RETRIEVAL PRACTICE ANSWERS

Characteristics of living organisms- page 7

Q1- This is the ability of an organism to increase in dry mass or size by increasing the number of cells or size of cells.
Q2- A chemical reaction that takes place inside cells, where glucose is broken down to release energy. There are two types of respiration, aerobic respiration, which occurs with oxygen and anaerobic respiration, which occurs without oxygen.
Q3- Excretion is the removal of metabolic waste.
Q4- Carbon dioxide, water and urea
Q5- Change in temperature or pain.
Q6- Gravity and sunlight
Q7- They grow in the direction of a stimulus such as gravity and sunlight.
Q8- This is the ability of an organism to control its internal conditions within narrow limits known as homeostasis. Examples of conditions that need to be controlled in living organisms include glucose, temperature and water.
Q9- Glucose --> Lactic acid + (ATP)
Q10- Movement, reproduction, respond to their surroundings, grow and develop, respiration, excretion, nutrition, and control of their internal conditions.

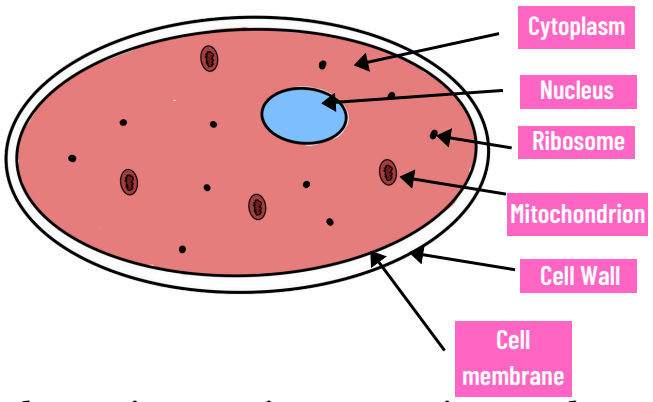
Variety of living organisms- page 17

Q1- Animals, plants, fungi and protoctists
Q2- A type of nutrition in bacteria and fungi where dead organic matter is broken down and absorbed. It happens in three steps:
-The fungi will secrete enzymes out of their cells onto the dead organism or organic matter.
-The enzymes will digest this organic material. As this happens outside the cell, it is known as extracellular digestion.
-Products of digestion are absorbed by the fungi.

RETRIEVAL PRACTICE ANSWERS

Variety of living organisms- page 17

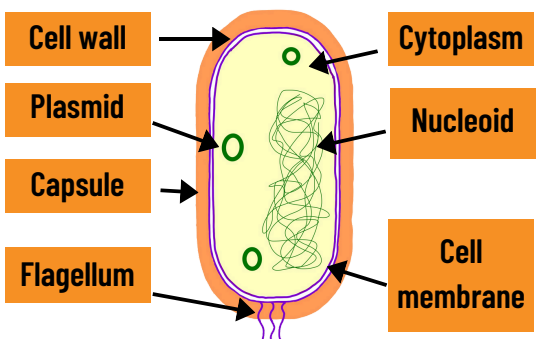
Q3



Q4- Eukaryotic organisms contain membrane-bound organelles such as the nucleus and mitochondria. Prokaryotic organisms do not contain membrane-bound organelles such as the nucleus and mitochondria.

Q5- Pneumococcus is a spherical bacterium that is the pathogen that causes pneumonia.

Q6-



Q7- Are microbes that cause disease.

Q8- Any from HIV, tobacco mosaic virus, COVID-19 or influenza virus that causes flu.

Q9- They are multicellular (made from many cells) organisms; they can carry out photosynthesis which is how plants make their own food, their cells contain chloroplasts, these organelles contain chlorophyll which are pigments that trap sunlight to allow photosynthesis to occur, their cells have cell walls made from cellulose, and they store carbohydrates as starch or sucrose.

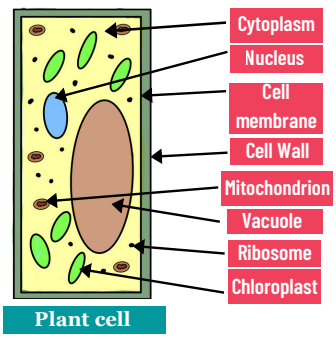
Q10- Any two from chlorella, amoeba and plasmodium.

RETRIEVAL PRACTICE ANSWERS

Level of organisation and cell structure- page 29

Q1- Biggest to smallest- Organism, Organ system, Organ, Cell and Tissue.

Q2



Q3- Where protein synthesis happens.

Q4- Similarities - Nucleus, Cytoplasm, Cell membrane, Mitochondria and Ribosomes. Differences- Chloroplasts, Permanent vacuole and Cell wall.

Q5- Controls the movement of substances in and out of the cell, they are partially permeable.

Q6- Where most of the chemical reactions happen and where the most water is found in a cell.

Q7- A undifferentiated cell.

Q8- Embryonic stem cells and Adult/tissue stem cells.

Q9- Any three from a) No embryos are killed, so they have fewer ethical issues than ES cells. b) Shortage of embryos or need for donors is not a concern. c) They are partly differentiated and so easier to control. They also have less chance of producing tumours. d) Using patients own cells prevents rejection as the cells will be genetically identical.

Q10- Any three from a) Stem cells taken from older people may not last very long as cells age. b) Adult stem cells are difficult to extract. c) Adult stem cells are limited in terms of cells they differentiate into. Nerve cells are very difficult to produce from adult stem cells.

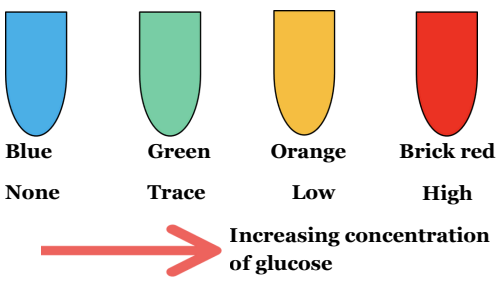
Biological molecules- page 44

Q1- Hydrogen, Oxygen and Carbon.

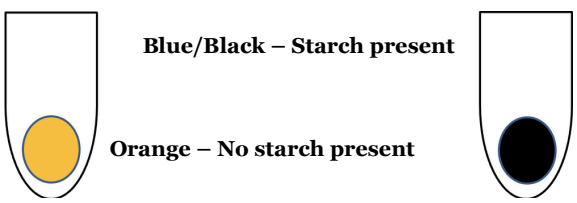
RETRIEVAL PRACTICE ANSWERS

Biological molecules- page 44

Q2- Glycerol and Fatty acids.
Q3- Add 2-3 drops of iodine onto your food samples. If the sample turns orange then no starch is present, if the sample turns blue/black the sample contains starch.
Q4- Place your different food samples into separate test tubes. Add 2-5 cm^3 of Benedict's solution into your food samples and mix. Place the test tubes in a water bath at 85 C for 5 minutes. The colour changes below, indicate how much glucose is present.



