B2 Revision Mind Maps

2.1 Cell organisation and simple cell transport

Animal cell

Membrane

Nucleus

Mitochondria

Ribosomes

Cytoplasm

Bacterial cell

Cytoplasm — genes (no nucleus)
Membrane — cell wall

Plant cell

Membrane

Nucleus

Mitochondria

Ribosomes

cytoplasm

Wall

Chloroplast

Vacuole

Yeast cell

Nucleus — cell wall
Cytoplasm — membrane

Animal Tissue

Muscular tissue –

Glandular tissue –

Epithelial tissue –

How does the stomach function as an organ?

- muscular tissue,
- glandular tissue,
- epithelial tissue,

How are cells specialised?

Red blood cell - Larger m_____ to carry more o_____

Root hair cell - F_____ like to increase s a_____

Sperm cell – head contains e_____ and middle part has m_____

Plant organs:

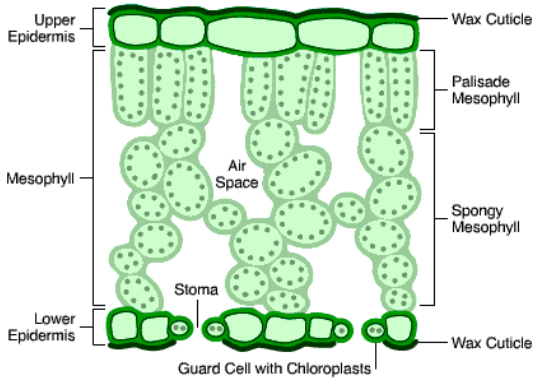
Plant tissues:

Epidermal tissue –

Mesophyll tissue –

Xylem –

Phloem –



Diffusion

Examples

2.1 Cell organisation and simple cell transport

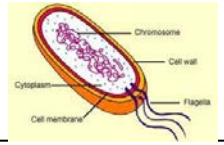
Animal cell

Membrane – controls what goes in and out of the cell.
Nucleus – controls all the activities of the cell

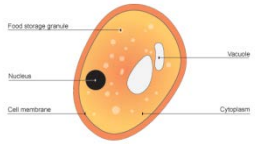
Mitochondria – where respiration takes place to release energy.
Ribosomes – site of protein synthesis

Cytoplasm – where chemical reactions happen

Bacterial cell



Yeast cell



Plant cell

Membrane

Nucleus

Mitochondria

Ribosomes

cytoplasm

Wall – strengthens the cell to withstand high water / turgor pressure
Chloroplast – site of photosynthesis

Vacuole – holds cell sap

Animal Tissue

Muscular tissue – allows movement by contraction

Glandular tissue – secrete chemical / hormones/ enzymes

Epithelial tissue – lining to cover parts of the body

How does the stomach function as an organ?
- muscular tissue, to churn the contents
- glandular tissue, to produce digestive juices
- epithelial tissue, to cover the outside and the inside of the stomach.

How are cells specialised?
Red blood cell - Larger membrane to carry more oxygen
Root hair cell - Finger like to increase surface area
Sperm cell – head contains enzymes and middle part has mitochondria

Plant organs: leaves, stems, roots

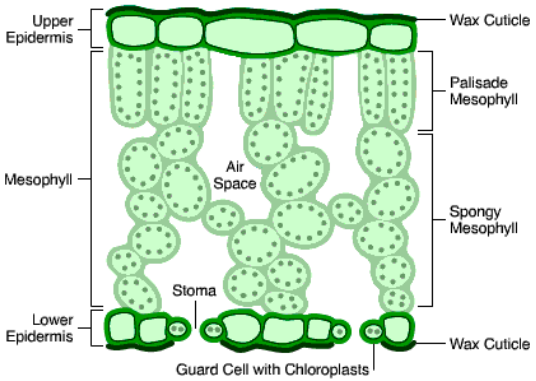
Plant tissues:

Epidermal tissue - which cover the plant

Mesophyll tissue - which carries out photosynthesis

Xylem – transport water up the stem

Phloem – transports glucose all over plant



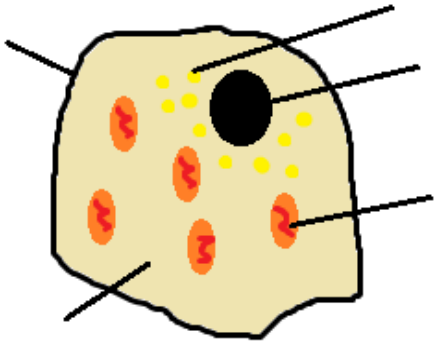
Diffusion

Movement of dissolved particles, liquids and gases from an area of high concentration to an area of low concentration.

Examples
Glands releasing hormones into the blood, oxygen moving from air sac onto red blood cell, carbon dioxide from blood plasma to air sac, carbon dioxide from atmosphere in through stomata of leaf.

2.1 Cells & Transport

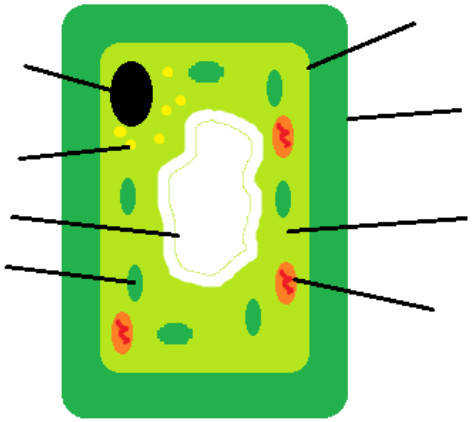
Label the cell:



What type of cell is it?

Name four types of organism whose cells have a cell wall and explain the function of this.

Label the cell:



What type of cell is it?

Give 3 special features of a sperm cell and explain how it helps the sperm function.

Give the functions of the following:

- Nucleus
- Cytoplasm
- Mitochondrion
- Cell membrane
- Ribosomes.

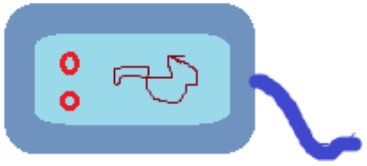
Give 3 things that can speed up the rate of diffusion.

What is the function of root hair cells and how are they adapted?

What is diffusion?

What is unusual about the genetic material in a bacterial cell?

Identify the cells below.



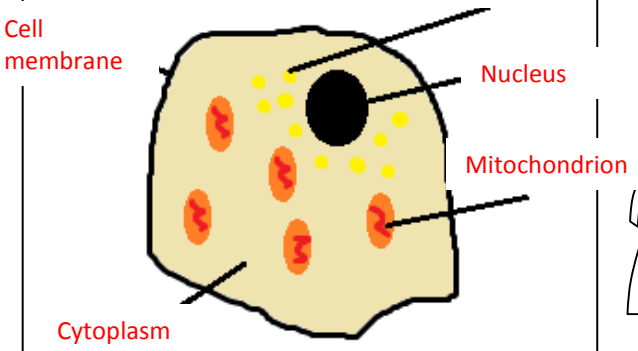
Which organelle would you expect muscle cells o have lots of and why?

What key process takes place in chloroplasts? Write an equation.

Beta cells in the pancreas make lots of insulin, which is a protein. What cell part would you expect to see in high numbers?

2.1 Cells & Simple Transport

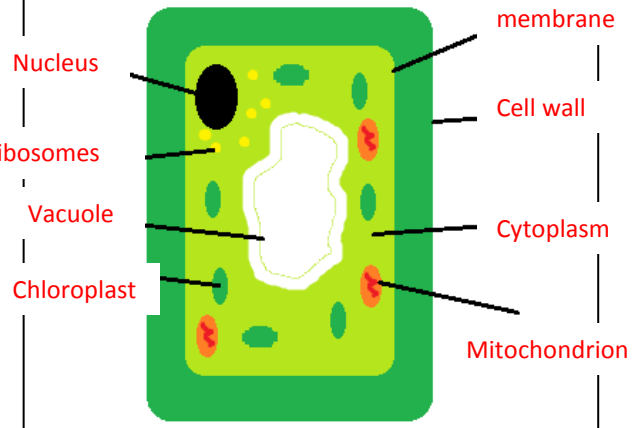
Label the cell:



What type of cell is it? Animal

Name four types of organism whose cells have a cell wall and explain the function of this.
Plant, algae, bacteria, fungi
Strengthens cell

Label the cell:



What type of cell is it? Plant

Give 3 special features of a sperm cell and explain how it helps the sperm function.
•Lots of mitochondria – release energy so can swim to egg cell
•Long tail – to swim to egg
•Acrosome containing enzymes – digest egg membrane.

