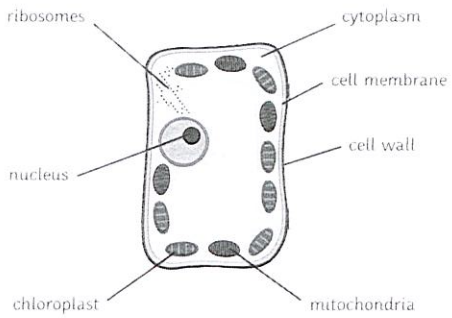
Biology

AQA Biology GCSE Unit 4.1 Cell Biology Answers

a

Draw and label a typical plant cell.



Which organelle is:

- the site of anaerobic respiration?

Cytoplasm

- the site of protein synthesis?

Ribosomes

- the site of photosynthesis?

Chloroplasts

b

How many chromosomes does:

- a human skin cell contain?

46 / 23 pairs (diploid)

- a human gamete contain?

23 single (haploid)

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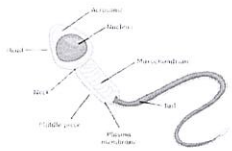
Sperm cells are specialised cells. Explain how the acrosome helps the sperm cell to carry out its function.



The acrosome contains enzymes to digest through the egg cell membrane.

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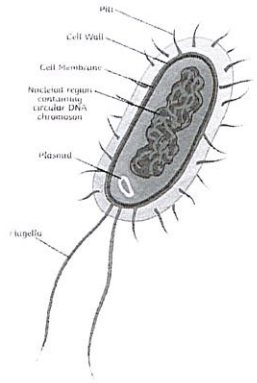
Draw and label the parts of a typical bacterial cell.



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Why do cells undergo mitosis?

To produce new cells for growth and repair.

What happens to the cell during:

- interphase?

The cell grows, increases the amount of organelles and replicates its DNA.

- mitosis?

1. Chromosomes line up at the centre of the cell and the copies are pulled apart by spindle fibres to opposite ends of the cell.
2. Nuclear membranes form around the chromosomes to make 2 nuclei.
3. Finally, the cell splits into two identical 'daughter' cells.

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What are 'embryonic' stem cells?

Undifferentiated cells found in the early embryo.

Name 2 medical conditions that could be treated with embryonic stem cells in the future.

1. Diabetes
2. Spinal injuries/paralysis

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Describe how to prepare an uncontaminated culture of bacteria using the aseptic technique.

1. Sterilise the Petri dish, inoculating loop, culture medium and working area to kill any unwanted microorganisms.
2. Lift the lid slightly to inoculate the plate and replace quickly to prevent microorganisms from the air getting in.
3. Secure the Petri dish lid with a small piece of tape.

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Diffusion is:

The movement of water particles from a high water concentration to a lower water concentration across a partially permeable membrane.	
The spreading out of the particles of any gas, or liquid from an area of high concentration to an area of lower concentration.	X
The movement of particles from a low concentration to a higher concentration.	

i

Name 3 substances that are transported into or out of animal cells by diffusion:

1. Oxygen
2. Carbon dioxide
3. Amino acids

j

List 5 important keywords from this unit.

1. Eukaryotic/Prokaryotic
2. Differentiation
3. Mitosis
4. Aseptic technique
5. Osmosis

k

Describe an advantage of using therapeutic cloning to treat disease.

The stem cells would have the same DNA as the patient, so would not be rejected by the body.

o

What is osmosis?

The movement of water molecules from an area of high water concentration to an area of lower water concentration, across a partially permeable membrane.

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Light microscopes have objective lenses.

What is the purpose of the objective lens?

To form and magnify an image of the specimen.

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Name the tubes that transport water up the stem of a plant.

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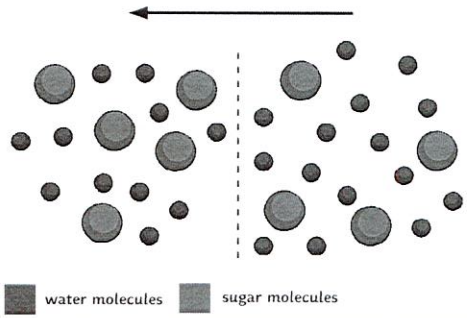
On the diagram below, draw an arrow to show the direction of the net movement of water molecules.



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My main areas for improvement in this unit are:

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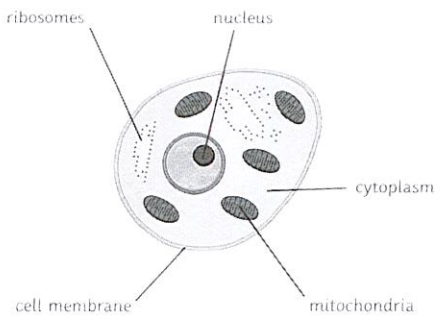

Which organelle is:

- the site of aerobic respiration?

Mitochondria

- controls the movement of substances in and out of the cell?

Cell membrane

- contains the genetic information?

Nucleus

b

An elephant sperm cell contains 28 chromosomes. How many chromosomes would be in an elephant:

- liver cell?

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- ovum?

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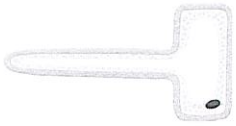
c

Root hair cells are specialised cells. Describe how the root hair cell is adapted to carry out its function.



Has a large surface area for the rapid absorption of water and mineral ions from the soil.

