

B2

Exam questions and answers

Topic you need to know about:

Chapter 1: cells, tissues and organs ✓

Chapter 2: organisms in the environment

Chapter 3: enzymes

Chapter 4: energy from respiration

Chapter 5: simple inheritance in animals
and plants

Chapter 6: old and new species

Chapter 1: cells, tissues and organs

1. What three components (organelles) are found in plant cells but not animal cells?

2. What does a cell wall do? 1. Cell wall, chloroplasts and vacuole

3. Where is DNA found in a cell? 2. A cell that has a particular function, e.g. a root hair cell

4. What is the function of a cell membrane? 3. To the nucleus and minerals

5. What is the function of a cell wall? 4. It is selectively permeable (also known as semi-permeable) and it decides what substances can go in and out

6. What green liquid is found in chloroplasts? 5. It is where light energy is converted into chemical energy

7. What is found in the vacuole? 6. chloroplast

8. What is the function of a cell wall? 7. Cell sap (water and water)

9. How are root hair cells adapted for their function? 8. It keeps the cell turgid

10. What is the difference between xylem and phloem? 9. They transport water and nutrients

11. What is the function of a leaf? 10. To capture light energy and convert it into chemical energy

12. Do bacterial cells have a nucleus? 11. NO! bacteria do not have a nucleus, their DNA is in the cytoplasm

13. What can we use yeast for? 12. NO! bacteria do not have a nucleus, their DNA is in the cytoplasm

14. What does a yeast cell do? 13. Baker's yeast is used to make bread and beer

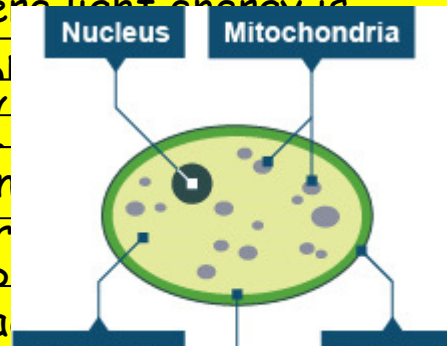
15. Describe diffusion? 14. The movement of particles from an area of high concentration to an area of low concentration

16. What are organs made from? 15. Organs are made up of lots of tissues

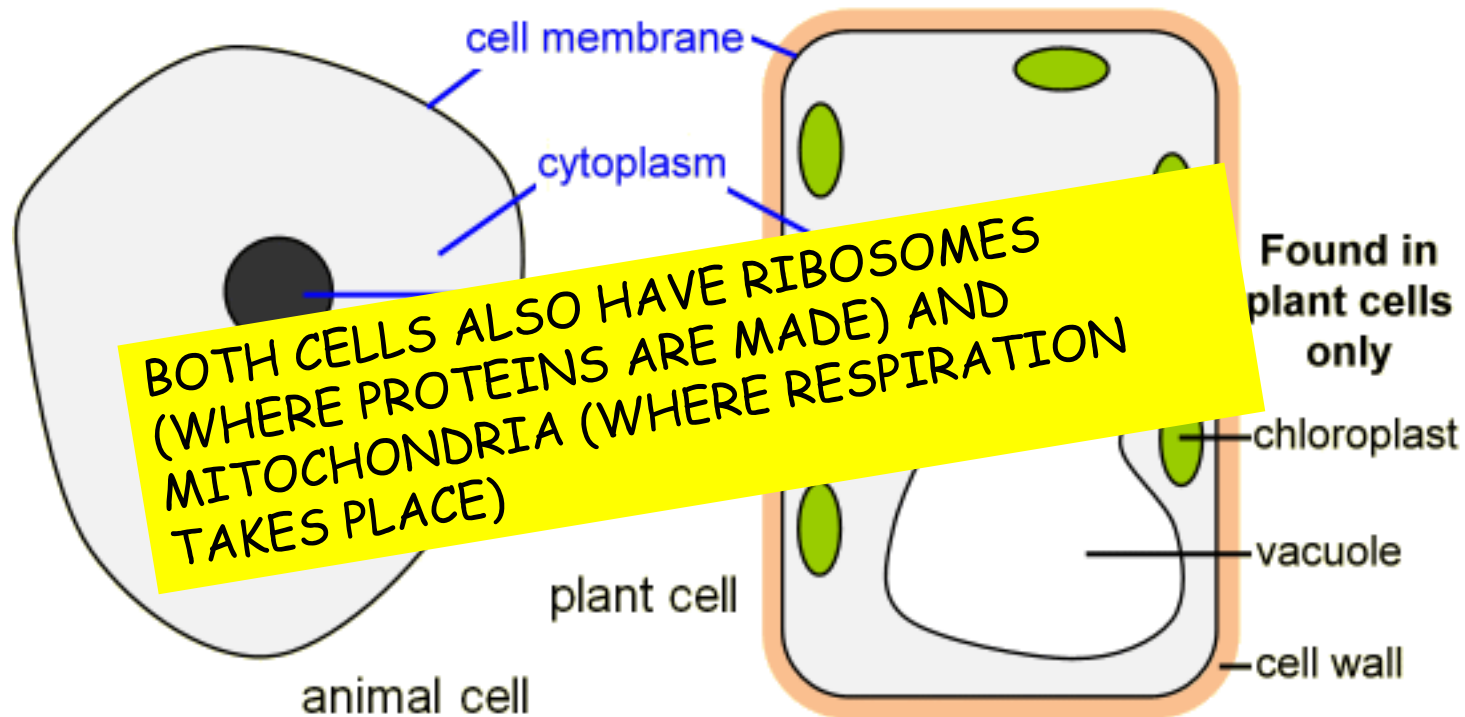
17. Name four organs in plants. 16. Root (provides anchorage and where water and minerals are absorbed from the soil), stem (holds the leaf upright), leaf (where photosynthesis occurs) and flower (involved in reproduction).