Give the functions of the following:
•Nucleus contains DNA: controls activities of cell
•Cytoplasm cellular reactions take place here
•Mitochondrion releases energy during aerobic respiration
•Cell membrane controls passage of substances in and out of cell
•Ribosomes. Site of protein synthesis

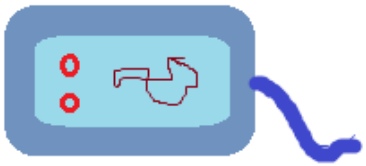
Give 3 things that can speed up the rate of diffusion.
Bigger diffusion gradient
Larger surface area
Shorter diffusion distance

What is the function of root hair cells and how are they adapted?
To absorb water and nutrients.
Large surface area – speeds up absorption

What is diffusion?
The net movement of particles of a liquid or solute from an area of high concentration to an area of lower concentration

What is unusual about the genetic material in a bacterial cell?
Not inside a nucleus

Identify the cells below.
Bacterium



Yeast cell

Which organelle would you expect muscle cells o have lots of and why?
Mitochondria
Need energy for contraction

What key process takes place in chloroplasts? Write an equation.
Photosynthesis

Water + carbon dioxide -> glucose + oxygen

Beta cells in the pancreas make lots of insulin, which is a protein. What organelle would you expect to see in high numbers?
Ribosomes

2.2 Tissues, Organs And Organ Systems

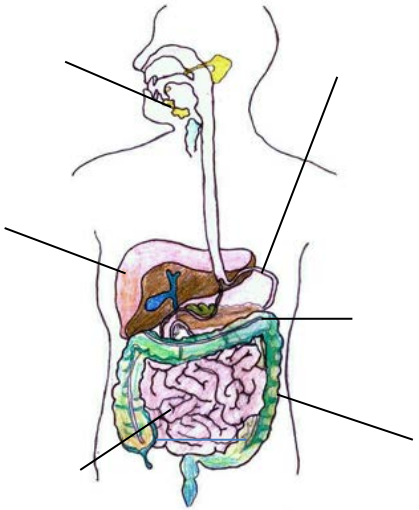
Give a definition of a tissue.

What is an organ?

What is the name given to a group of organs working together to perform a particular function?

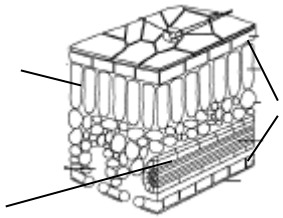
What are the key features of tissues or organs designed to act as exchange surfaces?

Add labels to the diagram of the digestive system and give the function of each labeled part.

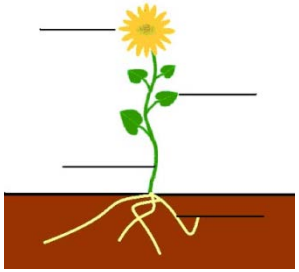


http://www.buzzle.com/articles/digestive-system-for-kids.html

Give the name and functions of the tissues in the leaf.

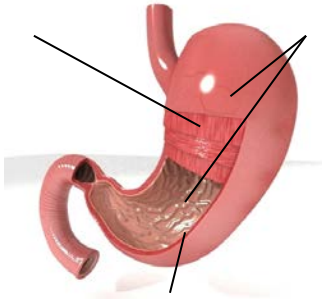


Add labels to the diagram to give the names of the plant organs.



http://www.kathimitchell.com/paclass.htm

Label the diagram to give the names of the tissues that make up the stomach and give the function of each.



http://www.turbosquid.com/FullPreview/Index.cfm/ID/547654

What is the job of muscle tissue?

Name 2 substances produced by glandular tissue, and 2 organs in which you might find it.

What does it mean if a cell is differentiated?

Where will you find epithelial tissue? What are some of its functions?

2.2 Tissues, Organs And Organ Systems

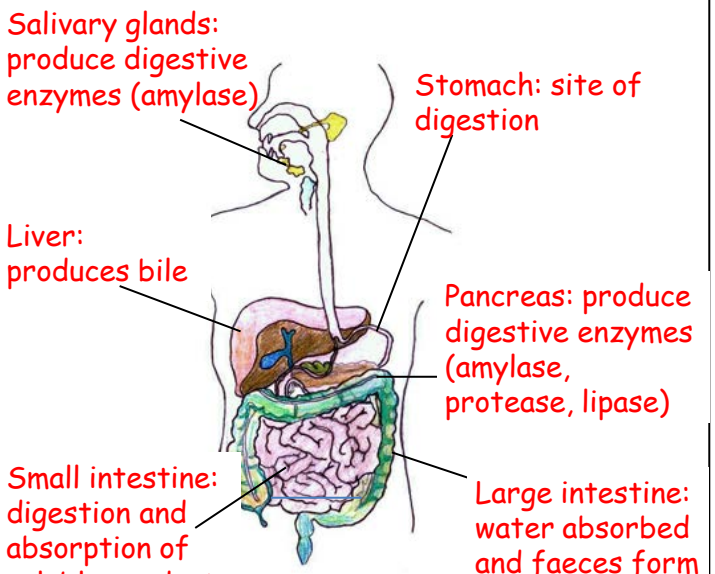
Give a definition of a tissue.
A group of cells with similar structure and function that work together to perform a particular job

What is an organ?
A part of an animal or plan made up of several tissues working together to do a specific job.

What is the name given to a group of organs working together to perform a particular function?
Organ system

What are the key features of tissues or organs designed to act as exchange surfaces?
Large surface area
Thin walls
Permeable surface
Good blood supply

Add labels to the diagram of the digestive system and give the function of each labeled part.



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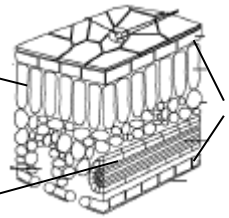
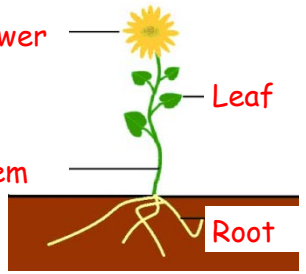
Give the name and functions of the tissues in the leaf.



Add labels to the diagram to give the names of the plant organs.



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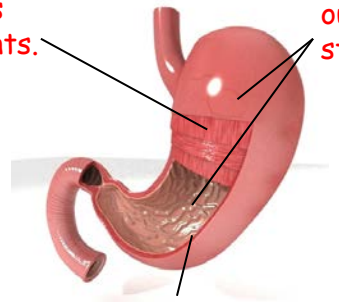
Label the diagram to give the names of the tissues that make up the stomach and give the function of each.



http://www.turbosquid.com/FullPreview/Index.cfm/ID/547654

What is the job of muscle tissue?
Contracts to bring about movement.

Name 2 substances produced by glandular tissue, and 2 organs in which you might find it.
Enzymes, Hormones

Stomach /Pancreas / Small intestine

What does it mean if a cell is differentiated?
It is specialized for a particular job.

Where will you find epithelial tissue? What are some of its functions?
Lining body surfaces – protection or exchange

2.3 Photosynthesis

Write a word equation for photosynthesis.

Name the two reactants in photosynthesis and state where each comes from.

Where is chlorophyll found?

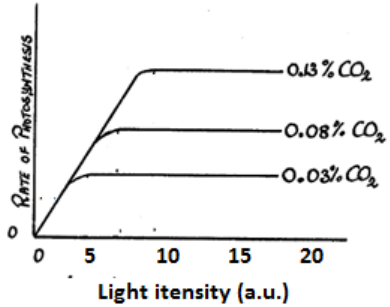
What is the function of chlorophyll?

State three things that can limit the rate of photosynthesis.

Name the substance that glucose can be converted to for storage and describe how you can test for the presence of this substance.

What is meant by a limiting factor?