Q5- Place your different food samples into separate test tubes. Add 2-3 drops of iodine onto your food samples. The colour changes below indicate the presence of starch.



Q6- These are biological catalysts made from proteins that speed up chemical reactions inside living organisms.
Q7- The substrate will collide with the active site of the enzyme. Active sites have a complementary shape to the substrate. Enzymes aid the formation of new bonds or help break bonds in the substrate. This stage is referred to as the enzyme-substrate complex. It shows that the fit between the enzyme and substrate is like a lock and key. Products are released, the enzyme is unchanged and can catalyse more reactions.
Q8- As the temperature increases, so does the rate of reaction due to more collisions between the enzyme and substrate.

RETRIEVAL PRACTICE ANSWERS

Biological molecules- page 44

This is due to them gaining more kinetic energy. Once the temperature reaches the optimum temperature, the reaction is happening at its fastest. Once past the optimum temperature, the enzyme denatures. Denaturing permanently changes the shape of the active site. This change in shape prevents the substrate from binding to the active site on the enzyme.
Q9- Set up five water baths at ranging temperatures from 0^{O}C to 80^{O}C. Add amylase to five test tubes. Label these test tubes as A1-5. Add starch to five different test tubes. Label these test tubes as S1-5. Place A1 and S1 together into your first water bath for five minutes. Do this for all your amylase and starch test tubes. Take a spotting tile and place one drop of iodine into each dimple. Mix A1 and S1 together, place back into the water bath and start your timer. Every 30 or 60 seconds, remove a sample using a pipette and add it to the different dimples in the spotting tile. Repeat step 7 until iodine stops turning black. Repeat steps 6-8 for each temperature. Record results in a suitable table. Draw a graph to show the time for starch to be digested at different temperatures.
Q10- Permanent changes to the shape of the active site of an enzyme.

Movement of substance into and out of cells- page 56

Q1- It is when particles move from an area of high concentration to an area of low concentration. This movement is random and is passive (requires no energy).
Q2- It is the diffusion of water from a high concentration of water (dilute solution) to a low concentration of water (concentrated solution) through a partially permeable membrane. This movement also requires no energy.
Q3- It is the movement of particles from an area of low concentration to an area of high concentration through a partially permeable membrane. Particles move against the concentration gradient, so they need ATP.
Q4- Surface area to volume ratio, distance, temperature and concentration gradient.

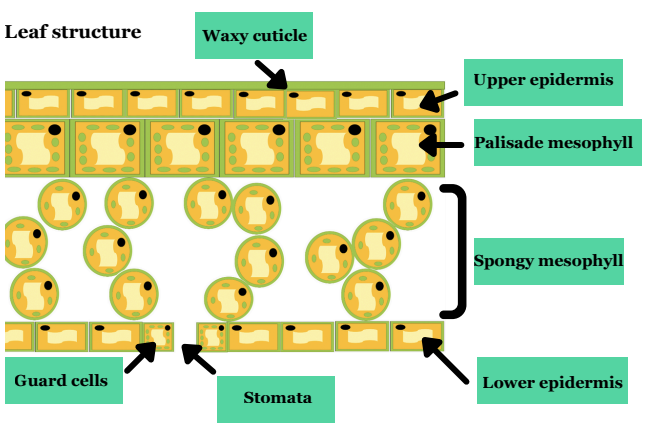
RETRIEVAL PRACTICE ANSWERS

Movement of substance into and out of cells- page 56

Q5- Work out the surface area and volume. Divide the surface area by the volume.
Q6- The smaller the organism the larger the surface area to volume ratio and vice versa.
Q7- End mass- Start mass ÷Start mass ×100 A positive number represents a percentage increase. A negative number represents a percentage decrease
Q8- As the temperature increases, atoms gain more thermal energy which causes atoms to vibrate faster, increasing their kinetic energy. As a result, the rate of movement also increases.
Q9- Use a cork borer and a scalpel to cut five equal-sized potato strips from a fresh potato. Blot with tissue paper and weigh the starting mass.
Put the different pieces into different concentrations of sucrose solution. 0 M (water), 2 M, 4 M, 6 M and 8 M. Leave for a few hours. Remove, blot with tissue paper and reweigh. Calculate the change in mass and the percentage change in mass.
Q10- The smaller the distance atoms need to move across, the faster the rate of movement and vice versa.

Nutrition (Flowering plants)- page 68

Q1- Carbon dioxide + Water --> Glucose + Oxygen
Q2-$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$
Q3-Light, temperature and carbon dioxide
Q4-



RETRIEVAL PRACTICE ANSWERS

Nutrition (Flowering plants)- page 68

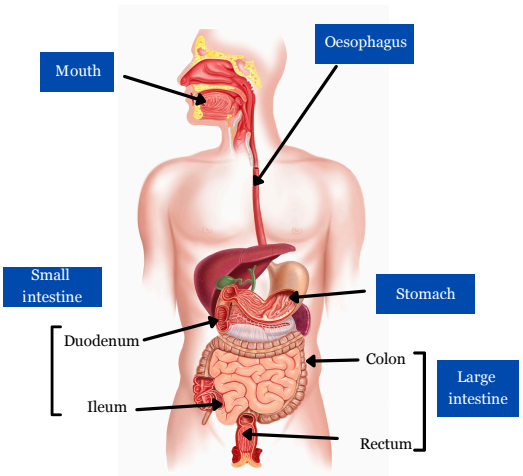
Q5- Magnesium is needed to make chlorophyll in plants; you know when a plant is lacking in this ion when its leaves turn yellow.
Q6-Nitrates are essential for making amino acids in plants. Without these nitrates, you get stunted growth in the plant.
Q7- Take a leaf and boil for two minutes. This will stop any chemical reactions. Boil in ethanol using a bunsen burner or a water bath for five minutes, which removes the chlorophyll. Wash with water to remove the ethanol. Place on a white tile and add iodine.
Q8- Destarch two plants by placing them in a dark cupboard for 24 hours.
Place one in a sealed bell jar with water, this will act as a control.
Place the other plant in another sealed bell jar this time with soda lime or sodium hydroxide. Place both plants in front of a light source for six hours.
Take a leaf from each plant and follow the test to test for the presence of starch. Boil for two minutes which will stop any chemical reactions. Boil in ethanol using a bunsen burner or water bath for five minutes, which removes the chlorophyll. Wash with water to remove the ethanol. Place on a white tile and add iodine.
Q9- A leaf that has areas that contain no chlorophyll.
Q10-

Leaf structure	Function
Waxy cuticle	Reduces water loss, protection from pathogens without blocking out light.
Upper epidermis	Transparent which allows light to reach the palisade cells.
Palisade mesophyll	Packed with many chloroplasts to allow photosynthesis to occur. Arranged closely together so that a lot of light energy can be absorbed. Found near the (upper) surface.
Spongy mesophyll	Contain air spaces for gas exchange to occur which includes the diffusion of gases oxygen and carbon dioxide. Contains the vascular bundle, composed of the xylem which transports water.
Lower epidermis	Contains the stomata.
Stomata	Are pores found in the underside of the leaf but can be found in the upper epidermis. They allow gasses such as oxygen and carbon dioxide to leave and enter the cell. They also allow water to escape. Their opening and closing are controlled by guard cells.