18. What is a cell?

18. The basic unit of life

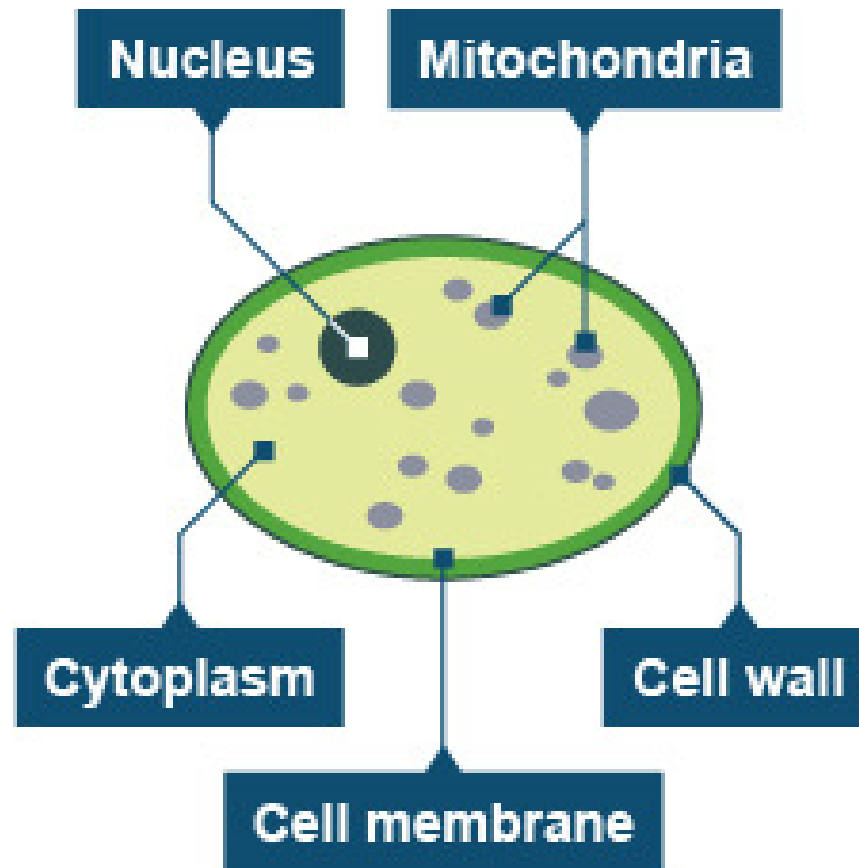


Draw an animal cell and plant cell

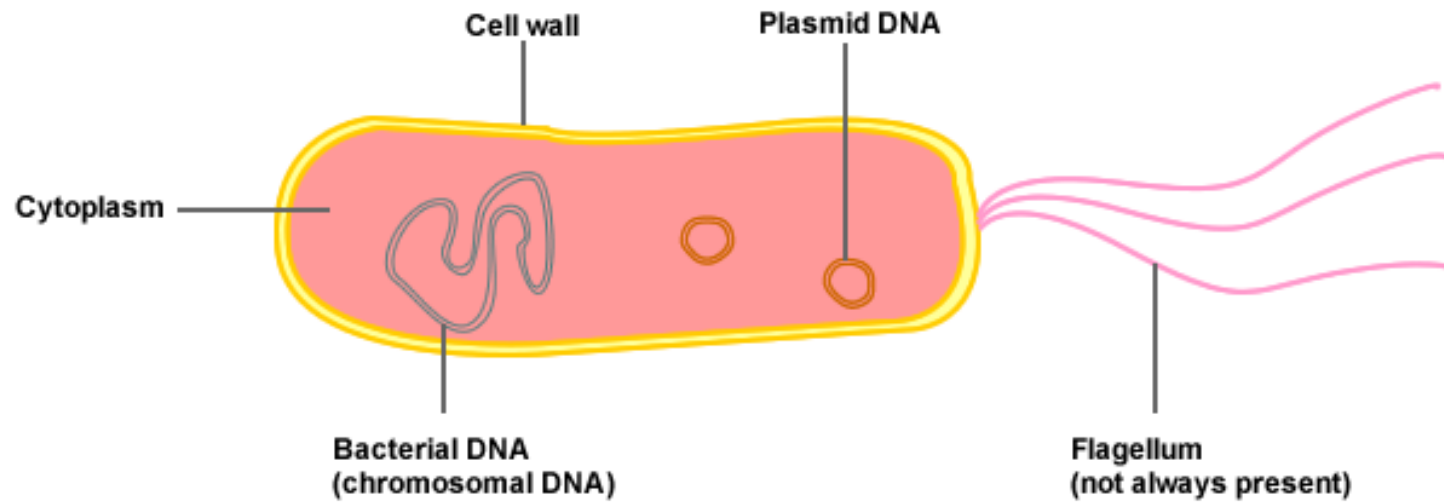


The **blue** is found in both cells and the three words in **black** are only found in plant cells.