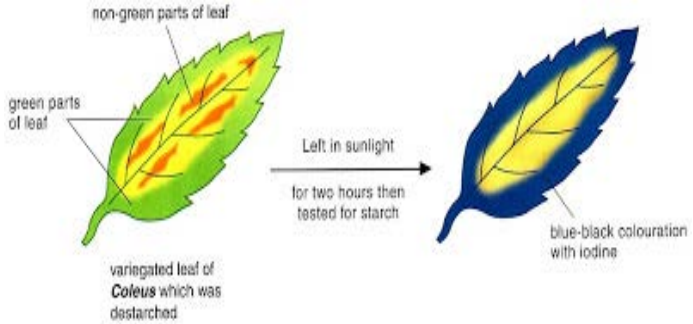
Look at the graph below.
Describe and explain the effect of increasing light intensity at 0.03% CO_2.



What is the function of cellulose?

State four uses of glucose in plants.

Explain the results obtained in the experiment below.



px=683&vpy=185&dur=1337&hovh=114&hovw=320&tx=212&ty=58&sig=104307363615294991887&page=1&tbnh=107&tbnw=300&start=0&ndsp=18&ved=1t:429,r:9,s:0,i:98&biw=1333&bih=645

What must be added to glucose to make proteins and where does this come from?

Why might a farmer put a paraffin heater in a greenhouse?

2.3 Photosynthesis

Write a word equation for photosynthesis.

Carbon Dioxide + Water $\xrightarrow{\text{Light}}$ Glucose + Oxygen

Name the two reactants in photosynthesis and state where each comes from.

Carbon dioxide – air
Water - soil

Where is chlorophyll found?

In chloroplasts in plants and algal cells,

What is the function of chlorophyll?

Absorbs light energy which is used to convert carbon dioxide and water to glucose and oxygen.

State three things that can limit the rate of photosynthesis.

- **shortage** of light
- low temperature
- **shortage** of carbon dioxide.

Name the substance that glucose can be converted to for storage and describe how you can test for the presence of this substance.

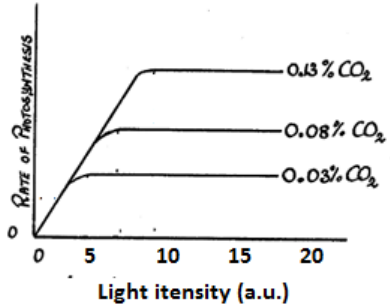
Starch

Test with iodine: changes from brown to blue-black if starch is present

What is meant by a limiting factor?

An environmental condition that when in short supply slows down the rate of photosynthesis.

Look at the graph below.
Describe and explain the effect of increasing light intensity at 0.03% CO_2.



Rate of photosynthesis increases up to 5 a.u.
Until 5 a.u. light is a limiting factor for photosynthesis
Above 5 a.u. carbon dioxide is a limiting factor

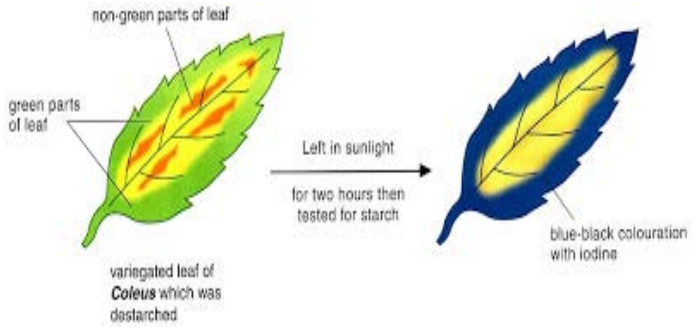
What is the function of cellulose?

It strengthens the cell wall.

State four uses of glucose in plants.

- Respiration
- To produce fat or oil for storage
- To produce cellulose
- To produce proteins

Explain the results obtained in the experiment below.



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There is no chlorophyll in the white bits of the leaf
Without chlorophyll photosynthesis cannot take place
So no glucose is made
So no starch is made
So the iodine does not turn blue-black

What must be added to glucose to make proteins and where does this come from?

Nitrates from the soil

Why might a farmer put a paraffin heater in a greenhouse?

To increase carbon dioxide concentration and increase the rate of photosynthesis.

2.3 Photosynthesis

Write down the equation for photosynthesis.

Explain why chlorophyll is needed in photosynthesis.

What are the three limiting factors in plants?

What is the glucose used for from photosynthesis?

1

2

3

4

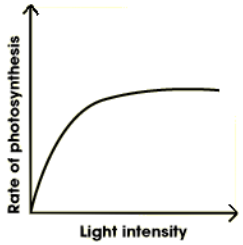
5

Explain this result:

How do plants produce proteins for growth?

Describe the shape of the light intensity graph.

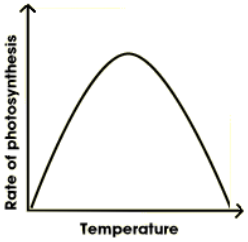
What are the limiting factors on this graph?



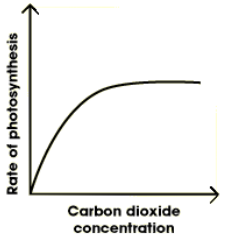
How could you increase the rate of photosynthesis in a greenhouse?

Explain the shape of the light intensity graph.

What are the limiting factors on this graph?



What are the limiting factors on this graph?



2.3 Photosynthesis

Write down the equation for photosynthesis.

Carbon Dioxide + water → glucose + oxygen

Explain why chlorophyll is needed in photosynthesis.

Chlorophyll absorbs the light energy needed to convert carbon dioxide and water into glucose (chemical energy)

What are the three limiting factors in plants?

Light intensity, carbon dioxide concentration, temperature

What is the glucose used for from photosynthesis?

1 - to release immediate energy through respiration in all plant cells

2 – store as insoluble starch

3 – to make proteins for growth

4 – to make cellulose fibres to strengthen the cell wall

5 – to produce fat/oils for storage in seeds

Explain this result:

The green chlorophyll is needed to absorb the light energy to convert carbon dioxide and water into glucose which is stored as Starch in these green parts of the leaf

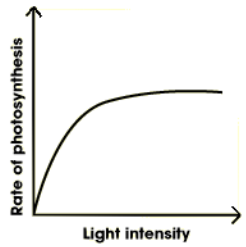
How do plants produce proteins for growth?

To produce proteins, plants also use nitrate ions that are absorbed from the soil to make amino acids that are then joined to make proteins.

Describe the shape of the light intensity graph.

As the light intensity increases the rate of photosynthesis increases up to a peak point. After this point any further increase in light intensity does not increase the rate of photosynthesis.

What are the limiting factors on this graph?



On the slope = light intensity

On the flat = temperature or carbon dioxide concentration

How could you increase the rate of photosynthesis in a greenhouse?

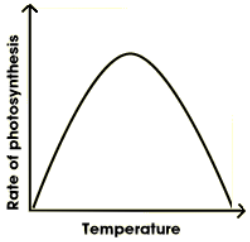
Light bulbs

Parrafin heater

Explain the shape of the light intensity graph.

When the line is diagonal at the start light intensity is limiting the rate of photosynthesis. At the peak point light is no longer limiting photosynthesis, something else is e.g. temperature or carbon dioxide.

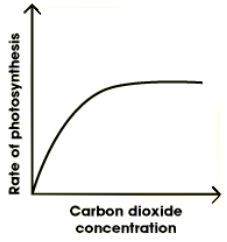
What are the limiting factors on this graph?



On the slope up and down = temperature.

On the peak = carbon dioxide concentration or light intensity

What are the limiting factors on this graph?



On the slope = carbon dioxide.

On the flat = temperature or light intensity

Explain what it means if your results are:
Reproducible:

Repeatable:

Describe how you could use a quadrat to investigate how the species of plants change with distance from a river.

Describe how you could investigate how leaf size changes with height on a bush.

Give two problems with using a count of nests to estimate bird population.

2.4 Organisms and their environment

Why is it important to have a large sample size?.