RETRIEVAL PRACTICE ANSWERS

Nutrition (Humans)- page 81

Q1- Having a balanced diet means having the correct proportions of carbohydrates, protein, lipid, vitamins, minerals, fibre and water.
Q2- Source- Carrots, liver, butter. Function- Vision, healthy skin and strong immunity against infection. Lack of vitamin A causes Night blindness.
Q3- Source- Butter, milk, eggs, olive oil or sunflower oil. Function- Are a store of energy.
Q4- As you grow older the energy you need increases as you reach adulthood.
Q5- A pregnant woman needs more energy as she is carrying more mass. The more mass a person is carrying, the higher the energy content.
Q6-

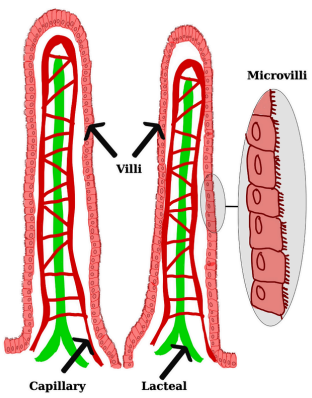


Q7-Movement along the alimentary canal which happens via muscular contractions.
Q8- Breaks starch into maltose.
Q9- a) Villi and microvilli increase surface area. b) Thin walls which are one cell thick provide a short diffusion distance for faster diffusion and more diffusion. c) Capillaries to absorb glucose and amino acid. d) Capillaries maintain a steep concentration gradient. e) Lacteals absorb fatty acids and glycerol. f) Small intestine is long so more absorption occurs it also increases surface area.

RETRIEVAL PRACTICE ANSWERS

Nutrition (Humans)- page 81

Q10-



Respiration- page 86

Q1- Chemical reaction that releases energy, occurs in organelles called mitochondria. This type of respiration uses oxygen.
Q2- Chemical reaction that releases energy, occurs in the cytoplasm. This type of respiration does not use oxygen.
Q3- Glucose + Oxygenà Carbon dioxide + Water +ATP
Q4- Glucoseà Ethanol + Carbon dioxide + ATP
Q5- Glucose + Oxygenà Carbon dioxide + Water +ATP
Q6-Chemical reactions to build larger molecules, movement (active transport) and keeping warm (maintains your
Core body temperature).
Q7- For 24 hours, soak 100g seeds in water. Boil 50 grams of the seeds. Place the unboiled seed in a vacuum flask with a thermometer. Measure the starting temperature. After 24 hours, record the temperature in both flasks.

Gas exchange (Flowering plants)- page 96

Q1- Points from the table mentioned.

RETRIEVAL PRACTICE ANSWERS

Gas exchange (Flowering plants)- page 96

Leaf structure	Function
Spongy mesophyll	Contain air spaces for gas exchange to occur. They provide a large surface area for gas exchange. The spongy mesophyll cell membranes are also thin, moist and permeable, aiding gas exchange further.
Lower epidermis	Contains the stomata.
Stomata	Are pores found in the underside of the leaf but can be found in the upper epidermis. They open in light and close in the dark. They allow gases such as oxygen (out) and carbon dioxide (in) to leave and enter the cell. They also allow water to escape. Their opening and closing is controlled by guard cells.

Q2-The stomata control gas exchange in the leaf. Each stoma can be opened or closed depending on how turgid its guard cells are. So carbon dioxide can enter and oxygen can leave.

Q3- 1. In the light, the guard cells produce glucose which lowers the water concentration. 2. Drawing water into the cells by osmosis. 3. The guard cells become turgid, and the stomata open.

Q4- 1. In the dark, the glucose produced during the day will be used in respiration. As no new glucose is made, this increases the concentration of water inside the cell (as solute concentration falls). 2. causing water to be drawn out by osmosis. 3. The guard cells lose water, becoming flaccid, and the stomata close.

Q5- No, as there is no sunlight.

Q6- Yes, sunlight is not needed for respiration.

Q7- In bright light, the rate of photosynthesis is higher than the rate of respiration, and there is a net release of oxygen and a net uptake of carbon dioxide.

Q8- The rate of respiration is higher than the rate of photosynthesis. During the night, there is no photosynthesis as it requires light energy. Respiration is always occurring as it is not reliant on light

RETRIEVAL PRACTICE ANSWERS

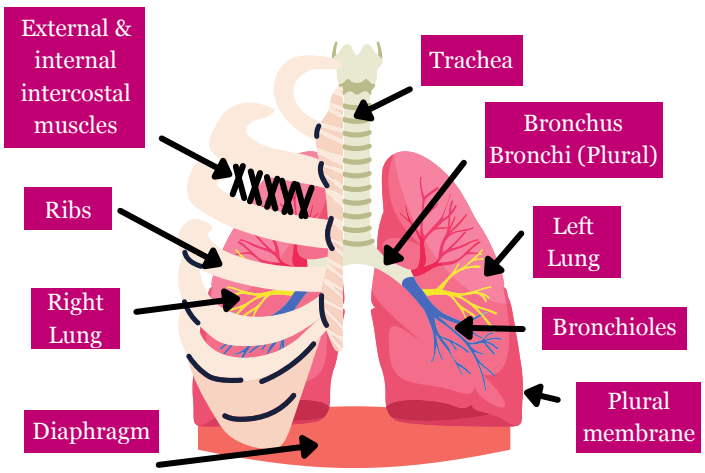
Gas exchange (Humans)- page 105

Q1- Ventilation describes the process of breathing in and out. It involves the ribs, diaphragm and intercostal muscles.
Q2- a) Cells of the alveoli are one cell thick which reduces the diffusion distance. b) Good blood supply, ensuring oxygen rich blood is taken away from the lungs and carbon dioxide rich blood is taken to the lungs. Keeps the concentration gradient steep c) Alveoli create a large surface area for more gas exchange can occur
Q3- Nicotine: It is an addictive substance that increases dependency on smoking. Nicotine also increases the heart rate and blood pressure and makes blood vessels narrower than normal. This can lead to heart disease. Carbon monoxide: It has a greater affinity than oxygen to bind to the red blood cells. It reduces the levels of oxygen in the body. Tar: A sticky substance that can lead to cancer of the mouth, throat and lungs. It reduces gas exchange by coating the lungs, including the alveoli.
Q4- Cilia are tiny hair-like structures on the surface of the cell. These hairs sweep hair, mucus, trapped dust and bacteria up to the back of the throat, where it can be swallowed. When a person smokes, the cilia stop moving, which leads to a build-up of mucus, bacteria, and dirt, producing a 'smokers cough.'
Q5- The external intercostal muscles relax and the internal intercostal muscles contract, pulling the ribcage downwards and inwards. The diaphragm relaxes, moving back upwards. Lung volume decreases, and the air pressure inside increases. Air is pushed out of the lungs
Q6- The internal intercostal muscles relax and the external intercostal muscles contract, pulling the ribcage upwards and outwards.The diaphragm contracts, pulling downwards. Lung volume increases and the air pressure inside decreases. Air is pushed into the lungs.