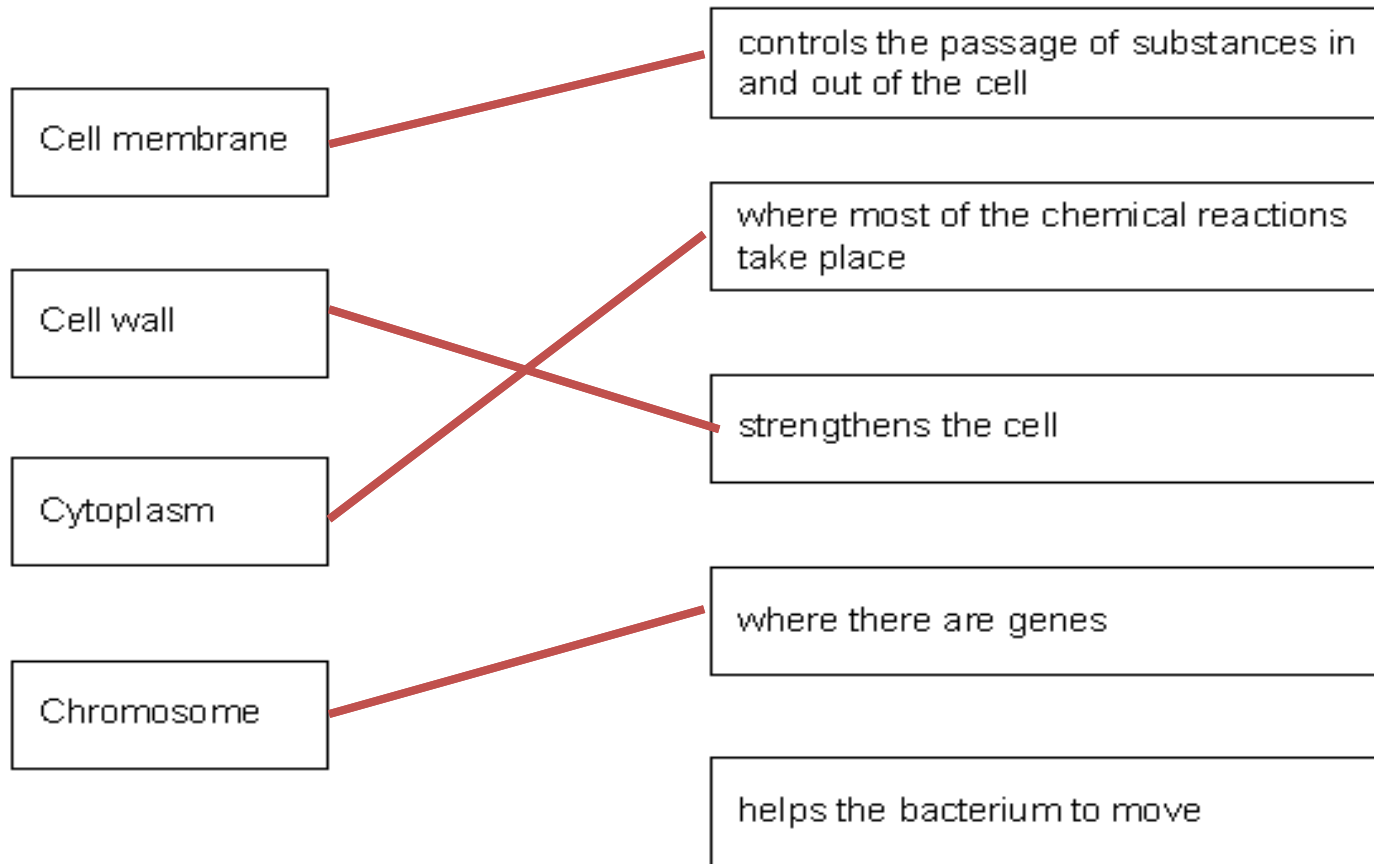
Draw a yeast cell

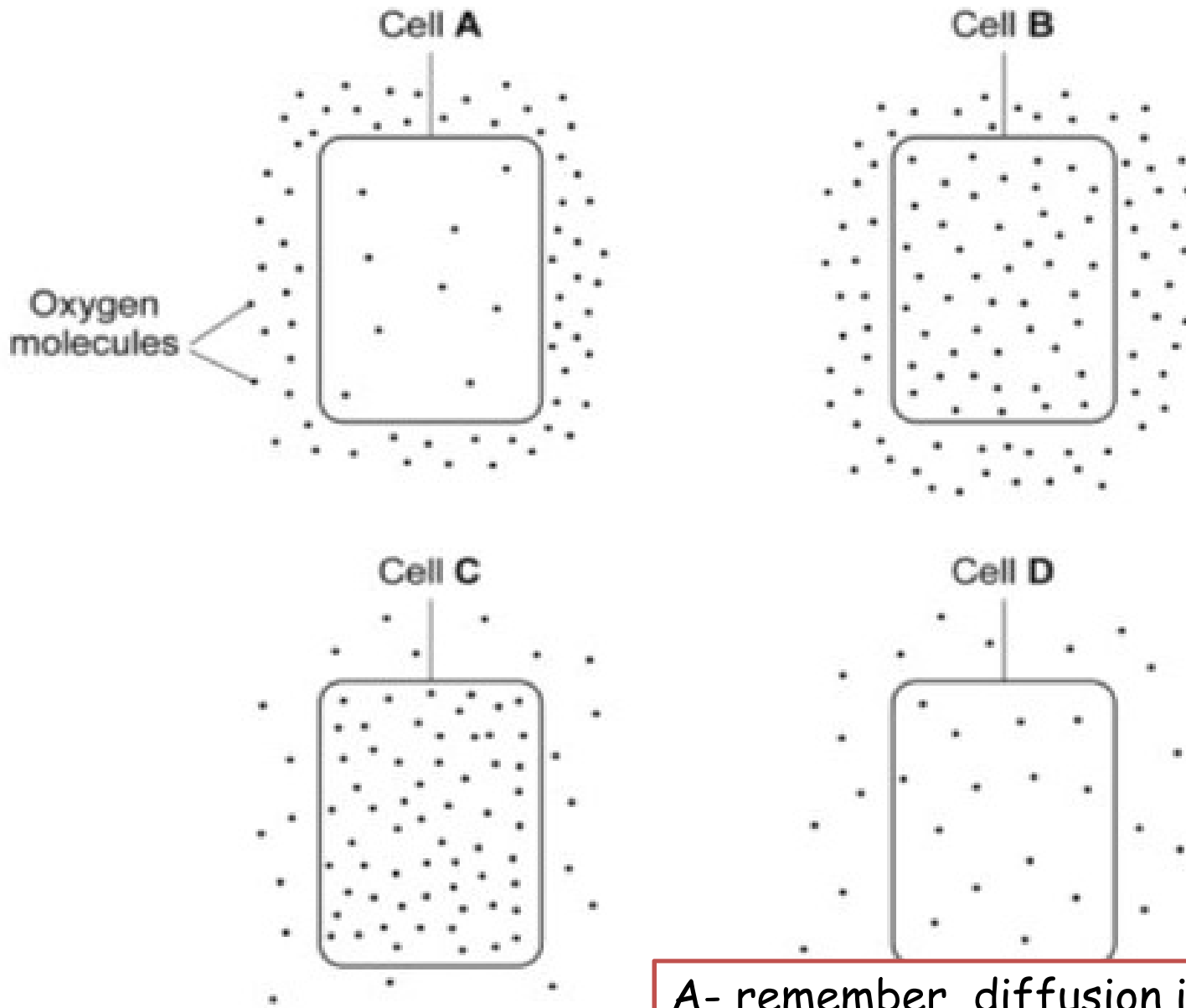


Draw a bacterial cell



Draw **one** line from each structure in **List A** to the correct information about the structure in **List B**.