Describe how you would carry out random sampling to compare the abundance of daisies in a 2 different fields

Physical Factor	Why does it affect the distribution of living organisms?
Temperature	
Nutrient availability	
Light intensity	
Oxygen availability	
Carbon dioxide availability	
Water availability	

Quadrat number	Number of daisies
1	12
2	10
3	8
4	12
5	11

Look at the table of results on the left. Calculate the
a. Mean
b. Median
c. Mode

If the mean number of clover plants per m^2 quadrat is 6 and a field has a total area of 1200m^2 how many clover plants would you expect to find in the whole field.?

Explain what it means if your results are:
Reproducible: the same results are repeated by someone else doing your experiment or by using a different method

Repeatable: you repeat the experiment with the same equipment and get the same results

Give two problems with using a count of nests to estimate bird population.
Nests may be old / disused
Young birds may have not made their own nest yet

Describe how you would carry out random sampling to compare the abundance of daisies in a 2 different fields
- Mark out an area in the first field using two tape measures
- Used a random number generator to generate coordinates
- Place the quadrat at each coordinate and count the number of daisies in the quadrat
- Repeat several times in that field
- Calculate a mean number of daisies per quadrat
- Repeat all the steps above in the other field taking the same number of samples

Quadrat number	Number of daisies
1	12
2	10
3	8
4	12
5	11

Describe how you could use a quadrat to investigate how the species of plants change with distance from a river.
- Use a tape measure to create a line transect
- Place quadrats at regular intervals
- Count the number of species in each quadrat

2.4 Organisms and their environment

Describe how you could investigate how leaf size changes with height on a bush.
- Use systematic sampling e.g. measure every 5th leaf
- Draw round the leaf on graph paper
- Add together the number of squares covered by the leaf, including half squares

Why is it important to have a large sample size?.
It allows you to identify anomalies.

Physical Factor	Why does it affect the distribution of living organisms?
Temperature	needs to be suitable for enzymatic reactions (different organisms have different ideal temperatures)
Nutrient availability	organisms need nutrients to synthesize new materials and grow
Light intensity	plants and algae need light for photosynthesis
Oxygen availability	needed by <u>all</u> organisms for respiration
Carbon dioxide availability	needed by plants and algae for photosynthesis
Water availability	needed for photosynthesis or to keep animals hydrated (not often a limiting factor though)

Look at the table of results on the left. Calculate the
a. Mean 11
b. Median 11
c. Mode 12

If the mean number of clover plants per m^2 quadrat is 6 and a field has a total area of 1200m^2 how many clover plants would you expect to find in the whole field.?
6 x 1200 = 7200

Describe a method to carry out random sampling of weeds using a quadrat.

How has white nose syndrome affected bats?

Data was collected by two groups of students. Calculate the means, medians and modes for each sample

	Sample 1	Sample 2
	12	14
	16	13
	14	15
	16	14
Mean		
Median		
mode		

Is the data reproducible? Explain why.

2.4 Organisms and their environment

Suggest why the red squirrel is rarely seen today except in particular niches of the UK

Why are butterflies again in decline in 2012?

What is the advantage of using a transect technique rather than just random quadrat sampling?

How is the brown tree snake impacting on the biodiversity in Guam

How does the acacia bullthorn plant work in a mutual relationship with ants?

What physical factors may affect organism numbers?

Why did the rabbit population in Australia increase?

What mechanisms are used to control the rabbit population in Australia

What are the arguments for the death and decline of the bee population?

What is the impact of bee decline on food production?

What can we do to raise the population of bees?

How is seaweed designed to survive the changing tide?

Describe a method to carry out random sampling of weeds using a quadrat.

Split field into equal sized fractions. Give each fraction a number. Use a random number generator program to choose which areas to sample.

How has white nose syndrome affected bats?

The white fungus lives on bats faces. Infection awakens hibernating bats, forcing them to use up fat reserves.

2.4 Organisms and their environment

Data was collected by two groups of students. Calculate the means, medians and modes for each sample

	Sample 1	Sample 2
	12	14
	16	13
	14	15
	16	14
Mean		
Median		
mode		

Is the data reproducible? Explain why.

Yes the data collects is similar for both groups.

Suggest why the red squirrel is rarely seen today except in particular niches of the UK

Introduction of grey squirrels from America that were bigger, stronger and carried a virus that infects and kills the red squirrel, and had a more varied diet.

Red squirrels are now really only found today in pine forest plantations in northern England and Scotland

Why are butterflies again in decline in 2012?

•Heavy rain and wind damages the butterflies wings.

•Changing flowering times has reduced food availability

What is the advantage of using a transect technique rather than just random quadrat sampling?

A quadrat just tells you about that spot - is useful for randomly sampling a whole field for daises.

A transect allow you to see patterns as you move along a line from point A to point B

How is the brown tree snake impacting on the biodiversity in Guam

The snake ate all the native small birds that were not used to having predators, and then the snake changed its diet to other small mammals.

Poisoned mouse bombs are being used to try and control the snake numbers.

How does the acacia bullthorn plant work in a mutual relationship with ants?

The plant provides a protective home and sugars for the ants. The ants deter hungry predators from eating the plant.

What physical factors may affect organism numbers?

Temperature
Nutrients
Light
Water
Oxygen
Carbon dioxide

Why did the rabbit population in Australia increase?

People released rabbits for hunting, and those kept for rearing escaped destroying farm land

What mechanisms are used to control the rabbit population in Australia

Electric fences

What are the arguments for the death and decline of the bee population?

Colony collapse disorder

Mobile phone masts interrupting bees navigation

Bees simply not returning

What is the impact of bee decline on food production?

Huge reduction in pollination of flowers for oil seed rape and fruit trees – reduced yield.

What can we do to raise the population of bees?

Place bee boxes in gardens and on farm land

How is seaweed designed to survive the changing tide?

Slime coat to prevent drying out, swim bladder to lift up when tide is out, holdfast attaqched to rock to withstand changing tide.

2.5 Proteins – Functions and uses

Give four functions of proteins in living organisms

Describe the structure of a protein.

What type of organism do we use to produce enzymes for industry and why?

What is an enzyme and what is its function?

Add labels to the following diagram of an enzyme-substrate complex.

What is meant by enzyme specificity and why are enzymes specific?

Give two factors that affect the rate of an enzyme controlled reaction.

What is the name of the enzyme used to convert glucose to fructose?

Explain what happens when a enzyme becomes denatured

What is the name given to the part of the enzyme that enables it to recognize a substrate?

Which enzymes are contained in washing powders?

Why are biological washing powders more 'environmentally friendly'?

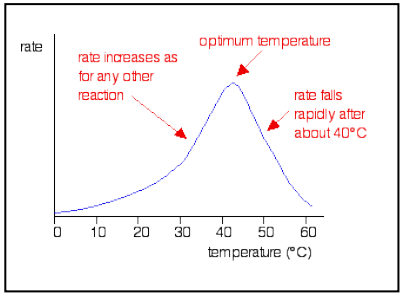
Why is fructose used instead of glucose in slimming foods?

Look at the graph on theleft which shows how temperature affects an enzyme-controlled reaction.

a. Describe the effect of temperature on the rate of reaction

b) Explain the shape of the graph.

What are carbohydrases used for in industry?



Give 2 disadvantages of using enzymes in industry.

2.5 Enzymes and Digestion

What is the function of digestive enzymes?

Why is the average human body temperature 37^0C?

State where bile is
Produced?
Stored?
Acts?

Why does the stomach produce hydrochloric acid?

What type of cells produce digestive enzymes?

What type of enzyme is used in the manufacture of baby foods and why?

Complete the table below to show where the following enzymes are made and where they act.

Enzyme	Where it is made	Where it acts
Amylase		
Protease		
Lipase		

Digestive enzymes are extracellular. What does this mean?

What are the two functions of bile?

Some people suffer from gallstones, which may block their bile duck. Explain the following symptoms:
Pale faeces:

Jaundice:

Complete the table below to show the functions of the different digestive enzymes.

Enzyme	Substrate	Product	Use of product
Amylase			
Protease			
Lipase			

Milk fat is a type of lipid. What would you expect to happen to the pH of the liquid as it's digested and why?

Why can't amylase break down protein?