RETRIEVAL PRACTICE ANSWERS

Gas exchange (Humans)- page 105

Q7-



Q8- Work in pairs. Count the number of breaths at rest for one minute and record your results. Jog on the spot for four minutes. Count the number of breaths every minute for five minutes and record your results.

Transport (Flowering plants)- page 113

Q1- A bigger organism has a larger distance from the surface to the inside. This means that simple diffusion will not be sufficient to meet the cells need. This is why they have organ systems with adapted exchange surfaces.
Q2- Transport water and mineral ions from the roots to the leaves.
Q3- Transport sucrose from the source to the sinks.
Q4- Mature xylem consists of elongated dead cells arranged end to end to form continuous vessels (tubes). The following features characterise their structure:
- No cytoplasm
- Impermeable to water
- Contain lignin

Q5- Phloem consists of living cells arranged end to end. Unlike xylem, phloem vessels contain cytoplasm, which goes through holes from one cell to the next. It is made of sieve tube elements and companion cells.

RETRIEVAL PRACTICE ANSWERS

Transport (Flowering plants)- page 113

Q6- Water is absorbed into the plant by osmosis via the root hair cells. Root hair cells are adapted for taking up water and mineral ions by having a large surface area to increase the rate of absorption.
Q7- Is the evaporation of water from the aerial parts of the plant.
Q8- Temperature, wind speed, humidity and light intensity.
Q9- An increase in temperature increases the rate of diffusion. As the temperature increases so does the kinetic energy, causing water to evaporate more quickly from the leaf, increasing transpiration.
Q10- As light levels increase so does the rate of photosynthesis. This causes the stomata to open to allow carbon dioxide to enter, resulting in more water loss.

Transport (Humans)- page 126

Q1- Red blood cells, white blood cells, platelets and plasma.
Q2- Contain haemoglobin a red protein that combines with oxygen. To form oxyhaemoglobin. No nucleus so they can contain more haemoglobin. Have a biconcave shape to maximise their surface area for oxygen absorption. Small and flexible so that they can fit through narrow blood vessels.
Q3-Lymphocytes and phagocytes
Q4- A dead or inactive form of the pathogen is injected into the patient. Memory cells remain in your body. Should the pathogen return, your body can quickly produce antibodies to destroy the pathogen. Produces a greater concentration of antibodies.
Q5- The heart is a muscular organ and is responsible for pumping blood around the body.
Q6- During exercise, there is an increase in the demand for oxygen, especially in your muscles which need the oxygen to carry out aerobic respiration so that your muscles have the energy to contract. To supply your muscles with this oxygen, your heart beats faster. An increase in heart rate also allows for waste products to be removed.

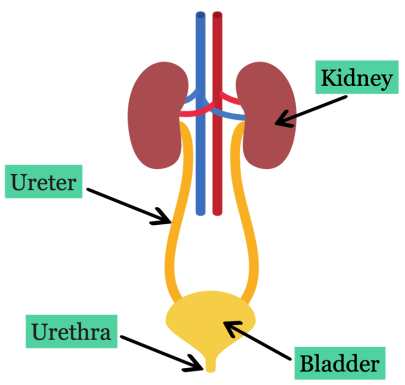
RETRIEVAL PRACTICE ANSWERS

Transport (Humans)- page 126

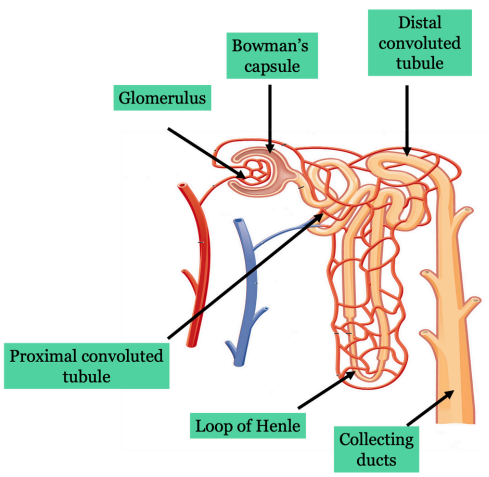
Q7- Poor diet, lack of exercise, stress, smoking and high blood pressure.
Q8- Artery carries blood away from the heart. It has the following features, small lumen, a thick wall with lots of muscle fibres and elastic tissue, carry blood at high pressure, connective tissue provides strength and no valves.
Q9- Veins carries blood towards the heart. It has the following features, large lumen, a thin wall with little muscle and elastic tissue, contains valves, carry blood at low pressure and have less connective tissue than arteries.

Excretion- page 134

Q1- Lungs, skin and kidneys.
Q2- Controlling water levels and mineral ions (salt) in the blood.
Q3-



Q4-

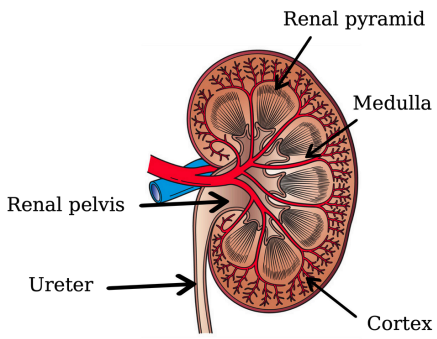


Nephron

RETRIEVAL PRACTICE ANSWERS

Excretion- page 134

Q5- Blood enters the glomerulus at high pressure forcing glucose, water, urea and salts into the bowman's capsule to form the filtrate. The membrane of the bowman's capsule filters what enters, preventing larger molecules such as red blood cells and large proteins from crossing the membrane.
Q6- At the proximal convoluted tubule, glucose is selectively absorbed by active transport. The nephron has lots of mitochondria which provides the energy for active transport. Selective reabsorption can only occur in this nephron region as protein gates that facilitate the active transport of glucose are only found in the proximal convoluted tubule.
Q7- Pituitary gland
Q8- ADH travels in the blood towards the collecting duct, making its wall more permeable to water, thus resulting in more water being reabsorbed into the blood.
Q9-



Co-ordination and response (Flowering plants)- page 145

Q1- This is growth in response to a stimulus.
Q2- This is growth in response to light. The shoot tips will show positive phototropism, which is growth toward light.
Q3- This is the response of a plant to gravity.
Q4- Auxin is a hormone, it can either promote cell elongation or inhibit it.
Q5- Auxin accumulates in the lower part of the root tip. Auxin will slow down growth, causing the upper part of the root tip to grow faster. This causes bending in the direction of gravity.

RETRIEVAL PRACTICE ANSWERS

Co-ordination and response (Flowering plants)- page 145

Q6- It will bend in the direction of the light source.
Q7- His experiments showed us that the coleoptile tip detected the stimulus of unidirectional light.
Q8- Shoots shows positive phototropism, the roots show negative phototropism.
Q9- Roots show positive gravitropism, the shoots show negative gravitropism.