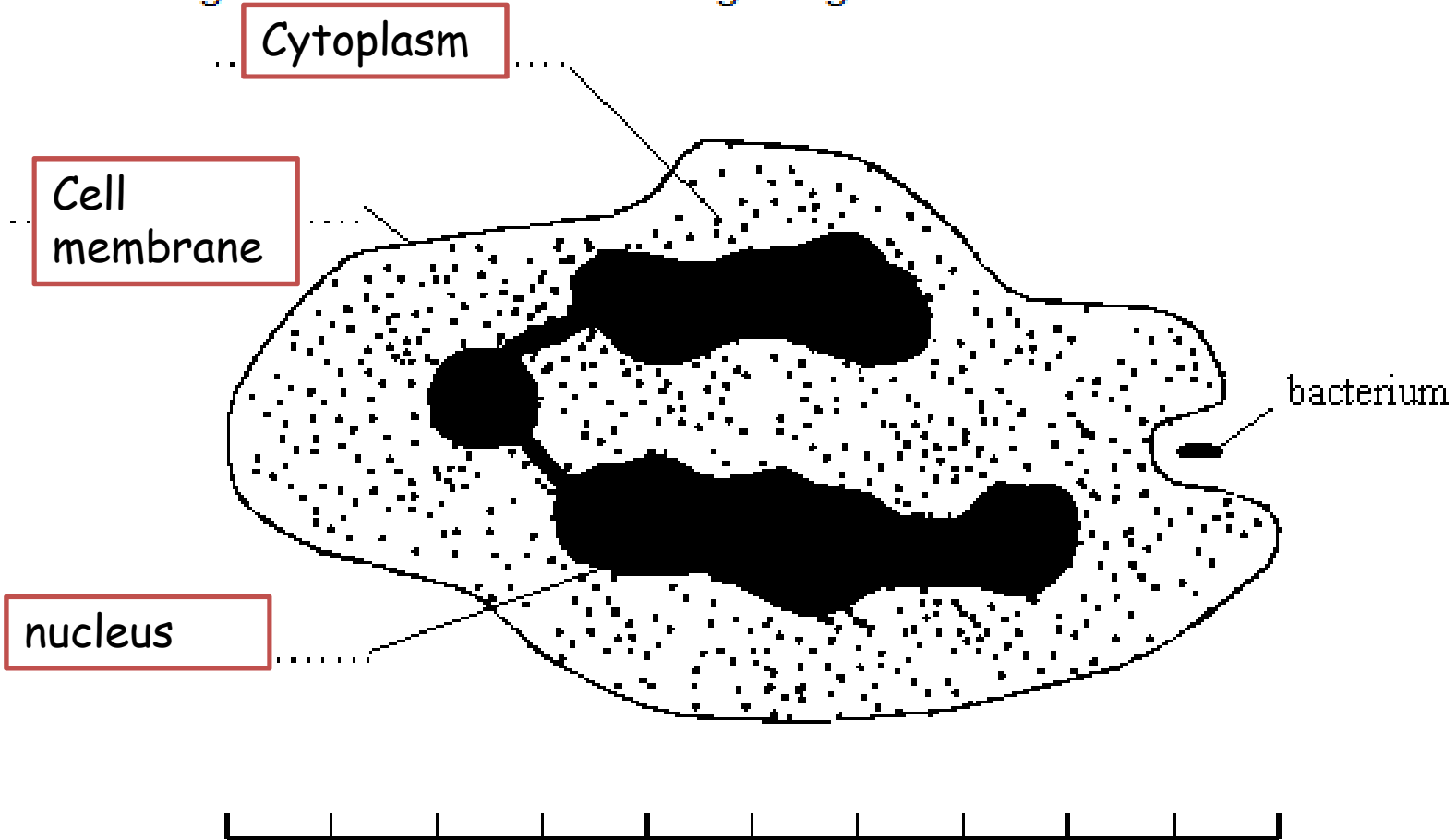




Into which cell, **A**, **B**, **C** or **D**, will oxygen

A- remember, diffusion is from a high concentration to a low concentration.

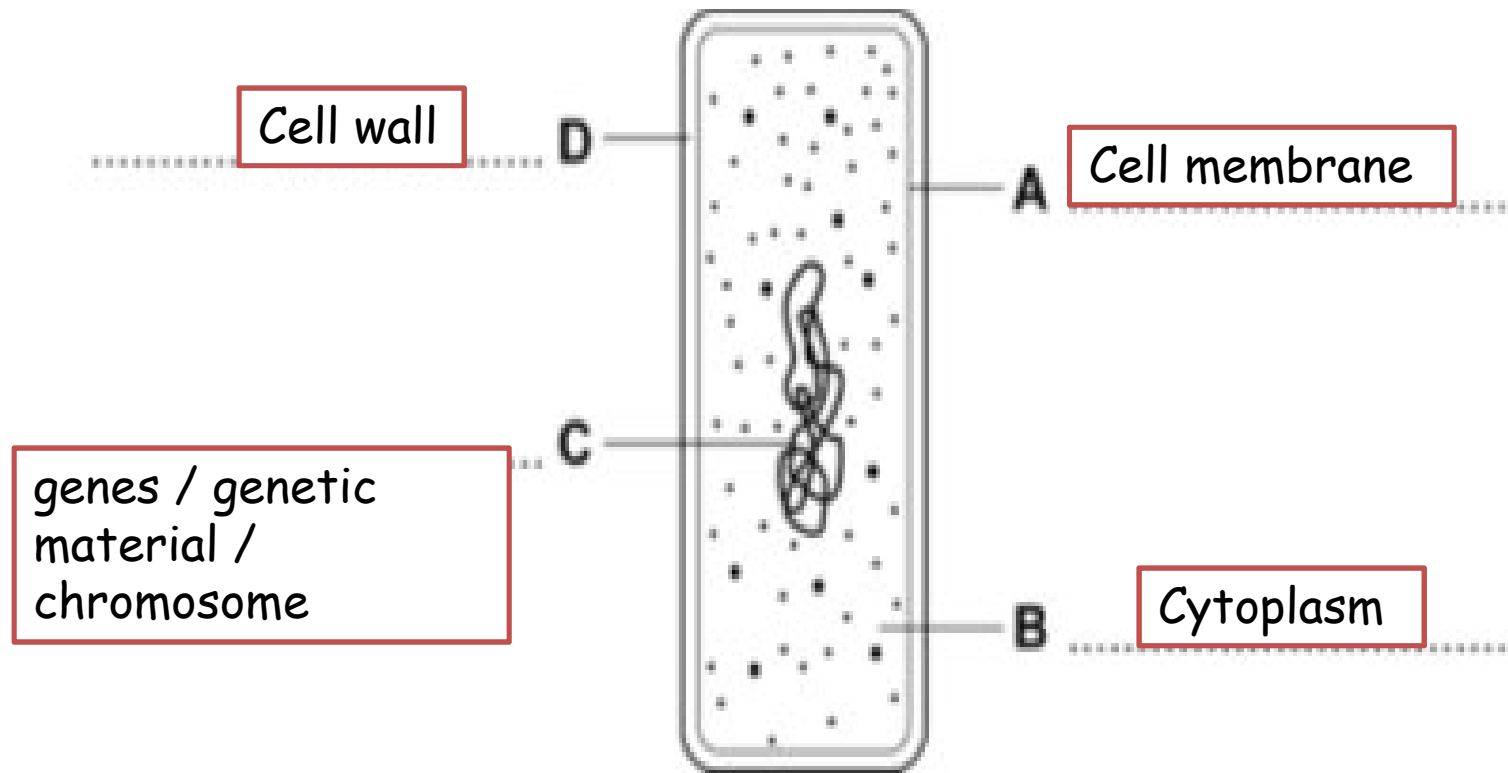
The drawing shows a white blood cell ingesting a bacterium.