2.5 Proteins – Functions and uses

Give four functions of proteins in living organisms
- Hormones
- Enzymes (catalysts)
- Antibodies
- Structural components of tissues

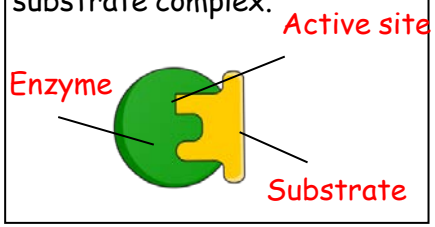
Describe the structure of a protein.
Long chain of amino acids
Folded to produce a specific 3D structure

What type of organism do we use to produce enzymes for industry and why?
Microorganisms
They reproduce rapidly so produce lots of enzyme
They are cheap and easy to handle

What is an enzyme and what is its function?
Biological catalyst – speeds up the rate of a reaction

What is meant by enzyme specificity and why are enzymes specific?
Each enzyme only catalyses one type of reaction.
Each enzyme has a different shape active site

Add labels to the following diagram of an enzyme-substrate complex.



Give two factors that affect the rate of an enzyme controlled reaction.
- Tempearture
- pH

What is the name of the enzyme used to convert glucose to fructose?
Isomerase

Explain what happens when a enzyme becomes denatured
Shape of the active site changes so the enzyme no longer works,

What is the name given to the part of the enzyme that enables it to recognize a substrate?
Active site

Which enzymes are contained in washing powders?
Proteases
Lipases

Why are biological washing powders more 'environmentally friendly'?
Allow you to wash clothes at a lower temperature
Use less energy and therefore less fuel so produce less pollution

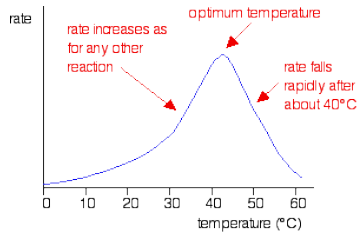
Why is fructose used instead of glucose in slimming foods?
Fructose is sweeter than glucose
So less is needed

Look at the graph on theleft which shows how temperature affects an enzyme-controlled reaction.

a. Describe the effect of temperature on the rate of reaction
- Rate increases up to 40^{0}C
- Rate is at a maximum at 40^{0}C
- Above 40^{0}C rate rapidly falls

b) Explain the shape of the graph.
- Between 0 and 40^{0}C increasing tempearture increases the kinetic energy of molecules so the enzyme and substrate collide more often and with more force
- Above 40^{0}C the enzyme is denatured so can no longer catalyse the reaction

What are carbohydrases used for in industry?
To cpnvert startch to sugar syrup



Give 2 disadvantages of using enzymes in industry.
Most enzymes are expensive to extract
Some people are allergic to certain enzymes

2.5 Enzymes and Digestion

What is the function of digestive enzymes?
To break large insoluble food molecules into small soluble molecules that can be absorbed.

Why is the average human body temperature 37^{0}C?
Optimum temperature for most enzymes

State where bile is
Produced? Liver
Stored? Gall bladder
Acts? Small intestine

Why does the stomach produce hydrochloric acid?
Stomach enzymes work best in acidic conditions.

What type of cells produce digestive enzymes?
Specialised cells in glands and the lining of the gut

What type of enzyme is used in the manufacture of baby foods and why?
Proteases to predigest the protein in the food. .

Complete the table below to show where the following enzymes are made and where they act.

Digestive enzymes are extracellular. What does this mean?
They work outside of cells.

What are the two functions of bile?

•Neutralises the stomach acid to produce alkaline conditions so that enzymes in the small intestine are not denatured

•Emulsifies (breaks up) fats so they have a larger surface area on which enzymes can work, meaning they are digested more rapidly

Enzyme	Where it is made	Where it acts
Amylase	Salivary glands, pancreas, small intestine	Mouth, small intestine
Protease	Stomach, pancreas, small intestine	Stomach, small intestine
Lipase	Pancreas, small intestine	Small intestine

Some people suffer from gallstones, which may block their bile duck. Explain the following symptoms:
Pale faeces: bile can't get into the small intestines

Jaundice: Bile pigment is deposited in the skin

Complete the table below to show the functions of the different digestive enzymes.

Milk fat is a type of lipid. What would you expect to happen to the pH of the liquid as it's digested and why?
Become more acidic.
Fatty acids produced

Why can't amylase break down protein?
The shape of the active site in amylase is not complementary to the shape of a protein molecule.

Enzyme	Substrate	Product	Use of product
Amylase	Carbohydrate (starch)	Glucose	Substrate for respiration
Protease	Protein	Amino acids	Used to synthesise other proteins
Lipase	Lipids (fats and oils)	Fatty acids and glycerol	Cell membranes, making hormones, insulation, energy store

2.6 Aerobic and Anaerobic Respiration

What type of molecules control the rate of reactions inside cells?

Write a word equation for aerobic respiration.

→

What part of the cell do most stages of aerobic respiration take place in?

What do plants use the energy from respiration for?

When does anaerobic respiration take place?

Why does anaerobic respiration release so much less energy than aerobic respiration?

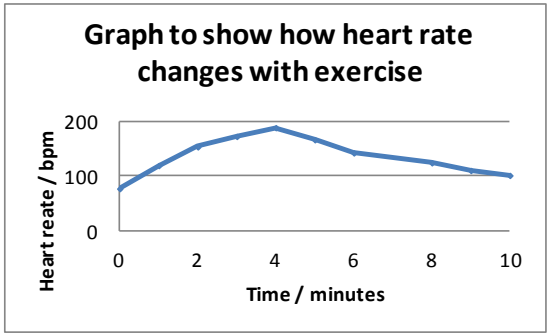
Give two changes that happen in the body when you exercise.

Why do birds and mammals have a higher rate of respiration than reptiles and fish?

What is the product of anaerobic respiration?

What is meant by an oxygen debt?

Why do athletes 'carb load' before a big race?



Why do muscle cells have lots of mitochondria?

What happens to muscles when they are subject to long periods of vigorous activity and why?

The graph above shows how Fred's heart rate changed during a 1500m race,)minutes is when he started the race and 4 minutes is when he finished, Describe and explain the shape of the graph,

What is fermentation?

Write an equation.

→

2.6 Aerobic and Anaerobic Respiration

What type of molecules control the rate of reactions inside cells?
Enzymes

Write a word equation for aerobic respiration.

Glucose + Oxygen → Water + Carbon dioxide (+ Energy)

What part of the cell do most stages of aerobic respiration take place in?
Mitochondria

What do plants use the energy from respiration for?
To build up sugars, nitrates and other nutrients into amino acids which are then built up into proteins.

When does anaerobic respiration take place?
When there is insufficient oxygen supply.

Why does anaerobic respiration release so much less energy than aerobic respiration?
Anaerobic respiration is the incomplete breakdown of glucose,

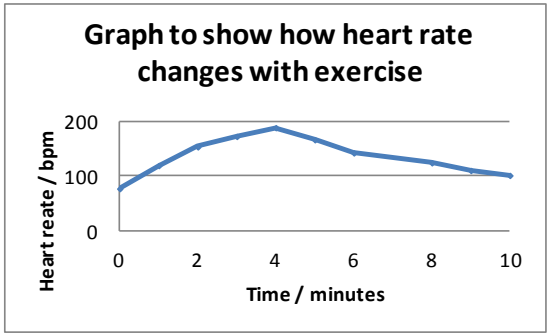
Give two changes that happen in the body when you exercise.
•Heart rate increases
•Rate and depth of breathing increases

Why do birds and mammals have a higher rate of respiration than reptiles and fish?
They use energy from respiration to maintain a steady body temperature

What is the product of anaerobic respiration?
Lactic acid

What is meant by an oxygen debt?
The amount of oxygen required to oxidise lactic acid to carbon dioxide and water

Why do athletes 'carb load' before a big race?
To increase stores of glycogen in their muscles
Can be converted back to glucose to be used for respiration during the race



Why do muscle cells have lots of mitochondria?
They need to respire lots to produce enough energy for contraction

What happens to muscles when they are subject to long periods of vigorous activity and why?
They become fatigued as the build up of lactic acid stops enzymes working

The graph above shows how Fred's heart rate changed during a 1500m race,)minutes is when he started the race and 4 minutes is when he finished, Describe and explain the shape of the graph,
Between 0 and 4 minutes heart rate rises to supply the muscles with **more** oxygen and glucose and remove carbon dioxide more rapidly,
Heart rate remains high after finishing the race to supply oxygen to recover the oxygen debt and blood to remove the lactic acid,

What is fermentation?
Anaerobic respiration in yeast.