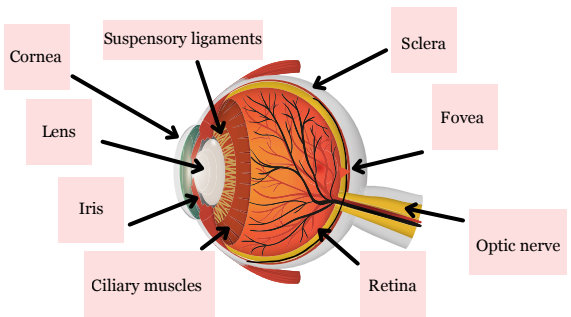
Co-ordination and response (Humans)- page 166

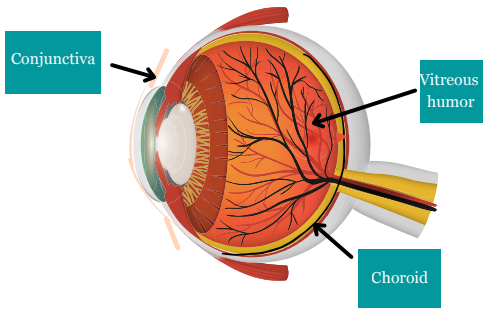
Q1- Brain and the spinal cord.
Q2- They are automatic and rapid responses; they do not involve the conscious part of the brain. They are essential responses that protect you from harm. Examples include the pupil reflex, Knee-jerk reflex and moving your hand when you touch something hot.
Q3- Fast-acting. Uses electrical signals/impulses. Effects of the nervous system are short-lasting. Electrical signals/impulses travel via neurones.
Q4- Slow acting. Uses chemical messengers called hormones. Effects of the endocrine system are long-lasting. Hormones travel in the blood.
Q5-Receptors in the hand detect the stimulus (burning candle). This information is sent along the sensory neurone as an electrical impulse. When the electrical reaches the end of the sensory neurone, neurotransmitters are released, diffusing across the synapse binding to receptors on the relay neurone. This generates an electrical impulse in the relay neurone. When the electrical reaches the end of the relay neurone, neurotransmitters are released, diffusing across the synapse binding to receptors on the motor neurone. This generates an electrical impulse in the motor neurone. When the electrical reaches the end of the motor neurone. This stimulates effectors, in this case, muscles in the arm. The person moves their arm away from the candle—this pathway bypasses the conscious part of the brain.

RETRIEVAL PRACTICE ANSWERS

Co-ordination and response (Humans)- page 166

Q6-





Q7- Contain light receptors (Rods and cones) that detect light.

Q8- Focusing on distant objects: Ciliary muscle relaxes, suspensory ligaments pulled tight and lens pulled flat. Close objects: Ciliary muscles contract, suspensory ligaments relax and the lens becomes thicker.

Q9- Source: Testes Role: Male reproductive hormone. Effect: Development of the secondary sexual characteristics.

Q10- The body temperature rises above the normal range. The thermoregulatory centre in the brain detects the change. Blood flow is increased in the capillaries close to the skin's surface, causing them to become wider due to the increased pressure. This is known as vasodilation. Heat can escape the blood through the skin by radiation. Temperature receptors in the skin can also send impulses to the thermoregulatory centre in the brain, giving information about skin temperature.

RETRIEVAL PRACTICE ANSWERS

Reproduction (Plant)- page 180

Q1- In sexual reproduction, two parents are needed to produce offspring, and these offspring will be genetically different to their parents.
Q2- In asexual reproduction, one parent is needed to produce offspring and these offspring will be genetically identical to their parent.
Q3- A fertilised sex cell.
Q4-

- Large colourful petals attract insects.
- Scent and nectar attract insects to the plant.
- Pollen grains are sticky/spiky to attach to insects.
- Anthers are located inside the flower so the insect has to brush past them.
- Stigma is sticky to collect pollen grains and located inside the flower so the insect has to brush past it.

Q5

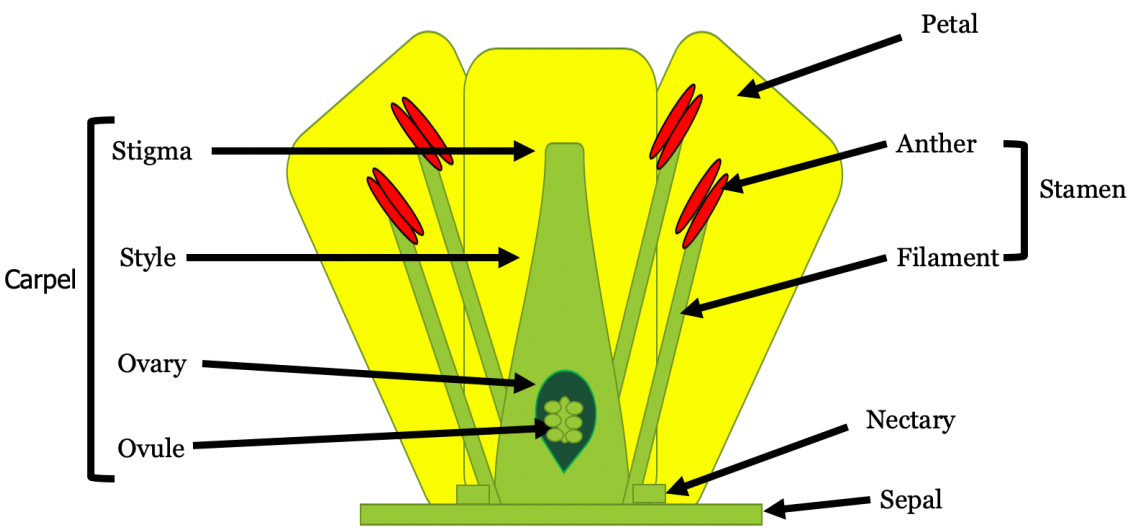
- Small and dull petals.
- No smell or nectar.
- More pollen grains are produced than insect-pollinated flowers.
- Pollen is smooth, small and light, so it is easily carried in the wind.
- Anthers are found outside the flower, so the pollen can easily be lost.
- Stigma is feathery and found on the outside of the leaf to catch pollen.

Q6
Insects will move from plant to plant, collecting nectar as the insect moves through the plant to collect this nectar, pollen sticks to them.
The insect will eventually leave the plant carrying the pollen with it. It brushes past the sticky stigma leaving behind the pollen when it reaches the next plant. This process is called pollination. The wind will carry pollen in wind-pollinated flowers, where the feathery stigma catches the pollen.
The pollen grows a pollen tube that grows towards the ovary and attaches to the ovule at an opening called the micropyle.
The nucleus travels down the pollen tube to fertilise the female nucleus of the ovule. This process is known as fertilisation.
The fertilised ovule develops into a seed. The rest of the carpel becomes the fruit.
Q7 - Water, warmth and oxygen
Q8- A sex cell.
Q9- the fusion of two gametes.