(i) Use words from the list to label the parts of the white blood cell.

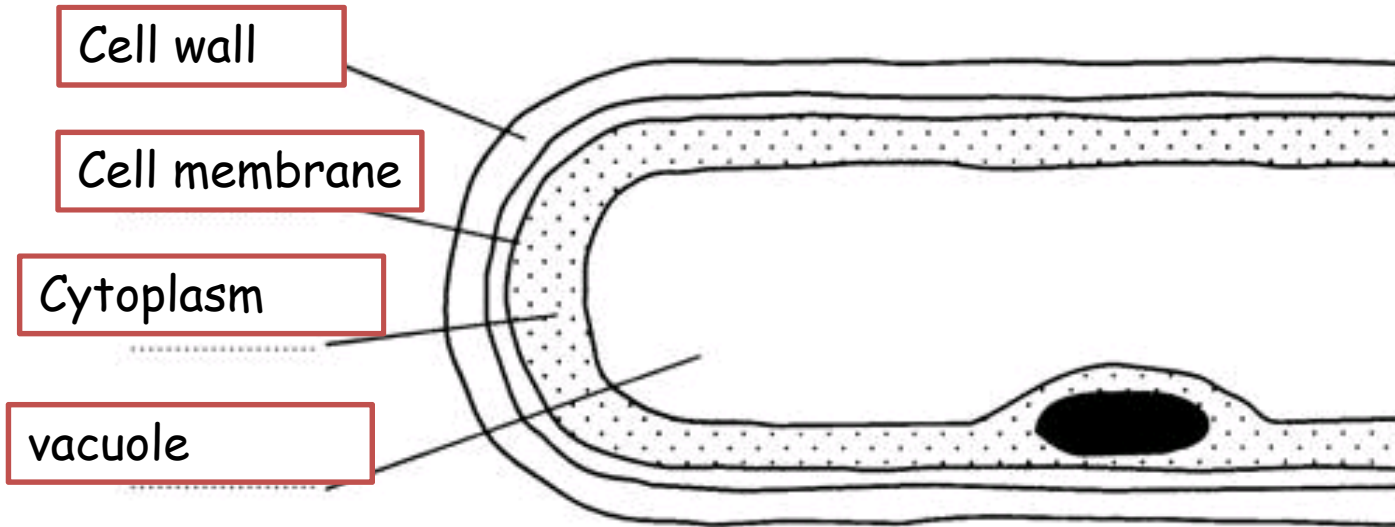
cell membrane cell wall cytoplasm nucleus vacuole

The diagram shows a bacterium.



On the drawing, name the structures labelled **A**, **B**, **C** and **D**.

The drawing shows part of a root hair cell.

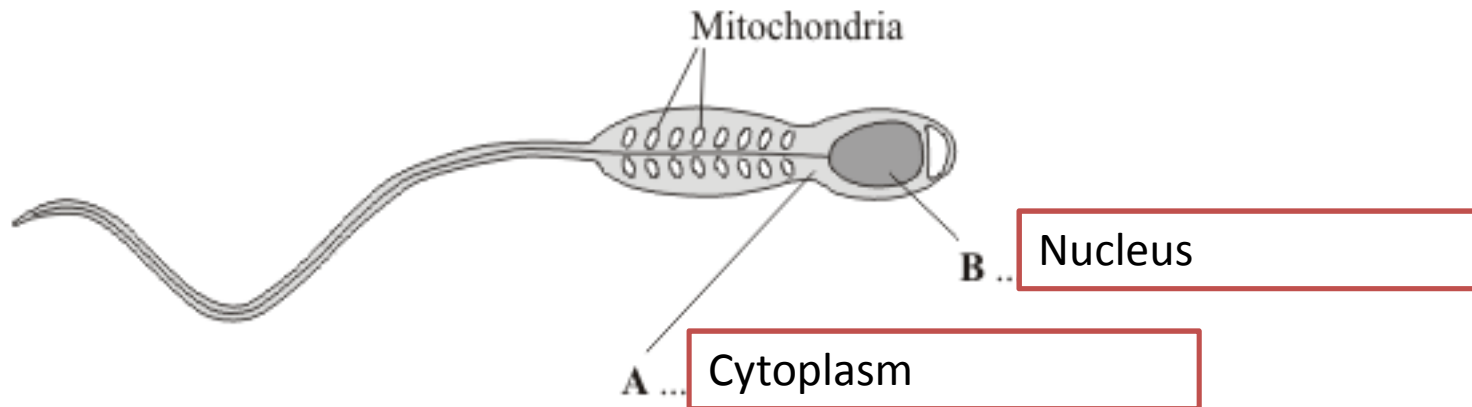


(a) Use words from the list to label the parts of the root hair cell.

cell membrane cell wall cytoplasm nucleus vacuole

This question is about cells.

(a) (i) The diagram shows a sperm cell.