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A bacterium can divide once every 20 minutes. A piece of chicken was contaminated with 5 bacteria; how many bacteria will there be on the chicken after 3 hours?

Time	Number
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40	20
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Describe how active transport is used by:

- plants

To obtain mineral ions from the soil

- animals

To absorb nutrients (e.g.glucose), when they are at low concentrations, from the small intestine.

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Describe 3 ways that exchange surfaces are adapted to their function.

1. Large surface area
2. Thin walls
3. Moist/good blood supply (animals)

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Describe 2 ways in which active transport is different to diffusion.

1. Moves against a concentration gradient (low to high)
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Where in the body are adult stem cells found and how do they differ from embryonic stem cells?

Found in the bone marrow. Can only turn into certain cell types, such as blood cells.

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The unit 'centimetres' is written as 'cm'. What do each of the following units represent?

mm: millimetres

μm: micrometres

nm: nanometres

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Plants can be cloned from meristem cells. Give two advantages of cloning plants.

Farmers can produce clones of a desired plant quickly and cheaply. Save rare species from extinction.

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List 5 important keywords from this topic.

1. Diffusion
2. Active transport
3. Meristem
4. Magnification
5. Resolution

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Electron microscopes have better resolution than light microscopes. What does 'resolution' mean?

The ability to distinguish between 2 points, so higher resolution produces a clearer image.

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Write each of the following numbers in standard form.

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Which has a bigger 'surface area to volume' ratio, an elephant or a mouse?

Mouse

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What is the equation for calculating the magnification of an image?

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Why do some people object to embryonic stem cell research?

They believe that all embryos have the potential to become a human being, so should not be used for experimentation.

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How do prokaryotic cells differ from eukaryotic cells?

Bacterial cells are much smaller, they don't have a nucleus, they don't have mitochondria or chloroplasts.

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My main areas for improvement in this unit are:

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Which organelle is:

- the site of anaerobic respiration?

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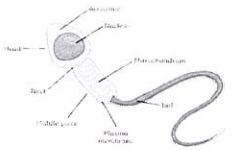

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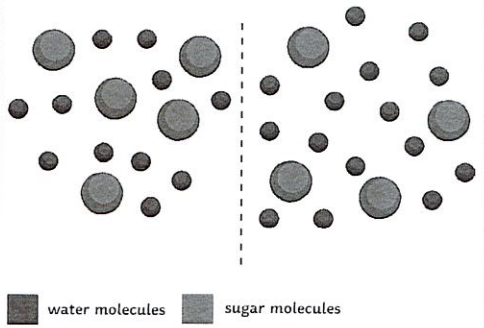

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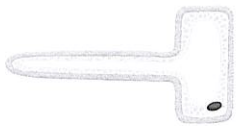

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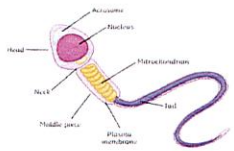

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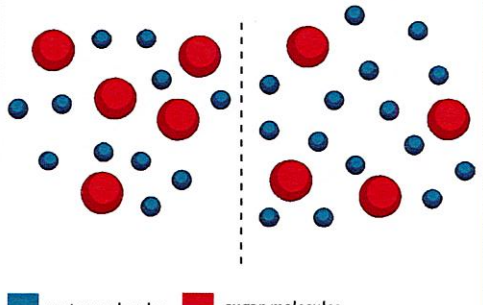

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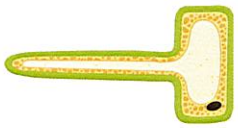

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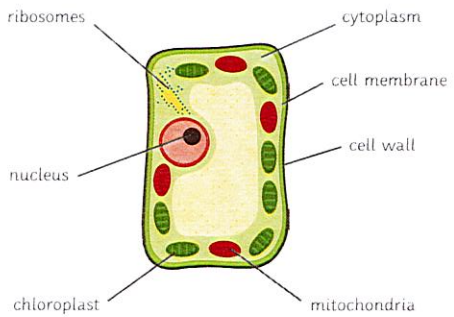

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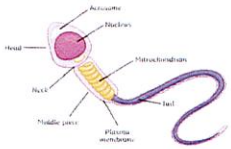

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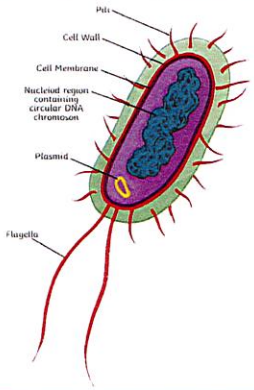

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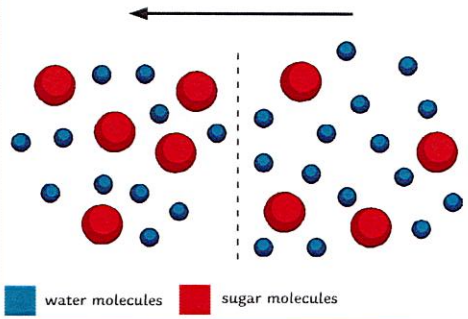

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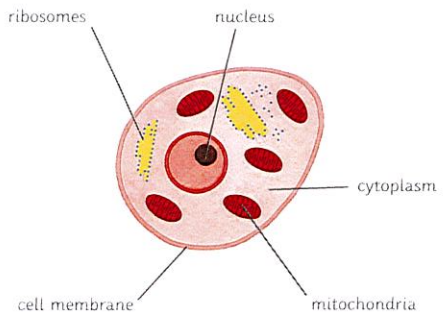

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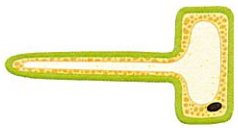

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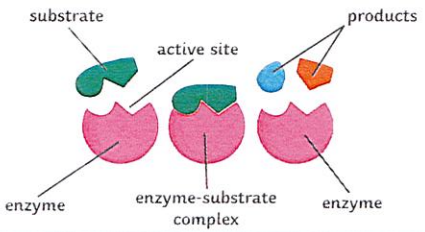
Complete the table below.