RETRIEVAL PRACTICE ANSWERS

Reproduction (Plant)- page 180

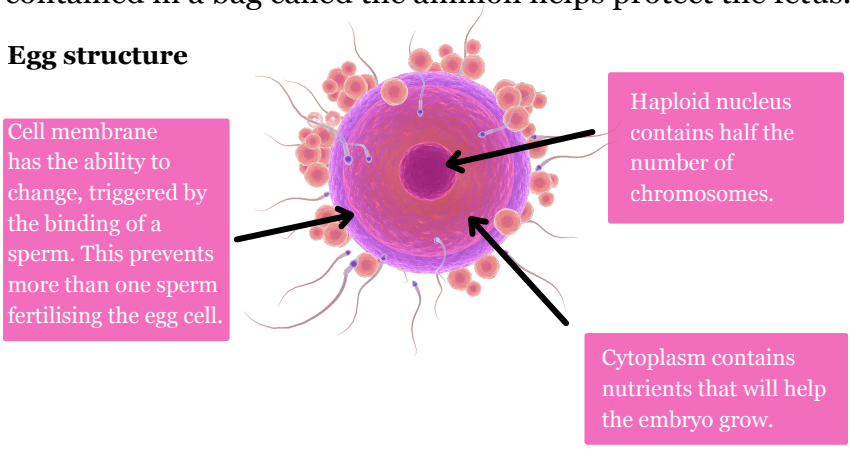
Q10-



Reproduction (Human)- page 193

Q1- Causes the repair and thickening of the uterus lining and inhibits FSH.
Q2-Maintains the lining of the uterus during the middle part of the menstrual cycle and during pregnancy.
Q3-Causes the egg to mature in the ovary. FSH also triggers oestrogen release.
Q4-Causes the egg to be released (Ovulation).
Q5- A organ responsible for providing oxygen and nutrients and removing waste substances.
Q6- a liquid contained in a bag called the amnion helps protect the fetus.
Q7-

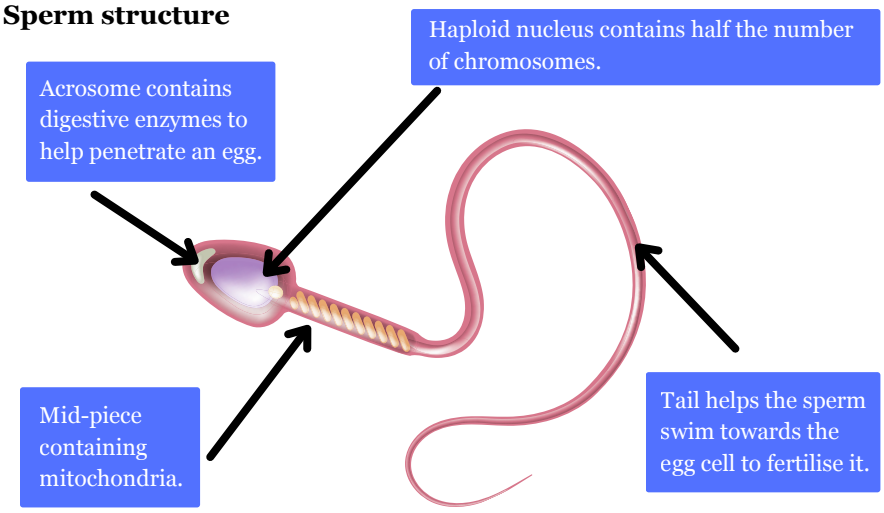
Egg structure



RETRIEVAL PRACTICE ANSWERS

Reproduction (Human)- page 193

Q8- **Sperm structure**



Inheritance- page 209

Q1- The genome is the entire DNA of an organism.
Q2-A gene is a section of a molecule of DNA that codes for specific proteins.
Q3-Deoxyribonucleic acid (DNA) has two strands coiled to form a double helix; a series of paired bases link the strands. A nucleotide is a repeating subunit that makes up a DNA molecule. It comprises of a phosphate group, a pentose sugar and a nitrogenous base.
Q4-Adenine (A), Cytosine (C), Guanine (G) and Thymine (T).
Q5- G-C and A-T
Q6-Ribonucleic acid (RNA) is single-stranded important for protein synthesis.
There are three types of RNA: transfer RNA (tRNA), messenger RNA (mRNA) and ribosomal RNA (rRNA). RNA has the same repeating subunit structure, however RNA polynucleotide chains are relatively short compared to DNA. The pentose sugar is also a ribose sugar not a deoxyribose sugar.
Q7- Helicase is a enzyme that 'unzips' the double helix, breaking the hydrogen bonds between the DNA strands and exposing the bases. RNA polymerase will then attach itself to the DNA. RNA polymerase moves along the DNA strand joining free RNA nucleotides which bind to the exposed DNA bases by complementary base pairing.
Only one DNA strand is read called the template strand; the other is called the non-template strand. RNA nucleotides contain the same bases as DNA, except T is replaced by U. U base pairs with A.

RETRIEVAL PRACTICE ANSWERS

Inheritance- page 209

The newly formed mRNA leaves the nucleus and moves to the cytoplasm to bind to the ribosome. The DNA molecule 'zips up' again.
Q8- At the ribosome; the bases on mRNA are read three bases at a time (codons). The ribosome will attach one complementary molecule of tRNA for every three bases. The three bases on tRNA are called the anticodons. tRNA binds at the
start codon on mRNA (usually AUG). A second tRNA binds to the next codon, forming a bond between the first and second amino acid.
The first tRNA will leave to collect another amino acid. This process will continue until the stop codon is reached on mRNA. You end up with an amino acid chain called a polypeptide. These polypeptide chains can be folded to form molecules like enzymes.
Q9- Alternate form of the same gene.
Q10- Homozygous alleles are both identical for the same characteristic.

Miosis/Meiosis/Variation/Mutation-page 221

Q1-The cell grows and increases the number of sub-cellular structures such as ribosomes and mitochondria. The DNA replicates to form two copies of each chromosome. This is called the interphase, the cell spends most of its life in this phase.In mitosis, the nucleus divides and one set of chromosomes is pulled to each end of the cell. This represents a small part of the cell cycle. The cytoplasm and cell membranes divide (cytokinesis)to form two identical cells.
Q2- Prophase - DNA would have replicated in interphase. The chromosomes pair up in homologous pairs called chromatids. Chromosomes condense becoming visible and the nuclear membrane breakdown. Metaphase- Chromatids line up in the middle of the cell. They attach to structures called spindles. Anaphase- Chromatids are pulled to different ends of the cell. This is because the spindle fibres shorten and pull the chromatids apart. Telophase- New membranes form around the chromosomes at each end of the cell. Cytokinesis-The cell membrane pinches in and eventually divides into two daughter cells.
Q3- Meiosis I -DNA would have replicated in interphase. The chromosomes pair up in homologous pairs called chromatids. Chromosomes condense, becoming visible and the nuclear membrane breakdown. Chromatids line up in the middle of the cell. They attach to structures called spindles. Chromatids are pulled to different ends of the cell. This is because the spindle fibres shorten and pull the chromatids apart. Two new cells are formed, the swapping of alleles and random mixing of chromatids creates variation in the cells.