Write an equation.
Glucose → Carbon dioxide + ethanol

2.6 Aerobic & Anaerobic respiration

According to the most widely accepted model to be classified as living there are 7 key life processes

M
R
S
G
R
E
N

Respiration allows e_____ to be **released** (NOT made) from the sugar g……..

Where does respiration take place?

On which structures in the cell does respiration happen?

Where are these structures found within the cell?

Chemical reactions take place in the cytoplasm. What controls all chemical reactions?

Explain simply why it is important for all cells to regulate their temperature.

Is there any difference in respiration between plants and animals?

Write a word equation for aerobic respiration.

→

Describe the changes in the body that take place when you exercise.

- H……. r….. increases
- Rate and d……. of breathing i……
- Arteries supplying muscles w…….. / dilate.
- Arteries going to the s…… dilate / widen
- Glycogen in muscles is broken down into g……..
- Increase in s…… at the skin

Explain the changes that happen when you exercise.

Faster transport / supply of ……. and ……. to m……. cells
Faster removal of ……. …….and ……. ……. from cells
Increased rate of d……. of oxygen and carbon dioxide at the lungs
Faster rate of r……. in cells releasing e……. faster.
Faster release of h……. from the body preventing e……. from denaturing

Why might aerobic respiration stop?

Word equation for anaerobic respiration.

→

How is the energy released used?

to build l……. molecules from s……. ones e.g. glycogen from ……. .molecules

in animals, to enable m…….to c…….

in mammals and birds (w……. blooded), to maintain a s……. body t…….. in colder surroundings

in plants, to build up sugars, n…….. and other nutrients into a…….. acids which are then built up into p……

Why is anaerobic respiration not as useful to cells as aerobic respiration?

- ……. …….. is made (which causes muscle fatigue) and is released into the b……,
- …….. energy is released as the breakdown of glucose is i……,
- an o…….. …… builds up

What happens to the lactic acid?
It must be oxidised (repay the oxygen debt) into ……. ……. and w……..

According to the most widely accepted model to be classified as living there are 7 key life processes

Movement
Respiration
Sensitivity
Growth
Reproduction
Excretion
Nutrition

Respiration allows energy to be **released** (NOT made) from the sugar glucose

2.6 Aerobic & Anaerobic respiration

Write a word equation for aerobic respiration.

Glucose + oxygen → carbon dioxide + water (+energy)

Describe the changes in the body that take place when you exercise.

- Heart rate increases
- Rate and depth of breathing increases
- Arteries supplying muscles widen / dilate.
- Arteries going to the skin dilate / widen
- Glycogen in muscles is broken down into glucose.
- Increase in sweating at the skin
- Muscles contract / respire faster

Explain the changes that happen when you exercise.

Faster transport / supply of glucose and oxygen to muscle cells
Faster removal of carbon dioxide and lactic acid from cells
Increased rate of diffusion of oxygen and carbon dioxide at the lungs
Faster rate of respiration in cells releasing energy faster.
Faster release of heat from the body preventing enzymes from denaturing

Why might aerobic respiration stop?

Oxygen may not get to the cells quickly enough and energy is still needed. The muscles stop contracting as efficiently.

Word equation for anaerobic respiration.

Glucose → lactic acid (+ energy)

Why is anaerobic respiration not as useful to cells as aerobic respiration?

- Lactic acid is made (which causes muscle fatigue) and released into the blood,
- less energy is released as the glucose is not fully broken down,
- an oxygen debt builds up

What happens to the lactic acid?

It must be oxidised (repay the oxygen debt) into carbon dioxide and water

Where does respiration take place?

In all living cells

On which structures in the cell does respiration happen?

mitochondria

Where are these structures found within the cell?

In the cytoplasm

Chemical reactions take place in the cytoplasm. What controls all chemical reactions? enzymes

Explain simply why it is important for all cells to regulate their temperature.

The enzymes would denature, respiration would stop happening and the cell dies.

Is there any difference in respiration between plants and animals?

No. It happens day and night in all cells

How is the energy released used?

to build larger molecules from smaller ones e.g. glycogen from glucose

in animals, to enable muscles to contract

in mammals and birds (warm blooded), to maintain a steady body temperature in colder surroundings

in plants, to build up sugars, nitrates and other nutrients into amino acids which are then built up into proteins

Compare mitosis and meiosis
Mitosis (nearly all cells)– chromosomes d……., cell splits o…… into … cells, both have the s…… number of chromosomes at the end as the original parent cell.

Meiosis – (produces g…….)Testes / ovaries cells chromosomes duplicate, cell undergoes … divisions to produce … cells with ……. the number of chromosomes of other b…… cells

Why do we need two types of cell division?
Mitosis – repair /growth of t…….
(replacement of c…….)
Meiosis – ensures v…… in offspring

2.7a Cell division and Inheritance

Why is fertilisation important?
Ensures variation in offspring, through … parents (s……. reproduction) both passing on genetic information bringing differing combinations of genes / a…….
Higher chance of survival against p…….

~~Why are plants better designed for survival~~ than animals?
Plants retain s….. cells throughout its lifetime, meaning new limbs/ shoots can be r……..

Compare the terms dominant and recessive

~~What are stem cells~~
Cells that have not yet s……. by the process of d…….

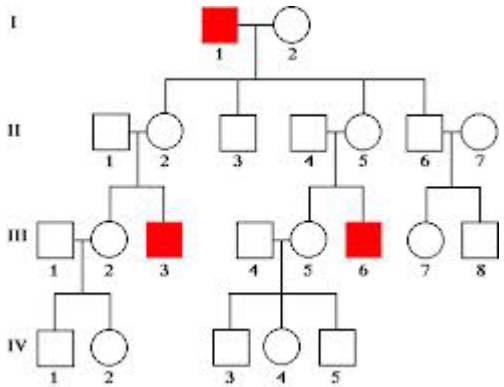
What are the main animal sources of stem cells?
E…… (IVF unused embryos)
U…… ……
A……. stem cells (e.g. b….. ……..)

Which is the best source?
Embryonic – as they can become a… cell in the body. The others are limited.

Why was Henry VIII wrong when he blamed his wives for giving him girls instead of boys?

	Woman
man	

Explain why cystic fibrosis appears to be caused by a recessive allele.



- It skips the ……. and generations.
- It is hidden in some people (……)
  such as …., ….,…. who appear n……

What shape is the DNA that makes up a chromosome?

~~Evaluate the ethical, social uses of stem cells.~~
E…… are l…….. balls of cells – who should we be to decide their fate as spare parts?
At such an early stage of development the embryo has no s….. / b…….– scientifically acceptable to manipulate these cells.
Treat conditions such as p……..and diabetes, improving f……. lives.

What is the difference between a gene and an allele?

2.7b Inheritance and screening

Why did Mendel propose the idea of separately inherited factors (genes)?
Mendel proposed the idea because the r….. of peas implied the idea of separately inherited factors. He classified the characteristics of peas and recognized that there is always a certain ratio. i.e. : or : or : .
He also recognised that features could …… generations which implied s……. f…….. of inheritance.

Who was Mendel?

Why was Mendel's work not accepted in his life-time?
- He was a m…… not a s…….
- Technology / m…….. were not advanced enough to see the ……. / genes of i…….
- His theory defied current r……. beliefs about God and c……...

Compare a DNA fingerprint, with a fingerprint.

What is embryo screening?

When carrying out a genetic cross to work out the F2 what combination of alleles must you have for the P1?

Compare the terms homozygous and heterozygous

Explain how polydactyl syndrome is inherited.

Show how using a genetic cross pink pea flowers may skip a generation.

P1 phenotypes white x pink

P1 genotypes

Gametes

F1 genotypes (cross)

F1 phenotypes

P2 phenotypes

P2 genotypes

Gametes

F2 genotypes (cross)

F2 phenotypes

Explain how cystic fibrosis is inherited.

Compare the terms genotype and phenotype.