Enzyme	Site of Production	Substrate	Products
amylase	salivary glands/ pancreas	starch	maltose/ glucose
pepsin	stomach	protein	amino acids
lipase	pancreas	fats	fatty acids & glycerol

b

The diagram below shows the 'lock & key' model of enzyme function. Label the diagram using the following words:



c

Describe how to carry out the test for reducing sugars.

1. Place the test sample into a test tube (about 2ml).
2. Add an equal amount of Benedicts reagent.
3. Heat in a water bath for 5 minutes.
4. The colour will change from blue to either green/ yellow/red depending on the amount of reducing sugar present.

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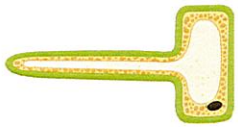
Describe how this root hair cell is adapted for the efficient uptake of water and mineral ions.



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e

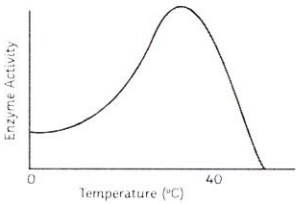
Place the following structures in order from smallest to largest:

cell, organ, nucleus, tissue, organism

nucleus, cell, tissue, organ, organism

f

Use the graph below to describe how temperature affects enzyme function.



Initially, as temperature increases, the rate of enzyme activity also increases, up to 40°C, which is the optimum temperature. After 40°C, as the temperature increases the rate of enzyme activity decreases.

g

Enzymes are described as being 'specific' to a substrate. What does this mean? Use a labelled diagram to help your explanation.

A diagram showing active site of enzyme has a complimentary shape to the substrate molecule. The active site of the enzyme has a unique shape, only a substrate with a complimentary shape can fit and bind to form an enzyme-substrate complex.

h

Describe how to test for protein

1. Place the test sample into a test tube (about 2ml)
2. Add an equal amount of Biuret reagent and mix.
3. The colour will change from blue to purple if protein is present.

i

Bile is made in the liver and stored in the gall bladder. Explain how bile helps digestion.

Bile neutralises stomach acid to raise the pH so protease enzymes can work.

It also emulsifies fats to give them a larger surface area for lipase to work, which speeds up digestion.

j

Transpiration is:

The movement of water molecules from a high water concentration to a lower water concentration across a partially permeable membrane. ☐

The evaporation and diffusion of water from the leaves of a plant. ☒

The movement of glucose molecules around the plant. ☐

k

Name 3 factors that affect the rate of transpiration.

Any 3 from;

Temperature, Light intensity, Air flow or Humidity.

l

List 5 important keywords from this unit.

1. _____
2. _____
3. _____
4. _____
5. _____

m

Why are enzymes referred to as 'biological catalysts?

They speed up useful chemical reactions in the body.

n

What is the function of phloem tissue?

To transport food substances (dissolved sugars) around the plant. This process is called translocation.

o

From which part of the human digestive system is nutrients absorbed into the bloodstream?

Small intestine.

p

Where in the plant is meristem tissue located?

Growing tips of roots and shoots.

q

The xylem tissue is composed of hollow tubes strengthened by lignin. What is the function of xylem tissue?

To transport water and dissolved minerals from the roots to the stem and the leaves. This is called the transpiration stream.

r

Describe how to test for starch.

Place the test sample into a test tube.

Add a few drops of iodine solution and mix.

The colour will change from orange to blue/black if starch is present.

s

My main areas for improvement in this unit are:

_____

_____

_____

a

Complete the table below.

Enzyme	Site of Production	Substrate	Products
amylase			glucose
pepsin		protein	
lipase	pancreas		

b

The diagram below shows the 'lock & key' model of enzyme function. Label the diagram using the following words:

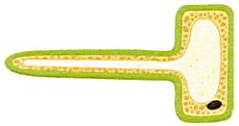
enzyme, active site, substrate, products, enzyme-substrate complex

c

Describe how to carry out the test for reducing sugars.

d

Describe how this root hair cell is adapted for the efficient uptake of water and mineral ions.



e

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cell, organ, nucleus, tissue, organism

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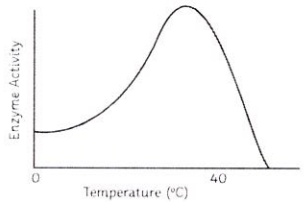

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- The evaporation and diffusion of water from the leaves of a plant. ☐
- The movement of glucose molecules around the plant. ☐

k

Name 3 factors that affect the rate of transpiration.

1.
2.
3.

l

List 5 important keywords from this unit.