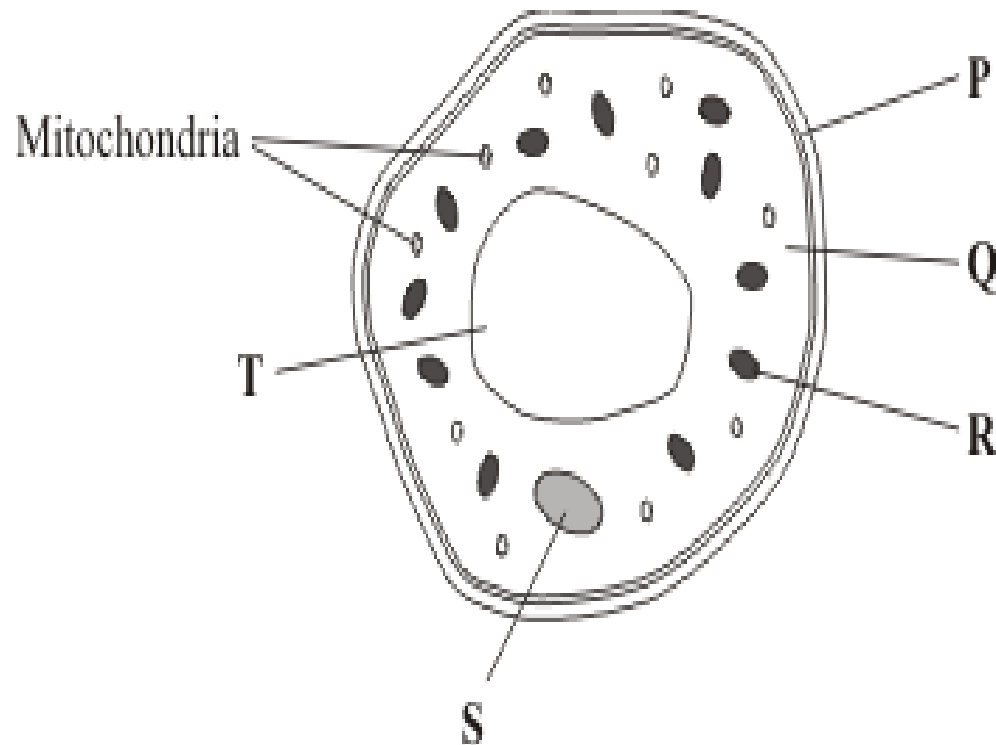


Use words from the box to label parts **A** and **B**.

cell membrane cytoplasm nucleus

(2)

(ii) The diagram shows a cell from a leaf.



Give the letters of **two** parts of the leaf cell which would **not** be found in a sperm

cell. and .

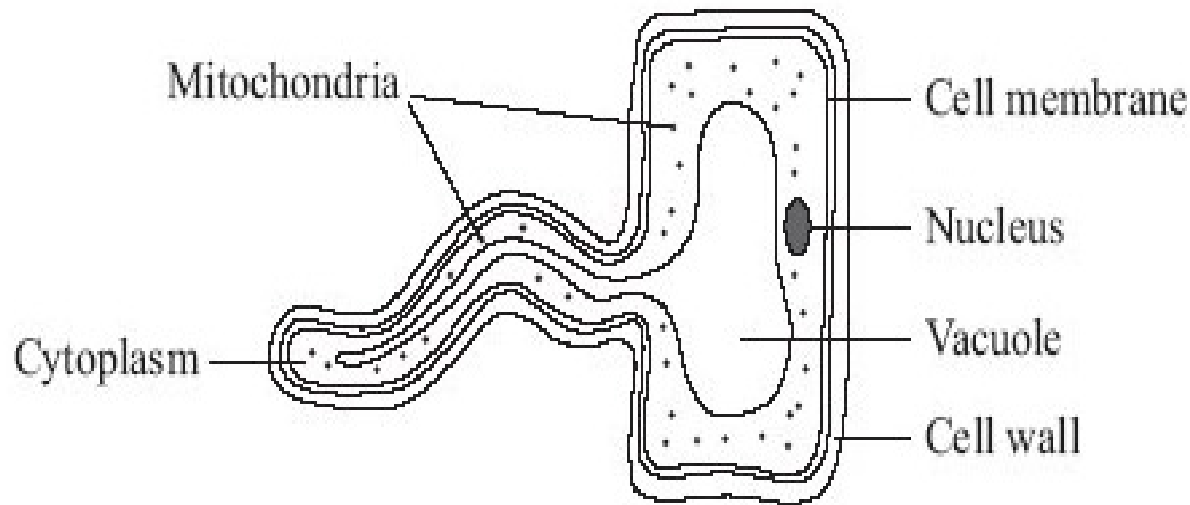
any **two** from:
two required for **1** mark

- P
- R
- T

(1)

(b) **Diagram 2** shows another type of plant cell.

Diagram 2



Give **two** ways in which this cell is different from an animal cell.

- 1
 1. has) cell wall (1)

- 2
 2. (has) vacuole or large / permanent vacuole
do **not** allow chloroplasts because even though it is a plant cell, it is found underground (it is a root cell) so it cant photosynthesise if it is not exposed to the sun!

(a) Which **two** of the following substances are found in the urine of a healthy person?

Tick (✓) **two** boxes.

