals as they decay and as preserved traces of organisms such as

Extinction occurs when there are no remaining individuals of a species still alive.

They inform us how organisms have changed or stayed the same as life has developed on earth.

Because they reproduce rapidly (e.g. every 20 minutes).

Changes to the environment over a long period of time, new predators, new diseases, competition or a single catastrophic event.

A strain of bacteria resistant to antibiotics.

A mutation of a non resistant bacteria could lead to resistance. The resistant strain is not killed by antibiotics but the non resistant strains are. The resistant strains

Inheritance, variation and evolution

Describe three steps which would reduce the development of antibiotic resistant strains.

Resistant bacteria

Inheritance, variation and evolution

Why is the development of new antibiotics unlikely to keep up with the emergence of new resistant strains?

Resistant bacteria

Inheritance, variation and evolution

Who first developed a classification system?

Classification

Inheritance, variation and evolution

How did he group organisms together?

Classification

Inheritance, variation and evolution

Name the 7 levels of classification used by Linnaeus.

Classification

Inheritance, variation and evolution

What is the binomial system?

Classification

Inheritance, variation and evolution

Why were new models of classification proposed?

Classification

Inheritance, variation and evolution

What system did Carl Woese develop?

Classification

Inheritance, variation and evolution

Why did Carl Woese propose a new system?

Classification

Inheritance, variation and evolution

How are organisms divided up in the three domain system?

Classification

The development of new antibiotics is costly and slow.

Doctors should not prescribe antibiotics inappropriately, patients should complete their course of antibiotics and the agricultural use of antibiotics should be restricted.

Their structure and characteristics.

Carl Linnaeus

A system of naming organisms using their genus and species e.g. *Homo sapiens*.

Kingdom, phylum, class, order, family, genus and species.

The three domain system.

An increase in our understanding of the internal structures of the cell and increased understanding of biochemical processes.

Archaea (primitive bacteria), Bacteria (true bacteria) and Eukaryota (includes protists, fungi, plants and animals).

Due to evidence from chemical analysis.

Inheritance, variation and evolution

What is an evolutionary tree?

Classification

Ecology

What does abiotic mean?

Communities

Ecology

What is an ecosystem?

Communities

Ecology

What is a habitat?

Communities

Ecology

What do organisms need to survive and reproduce?

Communities

Ecology

What do plants compete for in a habitat?

Communities

Ecology

What do animals compete for in a habitat?

Communities

Ecology

What is a population?

Communities

Ecology

What is a community?

Communities

Ecology

Name 4 ways in which species in a community depend on each.

Communities

The non living parts of an environment.

A diagram used by scientists to show how organisms are thought to be related.

An environment in which a particular species lives.

The interaction of a community of living organisms with the non living parts of their environment.

Light, space, water and mineral ions.

A supply of materials from their surroundings and from other living organisms living there.

A group of individuals from the same species living in an environment.

Food, mates and territory.

Food, shelter, pollination and seed dispersal.

A group of populations living within the same environment.

Ecology

What is a stable community?

Communities

Ecology

List seven abiotic factors which can affect a community.

Abiotic factors

Ecology

List four biotic factors which can affect a community.

Biotic factors

Ecology

What is an adaptation?

Adaptations

Ecology

Name the three types of adaptations.

Adaptations

Ecology

Give an example of a structural adaptation.

Adaptations

Ecology

Give an example of a behavioural adaptation.

Adaptations

Ecology

Give an example of a functional adaptation.

Adaptations

Ecology

Name three factors which can cause extreme environments?

Adaptations

Ecology

What are organisms that live in extreme environments called?

Adaptations

Light intensity, temperature, moisture levels, soil pH and mineral content, wind intensity and direction, carbon dioxide levels (for plants) and oxygen levels (for aquatic

A community where the species and environmental factors are in balance so that population sizes remain fairly constant.

A feature that enables an organism to survive in the conditions they normally live.

Availability of food, new predators, new diseases and competition between species.

Spines in a cactus instead of leaves prevent water loss.

Structural, behavioural and functional.

Formation of venom in plants and animals such as nettles and snakes.

Mating rituals in birds such as peacock feathers in males to attract females.

Extremophiles.

High temperature, pressure and salt concentration.

Ecology

Give an example of an organism that lives in an extreme environment?

Adaptations

Ecology

Who are the producers of biomass for life on Earth?

Levels of organisation

Ecology

How are feeding relationships within a community represented?

Levels of organisation

Ecology

What are producers?

Levels of organisation

Ecology

Give two examples of producers.

Levels of organisation

Ecology

What are transects and quadrants used to measure?

Levels of organisation

Ecology

What is the mean? The average number (of species in ecosystem).

Levels of organisation

Ecology

What is the mode?

Levels of organisation

Ecology

What is the median?

Levels of organisation

Ecology

Describe how energy is passed along a food chain.

Levels of organisation

Photosynthetic organisms.

Bacteria living in deep sea vents (high temperature and pressure).