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r

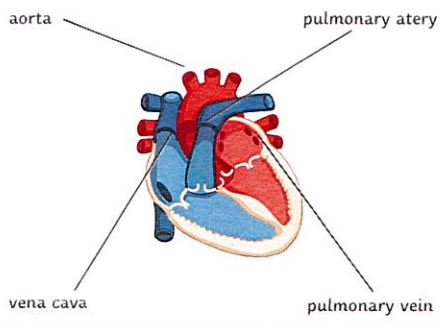
Describe how to test for starch.

s

My main areas for improvement in this unit are:

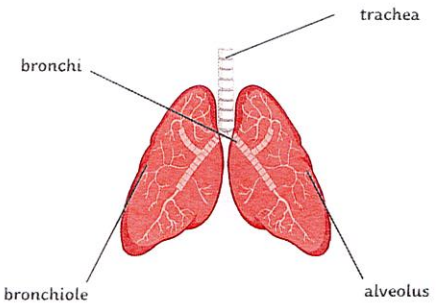
a

Label the following blood vessels on the diagram of the heart:



b

Label the following parts on the diagram below:



c

Describe how smoking tobacco affects:

Adults

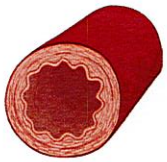
Can cause lung disease, including cancer, and cardiovascular disease.

Unborn babies

Can result in low birth weight and premature birth.

d

Describe how the structure of an artery is related to its function.



Thick layers of muscle for strength and elastic fibres so that they can spring back to help withstand high blood pressure.

e

In coronary heart disease, layers of fatty material build up inside the coronary arteries. Explain how this can lead to a 'heart attack'.

The layers of fatty material block the coronary arteries and restrict blood flow to heart muscle cells.. This results in a lack of oxygen and the heart muscle cells stop respiring which can lead to a heart attack.

f

Stents can be used to treat coronary heart disease. Give one advantage and one disadvantage of using stents.

Advantage

Patients recover quickly and they are effective for a long time.

Disadvantage

There is a risk of the patient developing a blood clot near the stent, which can lead to a heart attack.

g

Describe 3 lifestyle factors that can impact a person's physical and mental wellbeing.

Any 3 from: Diet, exercise, stress, smoking, drinking alcohol.

h

Why does the left ventricle have a thicker, more muscular wall than the right ventricle?

The left ventricle has to pump blood at high pressure so that it can reach all body cells. Whereas, the right ventricle only has to pump blood to the lungs.

i

Name the four main components of the blood and describe their function.

1. Red blood cells – transport oxygen.
2. White blood cells – defend against pathogens.
3. Platelets - help to clot the blood.
4. Plasma – liquid part of the blood, carries many substances e.g. glucose, hormones.

j

What is a 'carcinogen'? Give an example.

Substance/chemical that causes cancer e.g. the chemicals in cigarette smoke.

k

List 5 important keywords from this unit.

1. _____
2. _____
3. _____
4. _____
5. _____

l

Explain how an infection with a microorganism could lead to the development of other, non-communicable diseases.

Infection with some viruses can lead to the development of cancer (e.g. HPV infection and cervical cancer). Also, infection with pathogens can sometimes trigger allergic reactions and worsen asthma.

m

Describe how a faulty heart valve will affect a person's health.

Breathlessness, fatigue, tiredness.

n

Describe 3 ways that the lungs are adapted for gaseous exchange.

Any 3 from: Large surface area, Moist lining, Thin walls or good blood supply.

o

A problem with heart transplants is rejection of the donor heart. What is 'rejection'?

When the body's immune system (white blood cells) attacks and destroys the donor heart muscle cells.

p

Name the group of cells that controls the resting heart rate.

Pacemaker

q

What are 'statins'?

Drugs that reduce the amount of LDL cholesterol in the blood and so reduce the build up of fatty deposits in the coronary arteries.

r

What is the difference between a benign and a malignant tumour?

A benign tumour remains in one place and doesn't invade other tissues in the body – not usually dangerous. A malignant tumour spreads to other parts of the body when cells break off and travel in the bloodstream to form secondary tumours.

s

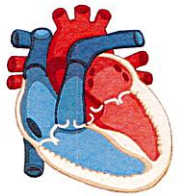
My main areas for improvement in this unit are:

_____

_____

a

Label the following blood vessels on the diagram of the heart: aorta, vena cava, pulmonary artery, pulmonary vein.



b

Label the following parts on the diagram below: trachea, bronchi, bronchiole, alveolus.

c

Describe how smoking tobacco affects:

Adults

Unborn babies

d

Describe how the structure of an artery is related to its function.

e

In coronary heart disease, layers of fatty material build up inside the coronary arteries. Explain how this can lead to a 'heart attack'.

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Stents can be used to treat coronary heart disease. Give one advantage and one disadvantage of using stents.

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Disadvantage

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1.

2.

3.

h

Why does the left ventricle have a thicker, more muscular wall than the right ventricle?

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Name the four main components of the blood and describe their function.

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What is a 'carcinogen'? Give an example.

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Explain how an infection with a microorganism could lead to the development of other, non-communicable diseases.

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Describe how a faulty heart valve will affect a person's health.