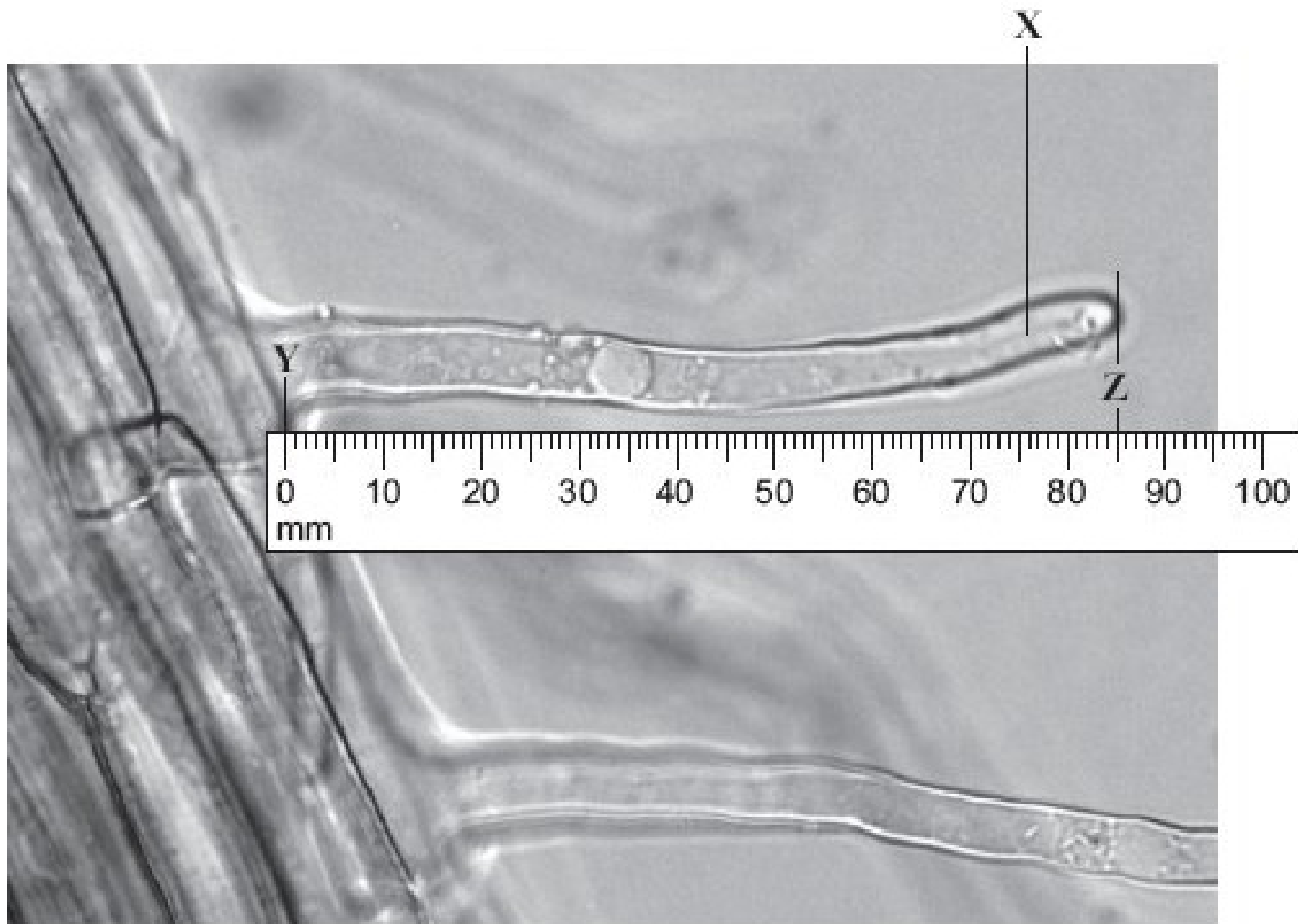
Glucose

Mineral ions

Proteins

Water

(2)



(a) What is the name of structure X?

Root hair

- (a) The concentration of sulfate ions was measured in the roots of barley plants and in the water in the surrounding soil.

The table shows the results.

	Concentration of sulfate ions in mmol per dm ³
Roots of barley plants	1.4
Soil	0.15

Is it possible for the barley roots to take up sulfate ions from the soil by diffusion?

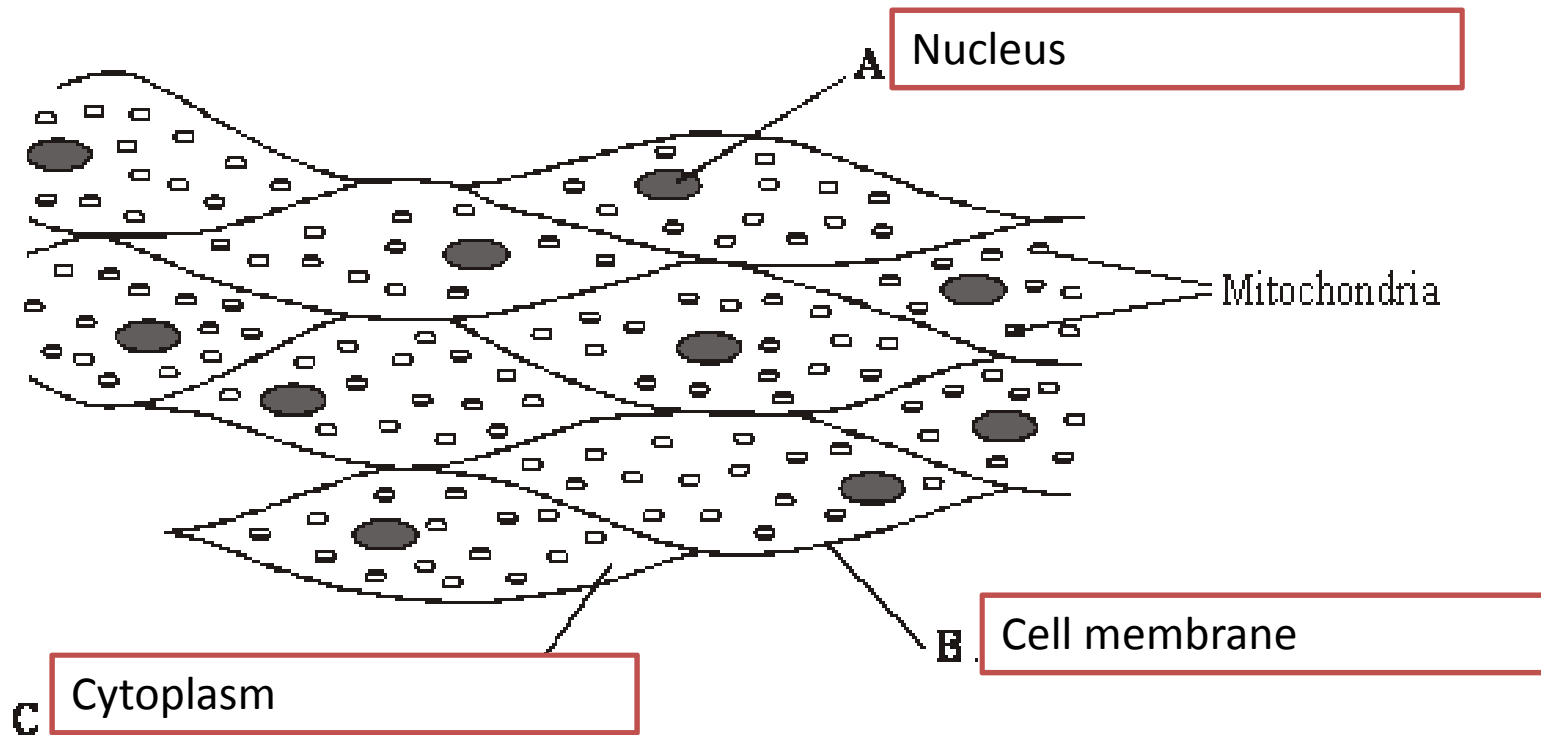
Draw a ring around your answer. **Yes / No**

Explain your answer.