RETRIEVAL PRACTICE ANSWERS

Miosis/Meiosis/Variation/Mutation-page 221

Meiosis II - At the end of this first stage of meiosis, you have two cells that have 46 pairs of chromosomes each. In the second cycle of division, the chromatids line the centre of the cell again. These chromatids are pulled apart to either side of the cell. At the end of this second stage of meiosis, you have four cells that have 23 chromosomes each. they are genetically different from each other.
Q4- Mitosis- -The new cells contain exactly the same chromosomes and the same genes as their parents. Two new cells are produced at the end of cell division. This type of cell division produces diploid cells. The purpose of this cell division is for growth, repair and replacement of damaged cells. Mitosis involves one cell division. Meiosis- The purpose of this cell division is the production of gametes in the sex organs. Four new cells are produced at the end of cell division. The new cells contain half a set of chromosomes. The four new cells are genetically different from each other. This type of cell division produces haploid cells. Meiosis involves two cell divisions.
Q5- Anaphase
Q6-spindle fibres shorten and pull the chromatids apart.
Q7- Metaphase
Q8-A mutation is a random change in the DNA base sequence.
Q9- Mutations can be increased by exposure to ionising radiation (such as gamma rays, x-rays or ultraviolet rays) and some chemical mutagens (for example, chemicals in tobacco).
Q10- Scar, changing your hair colour or getting a tan.

Evolution- page 227

Q1- A biologist who came up with the theory of evolution.
Q2- During his time at the Galapágos Islands, he noticed that finches were different on the islands than the ones found in mainland Ecuador. For example, their beaks were different depending on the local food source. Darwin concluded that because the islands are so far from the mainland, the finches that had arrived there had changed over time.
Q3- There is variation (differences in alleles) within a species caused by mutation. Individuals with characteristics most suited to their environment are more likely to survive and reproduce. Because those with the advantageous characteristics survive, they can reproduce, and these genes get passed to the next generation. This is known as “survival of the fittest.”

RETRIEVAL PRACTICE ANSWERS

Evolution- page 227

Those that are poorly adapted to their environment are less likely to survive and hence less likely to reproduce. Therefore those genes that make that organism less adapted to the environment reduce the population.
Given time, a species will gradually evolve with prominent desirable and advantageous characteristics.
Q4-is the process of change of an organism over time.
Q5-Variation due to a mutation in the bacteria population produces bacteria that are resistant to antibiotics. Bacteria that do not carry the mutation will die when an antibiotic is applied, leaving behind only the bacteria which is resistant to antibiotics. Antibiotic-resistant bacteria can reproduce with less competition from non-resistant bacterial strains. The genes for antibiotic resistance are passed to the offspring. Over time the whole population of bacteria are resistant to antibiotics.

RETRIEVAL PRACTICE ANSWERS

The organism in the environment- page 237

Q1- An individual living thing.
Q2- Any three from, Food availability, new pathogens, one species outcompeting another and new predators.
Q3- Any three from, Temperature, light intensity, water availability, oxygen and carbon dioxide availability, soil pH and mineral content, wind intensity and direction for plants.
Q4- High biodiversity reduces the dependence of one species on another for food, shelter and the maintenance of the physical environment. This ensures the stability of ecosystems.
Q5-Habitat destruction, overexploitation, hunting, agriculture and climate change.
Q6- Method

1. Select three plants from the identification keys you wish to sample.
2. In each habitat you investigate, mark out a 10m x 10m square on the ground by laying one tape measuring 10m lengthways and a second tape measuring 10m at right angles to the first (see figure 1).
3. Use a random coordinate generator to select two numbers from 1-10. This is called random sampling and avoids bias.
4. Each pair of random numbers can be used as x and y coordinates.
5. Place the lower left-hand corner of a frame quadrat at your selected coordinates.
6. Count the number of plants in your quadrat (see figure 2).
7. Repeat steps 1-6 another ten times and record your results in your table.

Q7- A place where plants, animals and microorganisms live.
Q8- A community is all the populations of different organisms that live together in a habitat, and a population is all the members of a single species that live in a habitat.

RETRIEVAL PRACTICE ANSWERS

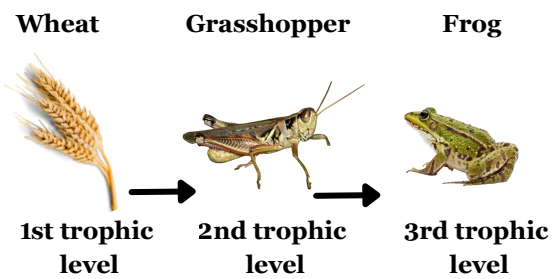
The organism in the environment- page 237

Q9- Method

1. Extend a measuring tape from one side of the habitat to another (10m in length). This is called a transect.
2. Place a quadrat at 0m on the tape.
3. Count the numbers/estimate percentage cover of your three selected plants.
4. Record results in a table.
5. Record water and PH of the soil and take a light reading at each position on the belt transect.
6. Move the quadrat along the transect 1m at a time.
7. Continue until the entire length of the measuring tape has been sampled. This is called a belt transect.

Feeding relationships- page 247

Q1-



Q2- An organism that obtains energy by eating other organisms.

Q3- A food chain shows the feeding relationships between different organisms and the movement of energy. Whereas a food web shows us how different food chains are interconnected.

RETRIEVAL PRACTICE ANSWERS

Feeding relationships- page 247

Q4- This shows the relative numbers of organisms at each trophic level in a food chain.
Q5- This shows an organism's dry mass at each trophic level.
Q6- This shows the amount of energy contained within the biomass of individuals at different trophic levels.
Q7-

$$\text{Percentage of energy transferred} = \frac{\text{Total energy in biomass}}{\text{Total energy available}} \times 100$$

Q8-
1) Correct scale
2) Correct order
3) The pyramid has been labelled.
Q9- because the biomass always goes down from one trophic level to the next.

Cycles within ecosystems- page 252

Q1- By photosynthesis
Q2- Respiration and Combustion
Q3- Bacteria and fungi break down dead plants, animals and faeces. This releases carbon into the atmosphere.
Q4- Convert nitrogen gas into nitrates.
Q5- Found in the root nodules of leguminous plants (clover, beans and peas).
Q6- Convert the ammonium compounds to nitrites and then to nitrates.
Q7- Convert nitrates back into nitrogen gas.
Q8- Can 'fix' N_2 gas by splitting the bond between the two atoms and turning them into nitrous oxides like N_2O and NO_2 that dissolve in rainwater and 'leach' into the soil.