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p

Name the group of cells that controls the resting heart rate.

q

What are 'statins'?

r

What is the difference between a benign and a malignant tumour?

s

My main areas for improvement in this unit are:

B9: Ecology

Lesson sequence

1. Ecosystems
2. Core practical – quadrats and transects
3. Abiotic factors and communities
4. Biotic factors and communities
5. Parasitism and mutualism
6. Effect of humans on biodiversity
7. Preserving biodiversity
8. Water cycle
9. Carbon cycle
10. Nitrogen cycle

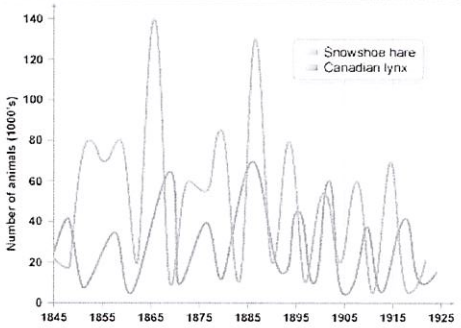
1. Ecosystems	
Ecosystem	An area in which the interactions between all the living organisms and the all the physical factors forms a stable relationship needing no external input.
Habitat	A particular area within an ecosystem.
Community	All the organisms living in an ecosystem.
Interdependence	The way in which the organisms in an area depend on each other, for food, shelter, protection and so on.
Population	The members of one particular species within an ecosystem.
Abundance	The number of members of one species in an ecosystem.
Quadrat	A metal square used to help find the number of small organisms living in an area.
Random sampling	Estimating the population of organisms in an area by randomly dropping a quadrat several times, finding the average number of organisms present and scaling up your answer.

Population size calculation	Population size = number of organisms in quadrat x (total area / quadrat area)

2. Core practical – quadrats and transects (CP6)	
Belt transect	A way to study how the population of a species changes as you move through an area but counting the organisms in a quadrat at regular intervals.
CP6 – Key question	How does the number of daises vary as you move away from the base of tree?
CP6 – Collecting data	Place a quadrat so it is touching the base of a tree and record the number of daisies. Repeat, moving the quadrat 1 m away each time until it is 10 m away. Repeat with three different trees.
CP6 – Calculate averages	Calculate the average number of daisies 1 m away, 2 m away and so on.
CP6 - Results	The number of daisies increases as you move away from the tree, and levels out at about 6 or 7 m.

3. Abiotic factors and communities	
***Abiotic factor**	A non-living factor that influences what can live where.
***Important abiotic factors**	Temperature, light intensity, rainfall, type of landscape, soil pH, soil nutrients, pollution.
***Pollutants**	Substances produced by human activities that can poison some or all of the organisms living in an area.
****Adaptation to abiotic factors**	Features of plants and animals that are suited to the abiotic factors where they live.
****Changes to abiotic factors**	If an abiotic factor changes – such as temperature increasing due to global warming – organisms may no longer be well adapted to where they live and may die out.

4. Biotic factors and communities	
***Biotic factor**	A living factor that influences what can live where.
***Important biotic factors**	The presence of food organisms, predators, competing organisms and disease.
***Competition**	Often two or more different organisms may compete for the same resource such as food, water or light.
****Effects of reducing competition**	Reduced competition when a species goes extinct can lead to unpredictable effects on other species with some benefiting from reduced predation, and others benefitting.
****Predator-prey cycles**	As the number of prey animals increases, the number of predators increase. The predators over-predate the prey leading to a fall in prey numbers which causes the number of predators to go down as there is less food. The number of prey increases again because fewer are being eaten.



5. Parasitism and mutualism	
***Parasitism**	A feeding relationship in which a parasite feeds off its host, causing harm to the host but (normally) not killing it.
****Examples of parasites**	Fleas and leeches sucking blood, tapeworms living in animals' intestines, mistletoe burrowing its roots into tree branches.

***Mutualism**	Organisms that live together in a relationship where both benefit.
****Examples of mutualism**	Cleaner fish that swim into sharks mouths to feed without being eaten. Algae that live inside coral polyps gaining shelter and providing food.

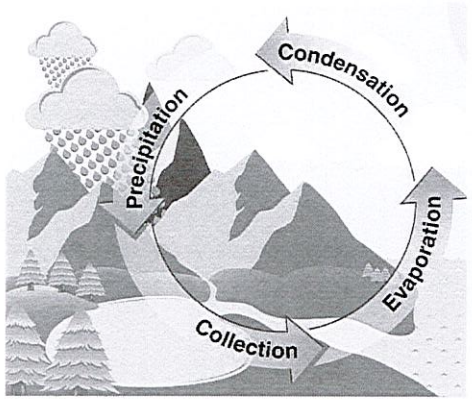
6. Effect of humans on biodiversity	
***Biodiversity**	The number of different species living in an area. High biodiversity is good.
***Fish farms**	Farms based in water where fish are farmed in pens to reduce the need to catch them in the wild.
****Effect of fish farming on biodiversity**	The waste produced by the fish sinks to the sea floor, changing the conditions and harming the organisms living there.
***Introduced species**	Organisms introduced by humans – intentionally or accidentally – into a new ecosystem.
****Effect of introduced species on biodiversity**	Many introduced species upset natural ecosystems by changing the food web. Introduced species often lack predators that can control their numbers.
****Eutrophication**	Fertiliser used on farmland gets washed into lakes and rivers by rain. It causes algae to grow out of control and when the algae dies, it sinks to the bottom and rots which uses up the oxygen in the water.
****Effect of eutrophication on biodiversity**	With less oxygen in the water, many species die, and biodiversity is reduced.