How does a gene code for a feature? How does cystic fibrosis arise? (Higher)
Each gene codes for a particular c……. of amino acids which make a s…….. P……. If a different amino acid is s……. a different protein is made which might cause more m…… to be released at the cell m……..

2.7a Cell division and Inheritance

Compare mitosis and meiosis
Mitosis (nearly all cells)– chromosomes duplicate, cell splits once into two cells, both have the same number of chromosomes at the end as the original parent cell.

Meiosis – (produces gametes.)Testes / ovaries cells chromosomes duplicate, cell undergoes two divisions to produce 4 cells with half the number of chromosomes of other body cells

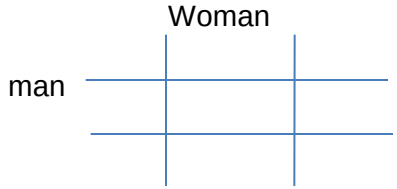
Why do we need two types of cell division?
Mitosis – repair /growth of tissues (replacement of cells)
Meiosis – ensures variation in offspring

Why is fertilisation important?
Ensures variation in offspring, through 2 parents (sexual reproduction) both passing on genetic information bringing differing combinations of genes / alleles.
Higher chance of survival against pathogens.

~~Why are plants better designed for survival~~ than animals?
Plants retain stem cells throughout its lifetime, meaning new limb/ shoots can be regenerated.

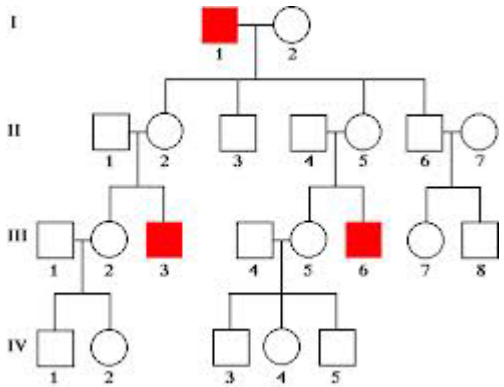
Compare the terms dominant and recessive
Dominant alleles only need to be inherited from 1 parent to be seen, recessive alleles must be inherited from both parents to be seen.

Why was Henry VIII wrong when he blamed his wives for giving him girls instead of boys?



- The Y sex chromosome carried by the man is the deciding factor.

Explain why cystic fibrosis appears to be caused by a recessive allele.



- It skips the 2nd and 4th generations.
- It is hidden in some people (carriers) such as 2, 4,5 who appear normal.

What shape is the DNA that makes up a chromosome?
Double helix

~~What are stem cells~~
Cells that have not yet specialised by the process of differentiation

What are the main animal sources of stem cells?
Embryonic (IVF unused embryos)
Umbilical cord
Adult stem cells (e.g. bone marrow)

Which is the best source?
Embryonic – as they can become any cell in the body. The others are limited.

~~Evaluate the ethical, social uses of stem cells.~~
Embryos are living balls of cells – who should we be to decide their fate as spare parts?
At such an early stage of development the embryo has no spine / brain – scientifically acceptable to manipulate these cells.
Treat conditions such as paralysis/ diabetes, improved family lives.

What is the difference between a gene and an allele?
A gene is a short section of chromosome DNA that codes for 1 feature e.g. eye colour, alleles are the variants of the gene, e.g. brown, blue, green.

2.7b Inheritance And screening

Why did Mendel propose the idea of separately inherited factors (genes)?

Mendel proposed the idea because the ratio of peas implied the idea of separately inherited factors. He classified the characteristics of peas and recognized that there is always a certain ratio. i.e. 1:1 or 3:1 or 1:0.
He also recognised that features could skip generations which implied separate factors of inheritance.

Who was Mendel?

Monk - founder of genetics. Studied the pea plant

Why was Mendel's work not accepted in his life-time?

- He was a monk not a scientist.
- Technology / microscopes were not advanced enough to see the factors / genes of inheritance.
- His theory defied current religious beliefs about God and creation.

Compare a DNA fingerprint, with a fingerprint.

DNA fingerprint is unique to everyone apart from identical twins. A fingerprint will be different in everyone.

What is embryo screening?

Taking a cell from an embryo (IVF) and looking for a genetic disorder.

When carrying out a genetic cross to work out the F2 what combination of alleles must you have for the P1?

AA and aa (homozygous dom and rec)

Compare the terms homozygous and heterozygous

Homozygous is either two dominant(AA) or two recessive alleles aa).

Heterozygous is a combination of a dominant and a recessive allele (Aa) for a gene

Explain how polydactyl syndrome is inherited.

Polydactyl is controlled by a dominant allele and so only needs to be inherited from one parent

Explain how cystic fibrosis is inherited.

Cystic fibrosis is controlled by a recessive allele and so needs to be inherited from both parents to be seen.

Compare the terms genotype and phenotype.

Genotype is the code used (combination of alleles e.g. Aa). Phenotype is what is displayed in the environment e.g white flowers.

Show how using a genetic cross pink pea flowers may skip a generation.

P1 phenotypes white x pink

P1 genotypes WW x pp

Gametes W W p p

F1 genotypes (cross)

	p	p
W	Wp	Wp
W	Wp	Wp

F1 phenotypes all white

P2 phenotypes white x white

P2 genotypes Wp x Wp

Gametes W p W p

F2 genotypes (cross)

	W	p
W	WW	Wp
p	Wp	pp

F2 phenotypes 3 White : 1 pink

How does a gene code for a feature? How does cystic fibrosis arise? (Higher)

Each gene codes for a particular combination of amino acids which make a specific protein. If a different amino acid is sequenced a different protein is made which might cause more mucous to be released at the cell membranes.

2.7 Cell Division and Inheritance 1

What is a gene?

Where is genetic information found in the cell?

What are gametes and where do they form?

What is the function of mitosis?

What is the difference between the genetic material in body cells and gametes?

What is the shape of a DNA molecule?

What is an allele?

What is the principle behind DNA fingerprinting?

Define the following terms:
Homozygous

Heterozygous

Complete the table to compare mitosis and meiosis.

	Mitosis	Meiosis
Type of cell formed		
Rounds of division		
Number of daughter cells		
Genetic makeup of daughter cells		

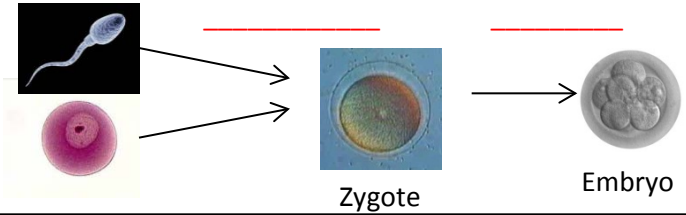
Why was the importance of Mendel's discoveries not appreciated until after his death?

Why are offspring produced by sexual reproduction genetically different to their parents?

What did Mendel use for his experiments?

Why is it easier to clone plants than animals?

Add labels to the diagram to show the processes taking place.



Distinguish between the terms genotype and phenotype using an example for each.

What is meant by a 'carrier' of a genetic disease?

State whether the following disorders are dominant or recessive?
Polydactyl
Cystic fibrosis

What are the features of polydactyl?

How many parents must possess the cystic fibrosis gene in order to have a child with the disease?

2.7 Cell Division and Inheritance 2

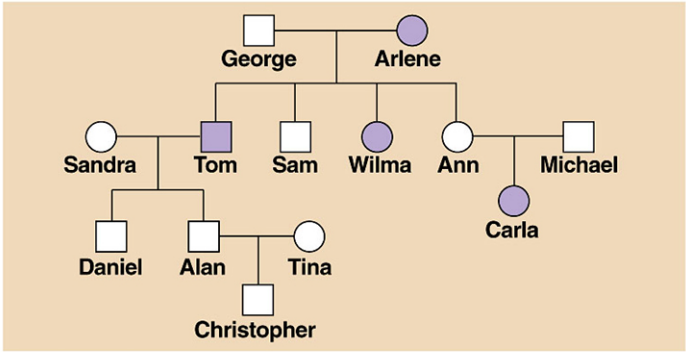
What is cystic fibrosis a disorder of?

How many polydactyl alleles do you need in order to have the disease?