An organism that synthesises molecules.

Food chains.

Distribution and abundance of a species in an ecosystem.

Green plants and algae.

The value which appears the most often.

The average number (of species in ecosystem).

Producers are eaten by primary consumers which in turn are eaten by secondary consumers which are then eaten by tertiary consumers.

The value in the middle of a range of data.

Ecology

What are predators?

Levels of organisation

Ecology

What are prey?

Levels of organisation

Ecology

What is a stable community?

Levels of organisation

Ecology

What is the name of the process in the carbon cycle that turns atmospheric CO₂ into carbon compounds in plants?

How materials are cycled

Ecology

What is the name of the process in the carbon cycle that converts carbon compounds in plants into carbon compounds in animals?

How materials are cycled

Ecology

What is the name of the process in animals and plants which converts carbon compounds into atmospheric CO₂?

How materials are cycled

Ecology

How are carbon compounds in plants and animals converted into carbon compounds in microorganisms.

How materials are cycled

Ecology

How are carbon compounds in animals and plants converted into fossil fuels?

How materials are cycled

Ecology

How are carbon compounds in fossil fuels converted into atmospheric CO₂?

How materials are cycled

Ecology

Name two ways water enters the atmosphere from groundwater and oceans.

How materials are cycled

Animals eaten by by other organisms.

Consumers that kill and eat other organisms.

Photosynthesis.

A community where the numbers of predator and prey fall and rise in cycles.

Respiration.

Feeding.

Fossilisation.

By death and decay.

Evaporation and transpiration

Combustion.

Ecology

What is transport in the water cycle?

How materials are cycled

Ecology

What is the process of cloud formation called?

How materials are cycled

Ecology

What is precipitation?

How materials are cycled

Ecology

What is infiltration in the water cycle?

How materials are cycled

Ecology

What is the effect of deforestation on the water cycle?

How materials are cycled

Ecology

What is biodiversity?

Biodiversity

Ecology

How does high biodiversity ensure the stability of an ecosystem?

Biodiversity

Ecology

Name three ways human activity have reduced biodiversity?

Biodiversity

Ecology

Name two reasons why the production of waste has increased.

Waste management

Ecology

Name three ways pollution can occur.

Waste management

Condensation.

The movement of water through the atmosphere, usually from over oceans to over land.

The process by which water soaks in to the soil and rocks to form groundwater.

Rain, snow, sleet or hail.

The variety of different species of organisms in an ecosystem.

Deforestation reduces transpiration, the lack of soil reduces infiltration and increases the amount of run off.

Waste, deforestation and global warming.

High biodiversity increases the stability of ecosystems by reducing the dependence of one species on another.

In water from sewage, fertilisers and toxic chemicals. In air from smoke and acidic gases. On land from landfill and toxic chemicals.

Rapid growth in population and an increase in the standard of living.

Ecology

How does pollution affect biodiversity?

Waste management

Ecology

Name 4 ways humans reduce the amount of land available for other animals and plants.

Land use

Ecology

What natural resource is used to make garden compost?

Land use

Ecology

How does the production of garden compost affect biodiversity?

Land use

Ecology

How does the use of peat contribute to global warming?

Land use

Ecology

Name two reasons for large scale deforestation in tropical areas.

Deforestation

Ecology

How does deforestation affect global warming?

Deforestation

Ecology

How does deforestation affect biodiversity?

Deforestation

Ecology

How does deforestation affect the water cycle?

Deforestation

Ecology

Name the biological consequences of global warming.

Global warming

Building, quarrying, farming and dumping waste.

Pollution kills plants and animals which reduces biodiversity.

Reduces the area of peat bog and as a result it reduces the biodiversity of the habitat.

Peat.

To provide land for cattle or rice fields and to grow crops for biofuels.

The decay or burning of peat release carbon dioxide into the atmosphere.

The destruction of habitat reduces the number of species living in a habitat.

Burning of timber increases the carbon dioxide being released into the atmosphere. The destruction of trees leads to less photosynthesis removing carbon dioxide from

Melting polar ice caps, rising sea levels, flooding and climate change (violent storms and extended droughts).

Deforestation reduces transpiration, the lack of soil reduces infiltration and increases the amount of run off.

Ecology

Name two gases which contribute to global warming.

Global warming

Ecology

Name one method of saving endangered species (e.g. Snow leopards)?

Maintaining biodiversity

Ecology

How can rare habitats (e.g. mangrove swamps) be saved?

Maintaining biodiversity

Ecology

How can biodiversity be increased in a field growing only one type of food crop (e.g. wheat)?

Maintaining biodiversity

Ecology

How can governments help to protect the environment?

Maintaining biodiversity

Ecology

How can resources be more efficiently used?

Maintaining biodiversity

Breeding programs.

Carbon dioxide and methane.

Reintroduction of field margins and hedge-rows.

Protection and regeneration.

Recycling rather than putting into landfill.

Legislate (make laws) to reduce deforestation and cut carbon dioxide emissions.