7. Preserving biodiversity

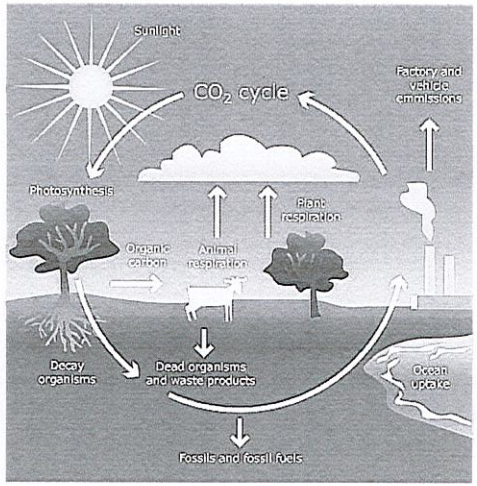
**Importance of biodiversity	Areas with high biodiversity recover more quickly from disasters such as floods and droughts. Many plants and animals are useful for new medicines and products.
*Endangered	When a species is at risk of dying out, usually because it has been over-hunted or its habitat has been destroyed.
*Conservation	When an effort is made to protect rare or endangered species or their habitat.
*Importance of conservation	Conservation can make the difference between a species dying out or surviving. It increases biodiversity.
*Reforestation	Planting trees or allowing trees to regrow on old farmland. It increases biodiversity by increasing the range of habitats in an area.
*Captive breeding programmes	Breeding animals in zoos – where they are protected from danger – in order to be able to release them into the wild.

8. The water cycle	
*Water cycle	The way in water is continuously moved around different parts of the environment.
*Water cycle stages	Precipitation, surface run-off and infiltration, evaporation, condensation.
**Precipitation	Water falls to the ground as rain, snow and hail.
**Surface run-off and infiltration	Water soaks into the ground (infiltration) or runs off into streams and rivers into lakes and oceans.
**Evaporation	Water evaporates as water vapour from oceans, lakes and rivers.
**Condensation	Water vapour condenses into tiny droplets to form clouds.

**Desalination	Producing potable (drinking water) from salty water, for example by distillation. Useful in areas with low rainfall.

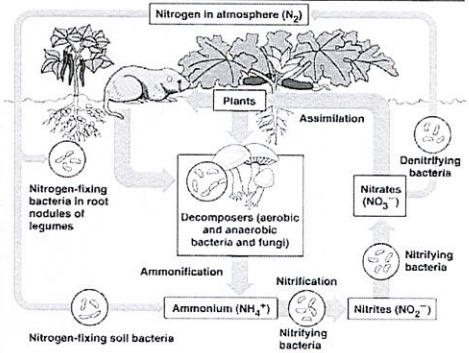


9. Carbon Cycle	
*Carbon cycle	The way carbon is continuously moved between different stores in the environment.
*Carbon cycle - photosynthesis	Carbon is transferred from the carbon dioxide in the air into plants.
*Carbon cycle - feeding	Carbon is transferred from plants into animals, and from animals into other animals.
**Carbon cycle – death and excretion	Carbon in waste (urine and faeces) and dead bodies is transferred to decomposers or to fossil fuels.
*Carbon cycle - respiration	Plants, animals and decomposers transfer carbon back to the air as carbon dioxide by respiration.
**Carbon cycle - combustion	Humans transfer carbon back to the air by burning fossil fuels.



10. Nitrogen cycle	
**Importance of nitrogen	Nitrogen is used to make amino acids which are used to make the proteins needed for growth and repair.
**Nitrogen cycle	The way nitrogen is continuously moved between different stores in the environment.
**Nitrogen cycle – nitrogen fixation	Nitrogen in the air is converted to nitrates in the soil by nitrogen fixing bacteria.
**Nitrogen cycle - plants	Plants absorb nitrates from the soil and convert them into amino acids and proteins.
**Nitrogen cycle - feeding	Animals eat plants (and other animas) transferring nitrogen into them in the form of protein.
**Nitrogen cycle – death and excretion	Nitrogen in the form of urea and protein is transferred to decomposers in the soil by death and excretion.
**Nitrogen cycle – decomposers	Decomposers convert nitrogen in urea and proteins into nitrates.

**Nitrogen cycle - denitrification	Denitrifying bacteria in the soil convert nitrates back into nitrogen gas in the air.



a

Define the following terms.

community: _____

stable community: _____

ecosystem: _____

population: _____

interdependence: _____

biotic factor: _____

abiotic factor: _____

b

Give three ways that animals and plants are interdependent.

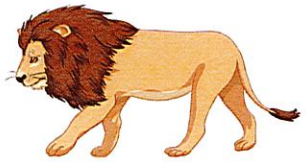
1. _____

2. _____

3. _____

c

When young male lions reach maturity, the older males kick them out of the pride. Explain which factors cause them to do this.



d

Plants may have to compete with other plants. Explain why plants may grow less well on forest floor than in a meadow.

e

List the factors that can affect a community under the correct headings below.

abiotic	biotic

f

Red squirrels are the native squirrel species in European woodlands. Grey squirrels were introduced to the UK in the late 19th century. Grey squirrels feed more often at ground level than red squirrels and are able to digest acorns, which the reds can't. Grey squirrels carry a deadly pox virus which does not affect them.

Explain why grey squirrels are now the dominant species of squirrel across much of England and Wales.

g

In 2010, an oil spill off the coast of Mexico polluted 1100 miles of coastline. Explain how this will have affected the marine plants that live on the floor of the ocean.

h

Organisms that live in extreme environments are called _____.

Give three examples of extreme environments.

1. _____

2. _____

3. _____

i

Link the type of adaptation to the correct example.

structural adaptation	Animal actions, such as migration or bird calls.
behavioural adaptation	Physical features, such as the shape or colour of the organism.
functional adaptation	The process of developing a trait that helps with survival, like temperature regulation.

j

Explain why most desert animals have a large surface area to volume ratio and large, thin ears.

k

Explain how animals that live in cold climates are adapted to survive.

l

A student uses a $1m^2$ quadrat to take 10 random readings of dandelions in the school field. The results are shown below.