What is the difference between a dominant allele and a recessive allele?

What is the name given to the technique that involves checking whether an unborn child has a genetic disease?

What are stem cells and where are they found?



http://www.proprofs.com/quiz-school/story.php?title=genetics-quiz-2

Look at the genetic pedigree above. Explain how Carla can inherit the disease when neither of her parents have it.

Draw a genetic diagram to show why there is an equal chance of a couple having a boy and a girl.

Give 2 advantages and 2 disadvantages of finding out whether your unborn child has a genetic disease.

2.7 Cell Division and Inheritance 1

What is a gene?
A small section of DNA that codes for a particular combination of amino acids that make a specific protein.

Where is genetic information found in the cell?
On chromosomes in the nucleus.

What are gametes and where do they form?
Sex cells – testes (sperm) and ovaries (ova)

What is the function of mitosis?
Growth of new cells
Repair of worn out or damaged cells
To create cells that can differentiate

What is the difference between the genetic material in body cells and gametes?
Body cells have 2 sets of chromosomes, gametes have only one set.

What is the shape of a DNA molecule?
Double helix

What is an allele?
An alternative version of a gene

What is the principle behind DNA fingerprinting?
Every individual except for identical twins has different DNA

Define the following terms:
Homozygous an individual for whom both alleles for a particular gene are the same

Heterozygous an individual for whom both alleles for a particular gene are different

Complete the table to compare mitosis and meiosis.

	Mitosis	Meiosis
Type of cell formed	Body cell	Gamete
Rounds of division	1	2
Number of daughter cells	2	4
Genetic makeup of daughter cells	Identical to parent cell	Different to parent cell

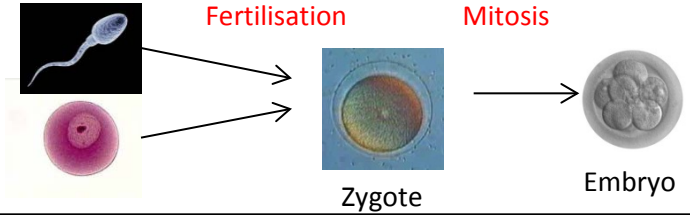
Why was the importance of Mendel's discoveries not appreciated until after his death?
- No one knew about chromosomes or genes at the time
- Mendel was not a well respected scientist and his work was not published in respected journals

Why are offspring produced by sexual reproduction genetically different to their parents?
Offspring inherit one of each pair of alleles from each parent.

What did Mendel use for his experiments?
Pea plants

Why is it easier to clone plants than animals?
Most plant cells retain the ability to differentiate throughout life whereas most animal cells become specialised during formation of the embryo.

Add labels to the diagram to show the processes taking place.



Distinguish between the terms genotype and phenotype using an example for each.
- Genotype: combination of alleles of an individual e.g. Bb
- Phenotype: observable characteristics of an organism e.g. brown eyes

2.7 Cell Division and Inheritance 2

What is meant by a 'carrier' of a genetic disease?
A heterozygote – has one normal allele and one faulty allele for a recessive disease

State whether the following disorders are dominant or recessive?
Polydactyl dominant
Cystic fibrosis recessive

What are the features of polydactyl?
Extra fingers or toes

How many parents must possess the cystic fibrosis gene in order to have a child with the disease?
Both

What is cystic fibrosis a disorder of?
Cell membranes

How many polydactyl alleles do you need in order to have the disease?
One

What is the difference between a dominant allele and a recessive allele?
A dominant allele controls the development of a characteristic when it is present on only one of the chromosomes in a pair.
A recessive allele controls the development of characteristics only if the dominant allele is not present is a recessive allele.

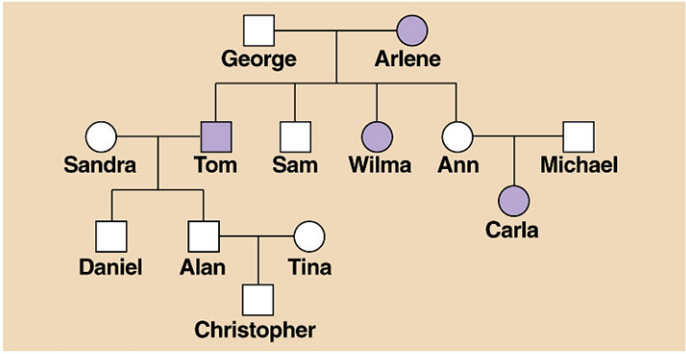
What is the name given to the technique that involves checking whether an unborn child has a genetic disease?
Embryo screening

What are stem cells and where are they found?
Undifferentiated cells that can specialise to form any other type of cell
Found in the embryo, cord blood and adult bone marrow

Draw a genetic diagram to show why there is an equal chance of a couple having a boy and a girl.

Mum (XX)

Dad (XY)	X	X
X	XX Girl	XX Girl
Y	XY Boy	XY Boy



http://www.proprofs.com/quiz-school/story.php?title=genetics-quiz-2

Look at the genetic pedigree above. Explain how Carla can inherit the disease when neither of her parents have it.
Disease must be recessive
Ann and Michael are both carriers
Neither exhibits the disease as they have one normal allele
Both pass one recessive allele to Carla so she inherits the disease

Give 2 advantages and 2 disadvantages of finding out whether your unborn child has a genetic disease.
•Advantages – can make an informed decision about abortion; can prepare mentally and financially for having a child with a disease; can prevent suffering
•Disadvantages - can lead to destruction of the foetus which is against some religions; procedure can harm mother or baby;

2.8 Speciation

•Why are fossils important for studying evolution?

What conditions are needed for decay to occur?

Give two reasons why the fossil record is incomplete.

What does it mean if a species has become extinct?

What is a fossil?

Describe 3 ways in which fossils can form.

What does it mean if 2 populations of a species become isolated?

Give 5 reasons why a species may become extinct.

What is the theory of evolution?

Give a definition of a species.

Lemurs and monkeys have a common primate ancestor. Explain how they became separate species.

Give 2 ways in which populations of a species can become geographically isolated.

Why has the introduction of grey squirrels led to red squirrels becoming endangered?

Why are scientists unsure about how animals evolved even if there is good fossil evidence?

2.8 Speciation

•Why are fossils important for studying evolution?
•They tell us about organisms that **no longer exist**
•They show us how organisms have changed over the course of evolution

What conditions are needed for decay to occur?
Oxygen
Moisture
Warmth

Give two reasons why the fossil record is incomplete.
•Many early life forms were soft bodied so few traces have been left behind.
•Foils have been destroyed by geological activity.

What does it mean if a species has become extinct?
All organisms of the species have died out.

What is a fossil?
The remains of an organism from millions of years ago preserved in rock.

Describe 3 ways in which fossils can form.
•from the hard parts of animals that do not decay easily
•from parts of organisms that have not decayed
•because one or more of the conditions needed for decay are absent
•when parts of the organism are replaced by other materials as they decay
•as preserved traces of organisms, eg footprints, burrows and rootlet traces.

What does it mean if 2 populations of a species become isolated?
They become physically separated.

Give 5 reasons why a species may become extinct.
•changes to the environment over geological time
• **new** predators
• **new** diseases
• **new**, more successful, competitors
• a single catastrophic event, eg massive volcanic eruptions or collisions with asteroids

What is the theory of evolution?
New species develop from old species by the process of gradual change over millions of years.

Give a definition of a species.
A group of organisms with similar characteristics that can reproduce to give fertile offspring

Lemurs and monkeys have a common primate ancestor. Explain how they became separate species.
•Two populations of the primate ancestor became geographically isolated
•Within each population there was genetic variation
•In the two different environments there were differing selection pressures
•In each population the alleles that gave a survival advantage were selected for
•Eventually the populations became so different that interbreeding was no longer possible

Give 2 ways in which populations of a species can become geographically isolated.
•Land mass breaks off / formation of an island
•Flooding
•Formation of a new mountain range

Why has the introduction of grey squirrels led to red squirrels becoming endangered?
•Grey squirrels are a **new** competitor
•Greys are better adapted to the environment e.g. less timid / eat wider variety of food etc

Why are scientists unsure about how animals evolved even if there is good fossil evidence?
No scientists around millions of years ago to document changes.