RETRIEVAL PRACTICE ANSWERS

Cycles within ecosystems- page 252

Q9- Nitrogen

Human influences- page 264

Q1-Burning fossil fuels and volcanic eruptions.
Q2- Burning fossil fuels and volcanic eruptions release sulfur dioxide into the air. This dissolves into rainwater and clouds making sulfuric acid.
Q3- Soil erosion, leaching and effects evapotranspiration.
Q4- It is colourless, odourless and tasteless. It's dangerous to humans as it binds with Haemoglobin more strongly than oxygen.
Q5- Water vapour, carbon monoxide, nitrous oxide, methane and CFCs.
Q6-
1) Farming cattle increases the release of methane.
2) Farming rice in paddy fields releases methane.
3) CFCs were released from manufacturing aerosols and used in refrigerators, although their use has been phased out under the Montreal Protocol due to their damage to the ozone layer.
4) Burning fossil fuels releases nitrous oxides, and they are also produced during the combustion of fuel in vehicles.
Q7- Electromagnetic radiation travels from the Sun to the Earth, which includes short-wavelength infrared radiation. The Earth absorbs most of the short-wave radiation and warms up. The Earth radiates energy as long-wavelength infrared radiation. Some long-wavelength infrared radiation goes into space. Some long-wavelength infrared radiation is absorbed by greenhouse gases and re-emitted back to the earth's surface. This traps heat energy and in turn, warms the Earth.
Q8- Ocean temperatures increase which causes the melting of polar ice caps, causing rising sea levels which leads to flooding.

RETRIEVAL PRACTICE ANSWERS

Human influences- page 264

The earth's warming can affect the weather. In particular, it can affect the patterns of rainfall, which can produce floods or droughts. A loss of habitat or changes to the habitat can be seen when there are changes to the weather due to global warming, which can impact food chains. The African elephants' habitat is negatively impacted by lower rainfall and higher temperatures. The earth's warming can also change migration patterns. Increased migration can increase the spread of pests and diseases. Furthermore, if a species cannot migrate to a suitable habitat, it can become extinct.

Q9- Minerals from fertilisers are washed into rivers or lakes by rainwater (Leached). Increasing the growth of aquatic plants such as algae. This is called an algae bloom. Sewage can also cause this to happen. Algae bloom makes it harder for sunlight to reach plants at the bottom of these lakes and rivers, causing them to die. Furthermore, rapid algae growth reduces the oxygen in the water. Dead plant matter is broken down by decomposers such as bacteria. These decomposers use up even more oxygen from the water. The loss of oxygen eventually kills all living organisms in the water.

RETRIEVAL PRACTICE ANSWERS

Food production- page 273

Q1- Controlling the temperature by using a heater.
-Controlling the light intensity by using artificially lighting.
-Providing additional carbon dioxide.
-Controlling the amount of water.
-Providing minerals to help plants grow.
-Reduce damage by pests.
2- Organic and inorganic.
3- Reduced growth.
- Affecting the quality or the appearance of the crop.
4-Aphids and locusts
5-Insecticides (which kill insects)
-Fungicides (which kill fungi)
-Herbicides (which kill weeds which are unwanted plants)
6-Pests can develop resistance to them.
-Need to be regularly applied.
-Can cause Bioaccumulation.
-Risk of pollination.
-Can affect human health.
7-Kills all the pest population.
-Immediate effect.
-Relatively cheap and easily accessible.
8-When another living organism is introduced to control the pest rather than a chemical.
9-Problems of resistance are not applicable.
-Can target specific pest species.
-Long-lasting.
-Does not need to be repeatedly applied.
-Environmentally safe (no Bioaccumulation).
-Less risk of pollution.
10-Never fully eliminate the pest.
-The organism introduced to control the pest could become a pest itself.
-Takes a long time to become effective.
-The organism introduced may eat other organisms instead of the pest.
-The introduced organism may not adapt to the environment or move out of the area.

RETRIEVAL PRACTICE ANSWERS

Food production- page 280

Q1- Fungi
Q2- The carbon dioxide causes the dough to rise.
Q3-Involves stretching and folding the dough.
Q4-Glucose -> Carbon dioxide + Ethanol + ATP
Q5-Bacteria
Q6-Yoghurt
Q7-The milk is heated to 85 – 95°C which kills active bacteria in the milk.
Q8-The stirring paddles ensure the microorganism, nutrients, oxygen, temperature and pH are evenly distributed throughout the fermenter.
Q9-Boiling the glucose removes oxygen, which then needs to be cooled before the yeast is added (stops enzymes important for respiration denaturing).

Food production & Selective breeding- page 286

Q1- Overfishing has led to a decline in the number of fish in the wild. Billions of people rely on fish for protein, and fishing is the principal livelihood for millions worldwide.
Q2- remove harmful bacteria and waste, which prevents disease and reduces fish growth.
Q3-Predation within the same species. Fishes are separated by size and age, so they don't kill each other.
Q4-Predation between different species. Nets, tanks or fences can separate different fish species.
Q5-Decide which characteristics are important enough to select.
-Choose parents that show these characteristics from a mixed population. They are then bred together.
-Choose the best offspring with the desired characteristics to produce the next generation. So that desired alleles are passed on.
-Repeat the process continues over many generations until all offspring show the desired characteristics.
Q6-Animals that produce lots of milk or meat;
-Chickens that lay large eggs;
-Domestic dogs that have a gentle nature.
Q7-Food crops that are disease resistant.
-Wheat plants that produce lots of grain.
-Large or unusual flowers.

RETRIEVAL PRACTICE ANSWERS

Food production & Selective breeding- page 286

Q8- They are fed in small amounts but frequently, so they don't overeat or eat each other.
Q9-Antibiotics are given to the fish, which prevents the spread of infection. Fish are also kept in small numbers to minimise the spread of disease.

Genetic modification & Cloning- page 295

Q1- are used because they cut DNA at particular points on the DNA molecule.
Q2- New DNA is formed by joining DNA from two different organisms.
Q3-Join strands of DNA
Q4-1. The gene for insulin is taken from a human cell.
-Restriction enzymes are used to cut the plasmid and DNA.
-Insulin gene is joined to the plasmid using ligase enzymes. This forms recombinant DNA.
-Plasmid is inserted into a bacteria.
-Bacteria with insulin-producing genes are grown in large quantities in fermenters.
Q5-Golden rice is used in areas where Vitamin A deficiency is common. These rice have a gene inserted into them that produces beta carotene, which is used by humans to make vitamin A.
Q6-Take explants (small pieces taken from a plant) from the parent plant.
-This is then transferred to sterile agar jelly in a petri dish. We say they are grown in vitro.
-Plant hormones (auxin) are added to stimulate growth. We say they are grown in vitro.
-The explants start to grow into tiny plantlets. More hormones are added to help grow the stems and roots.
-Plantlets are transferred and planted into compost, where they develop into plants. These plants will have the same characteristics as the parent plant.
Q7-Take an adult cell from sheep one and remove the nucleus. Take an egg cell from sheep two and remove the nucleus. This is called enucleation.
-The nucleus from the adult cell is inserted into the enucleated egg cell.
-Electrical stimulation of the diploid nucleus causes it to divide by mitosis.
-The embryo is placed inside the uterus of a surrogate which is where it will continue to grow and develop until birth.
Q8-Viral and plasmid
Q9- Is one that carries genes from another species (recombinant DNA).