1	2	3	1	2	3	1	5	3	3

What is the range of their data?

What is the mode of their data?

What is the median of their data?

What is the mean of their data?

a

The illustration shows an ocean food chain. Label each organism with their position in the chain and what type of diet they eat (if any).

Name a predator from the food chain.

Name an organism from the food chain that is prey.

Explain the role of producers in food chains.

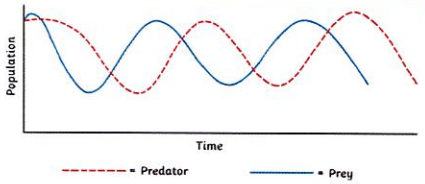
b

Define biodiversity.

Why is it important to maintain a good level of biodiversity?

What programmes are scientists putting into place to maintain biodiversity?

c



The numbers of predators and prey fall and rise in cycles. Use the graph to explain why.

d

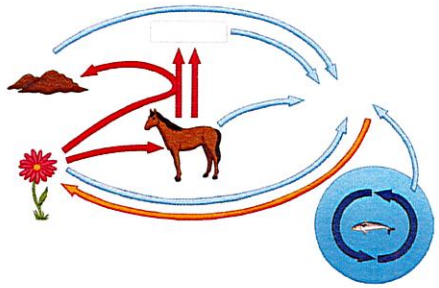
Label the illustrations with the method being used to determine the **abundance** and **distribution** of organisms.

The abundance is...

The distribution is...

e

Label each of the arrows in the illustration of the carbon cycle with the process that the arrow represents.



f

Explain the role of decomposers in the recycling of materials through an ecosystem.

g

Explain the importance of the water cycle to living organisms. Include the following keywords: condensation, transpiration, precipitation, evaporation, respiration.

h

How does pollution occur...

in water?

in the air?

on land?

i

How have humans affected the use of land?

j

Explain why global warming is occurring.

k

What are the biological consequences of global warming?

a

Define the following terms.

community: **All the populations of different organisms that live together in a habitat.**

stable community: **Where all the species and environmental factors are in balance so that population sizes remain stable.**

ecosystem: **A community and its habitat.**

population: **All the members of a single species that live in a habitat.**

interdependence: **A network of relationships between different organisms in a community.**

biotic factor: **A living thing that affects the ecosystem.**

abiotic factor: **A non-living part of the environment that affects living organisms.**

b

Give three ways that animals and plants are interdependent.

Any 3 of the following:

- **Plants produce food by photosynthesis.**
- **Animals eat plants.**
- **Animals eat other animals.**
- **Animals pollinate plants.**
- **Plants use animal waste for nutrients.**
- **Animals use plant and animal materials for building nests or shelters.**
- **Plants use animals for seed dispersal.**

c

When young male lions reach maturity, the older males kick them out of the pride. Explain which factors cause them to do this.

If the males remain in the pride they will compete for food, territory and mates with the older lions. The older males will be more likely to survive and reproduce without this competition.

d

Plants may have to compete with other plants. Explain why plants may grow less well on forest floor than in a meadow.

The plants will receive less light because the tree canopy will block most of it from reaching the floor. Light is needed to provide energy for photosynthesis; reduction of light will reduce photosynthesis and therefore the glucose needed for growth.
The plants will have to compete for space from the bigger trees and plants. The plant may not have enough space to grow, or enough space for a big root system to get water and nutrients. This means growth would be reduced.
The bigger trees would be better at getting water and mineral ions because they have large root systems. Water is needed for photosynthesis - the plants will get less water which will reduce photosynthesis and therefore the glucose required for growth.

Mineral ions are needed to produce larger molecules for growth, if the plant gets less of these, its growth will be reduced.

e

List the factors that can affect a community under the correct headings below.

abiotic	biotic
light intensity	availability of food
temperature	new predators arriving
moisture levels	new pathogens
soil pH	one species outcompeting another
soil mineral content	
wind intensity and direction	
carbon dioxide levels for plant	
oxygen levels (for aquatic animals)	

f

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Explain why grey squirrels are now the dominant species of squirrel across much of England and Wales.

Grey squirrels out-compete the red squirrels for food because they eat more often on the ground, so are able to eat food that has fallen from the trees. They are also able to eat acorns as a food supply so they have more food available. This means that they are more likely to survive and reproduce than the red squirrel.

The grey squirrels brought the pox virus to the habitats when they were introduced. The red squirrels are not immune so the disease will have spread through the population and resulted in the loss of many red squirrels.

g

In 2010, an oil spill off the coast of Mexico polluted 1100 miles of coastline. Explain how this will have affected the marine plants that live on the floor of the ocean.

The sunlight cannot pass through the oil on the surface of the water. The sunlight won't reach the plants so they won't be able to photosynthesise. This means they won't be able to grow.

h

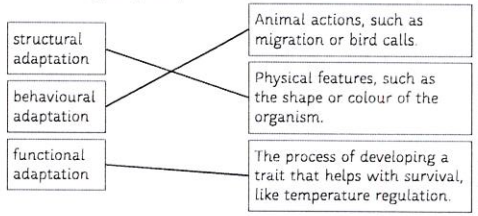
Organisms that live in extreme environments are called **extremophiles.**

Give three examples of extreme environments.

1. **high temperature**
2. **high pressure**
3. **high salt concentration**

i

Link the type of adaptation to the correct example.



j

Explain why most desert animals have a large surface area to volume ratio and large, thin ears.

To increase energy transfer through their skin to the surroundings to help them cool down.

k

Explain how animals that live in cold climates are adapted to survive.

They have a small surface area to volume ratio and small ears to reduce energy transfer to the surroundings.
They have thick layers of fat and fur for insulation.

l

A student uses a $1m^2$ quadrat to take 10 random readings of dandelions in the school field. The results are shown below.

1	2	3	1	2	3	1	5	3	3

What is the range of their data?
1-5 dandelions per m^2

What is the mode of their data?
3 dandelions per m^2

What is the median of their data?
3 dandelions per m^2

What is the mean of their data?
2.6 dandelions per m^2

a

The illustration shows an ocean food chain. Label each organism with their position in the chain and what type of diet they eat (if any).

tertiary consumer carnivore

secondary consumer carnivore

primary consumer herbivore

producer

Name a predator from the food chain.
Either the shark or seal.

Name an organism from the food chain that is prey.
Either the seal or crab.

Explain the role of producers in food chains.
Producers use energy from sunlight to make glucose during photosynthesis. The glucose is used to synthesise molecules that add to the biomass of the organism.

b

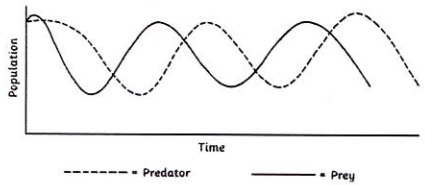
Define biodiversity.
The variety of all the different species of organisms within an ecosystem.

Why is it important to maintain a good level of biodiversity?
It reduces the dependence of one species on another for food, shelter and the maintenance of the physical environment.

What programmes are scientists putting into place to maintain biodiversity?

1. **Breeding programmes for endangered species.**
2. **Protection and regeneration of rare habitats**
3. **Reintroduction of field margins and hedgerows.**
4. **Reduction of deforestation and carbon dioxide emissions.**
5. **Recycling resources.**

c



The numbers of predators and prey fall and rise in cycles. Use the graph to explain why.

When there is plenty of food available, the prey animals are able to grow and reproduce successfully, so their numbers rise.

This means there is plenty of food available for the predators, so they can grow and reproduce successfully, and their numbers increase shortly afterwards.

The large number of predators around to eat the prey cause the prey numbers to fall.

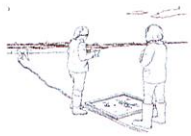
The reduced number of prey means there is less food for the predators, so their numbers begin to fall too.

A reduced number of predators, and lots of food available because there are fewer animals around, means the prey are able to grow and reproduce so their numbers rise again.

d

Label the illustrations with the method being used to determine the **abundance** and **distribution** of organisms.

quadrat



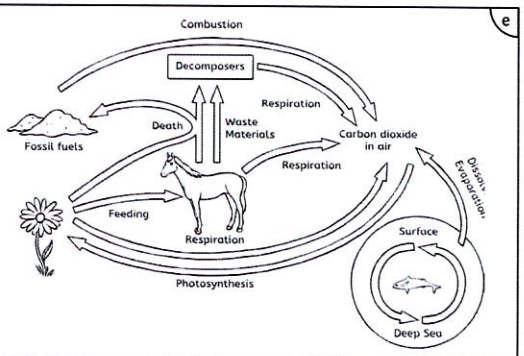
transect

The abundance is...
the number of species in an area.

The distribution is...
how the number of species changes from one area to another.

e

Label each of the arrows in the illustration of the carbon cycle with the process that the arrow represents.



f

Explain the role of decomposers in the recycling of materials through an ecosystem.
Decomposers break down dead bodies and waste materials. They release mineral ions as waste products back into the soil and carbon dioxide back into the air. These can then be used by producers in the food chain.

g

Explain the importance of the water cycle to living organisms. Include the following keywords: condensation, transpiration, precipitation, evaporation, respiration.
Water vapour is lost from organisms to the atmosphere via transpiration and respiration. Other water drains into the oceans and evaporates.
The warm water vapour in the atmosphere condenses as it cools and forms clouds of water droplets. As these get heavier, they fall onto the land as rain, hail or snow. This is called precipitation. The water cycle therefore provides fresh water for plants and animals on land.

h

How does pollution occur...
in water?
From sewage, fertiliser or toxic chemicals that are washed or dumped into water.
in the air?
From smoke and acidic gases (sulphur dioxide and nitrogen oxides) which cause acid rain.
on land?
From landfill and toxic chemicals from farming.

i

How have humans affected the use of land?
Reduced the amount of land available to other organisms by building, quarrying, farming and putting waste into landfill.
Destroyed peat bogs which reduces biodiversity in those areas.
Large scale deforestation to provide land for cattle and rice fields, and growing crops for biofuels, reduces biodiversity.

j

Explain why global warming is occurring.
Deforestation reduces the rate at which carbon dioxide is removed from the atmosphere by photosynthesis. Burning the trees also releases carbon dioxide via combustion.
The land that has been cleared is often used for rice fields or cattle, both of these release methane into the atmosphere.
When peat is burnt as a fuel or used in gardens, carbon dioxide is released.
When fossil fuels are burnt in power stations, factories or vehicles, carbon dioxide is released into the atmosphere.

k

What are the biological consequences of global warming?
Loss of habitat by flooding reduces biodiversity.
Climate changes will affect the distribution of organisms and may cause the migration patterns of animals to change.
Climate changes may mean some organisms are no longer able to survive and will become extinct. This reduces biodiversity.