No

- diffusion is from a **HIGH** concentration to a **LOW** concentration (i.e. **DOWN** a concentration gradient)
- The sulphate ions would **LEAVE** the root by diffusion

The diagram shows a group of muscle cells from the wall of the intestine.



(a) On the diagram, use words from the box to name the structures labelled **A**, **B** and **C**.

cell membrane cell wall chloroplast cytoplasm nucleus

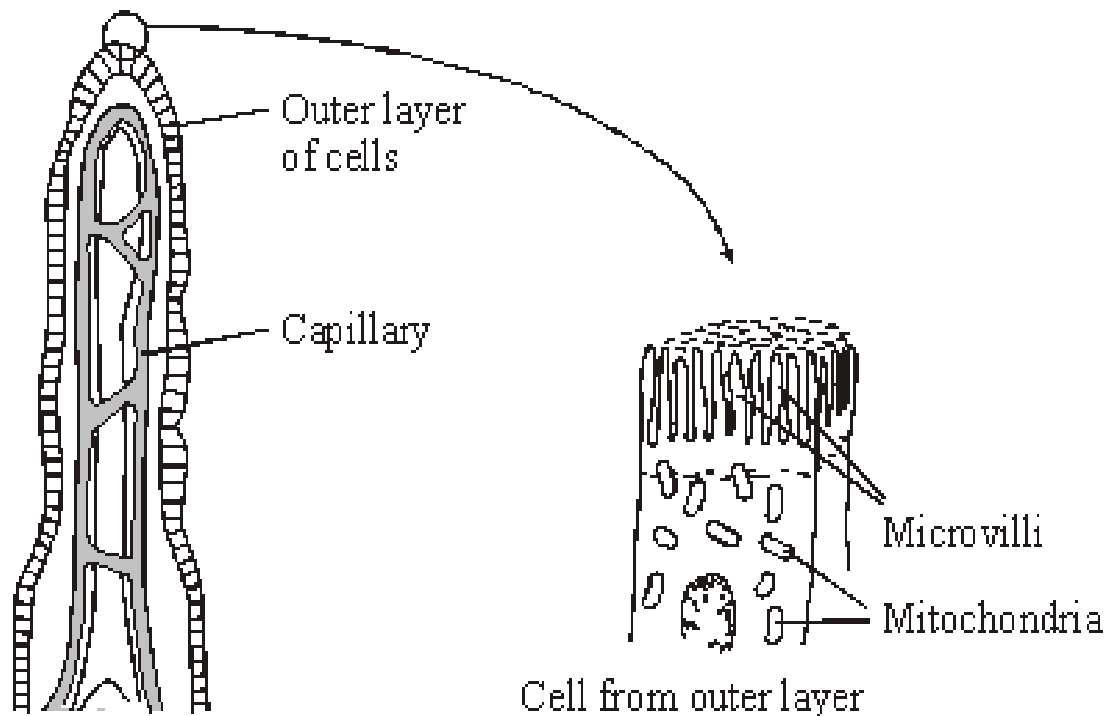
(b) How are these muscle cells adapted to release a lot of energy?

any **two** from:

- (contain mitochondria
- many (mitochondria)
- respiration (occurs in mitochondria)

(2)
(Total 5 marks)

The small intestine is lined with millions of villi.
The diagram shows the structure of a villus.



In the small intestine, some of the products of digestion are absorbed into the blood by *active transport*.

(a) Explain what is meant by *active transport*.

any **two** from:

- transport up / against concentration gradient / low to high concentration
- uses energy
- use of protein / carrier

(b) How do microvilli and mitochondria help in the active transport of the products of digestion from the small intestine into the blood?

Microvilli

large(r) surface area
accept have carriers

Mitochondria

release energy **or** make ATP
do **not** accept 'makes energy'

(2)

(Total 4 marks)

(b) (i) Which feature of this cell allows oxygen to pass through quickly?

Put a tick (✓) in the box next to your choice.

It is thin.

It has a large nucleus.

It has many mitochondria.

(1)

(ii) Complete the sentence by drawing a ring around the correct answer in the box.

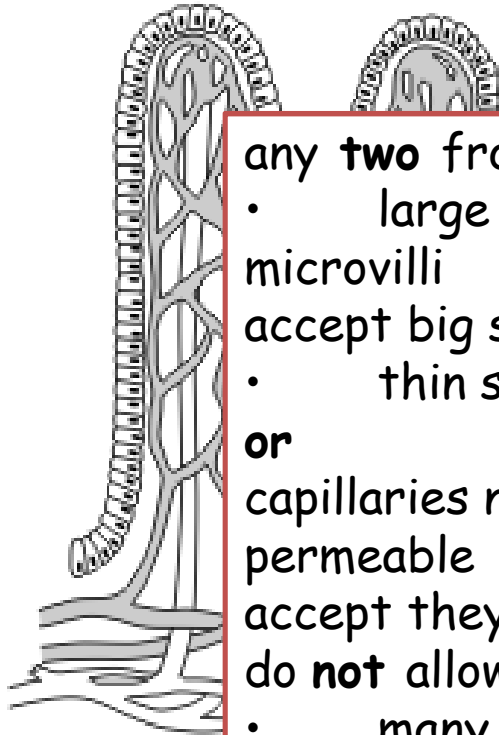
Oxygen passes through this cell by

diffusion
osmosis
respiration

(1)

Diagram 1 shows two villi in the small intestine of a healthy person.

Diagram 1



any **two** from:

- large surface / area **or** many villi **or** have microvilli

accept big surface / area

- thin surface **or** thin wall **or** surface 1-cell thick **or**

capillaries near surface **or** permeable **or** partially permeable

accept they are thin

do **not** allow thin **cell** wall

- many blood vessels **or** many capillaries **or** capillary network

or good blood supply

ignore 'constant blood flow' owtte

ignore extras eg moist or reference to gases

- have enzymes

ignore release enzymes

- accept reference to lacteal as 5th point

- allow reference to having mitochondria

(a) Describe **two** features

1

2

The table shows the concentrations of some mineral ions in the cells of a pond plant and in the surrounding pond water.

	Concentration in mmol per dm ³		
	Potassium	Calcium	Sulphate
Plant cells	49.0	7.0	7.0
Pond water	0.5	0.7	0.4

- (i) The plant cells would not have been able to absorb these mineral ions from the pond water by diffusion. Explain why not.

Because the plant cells have a higher concentration of mineral ions than the pond water.

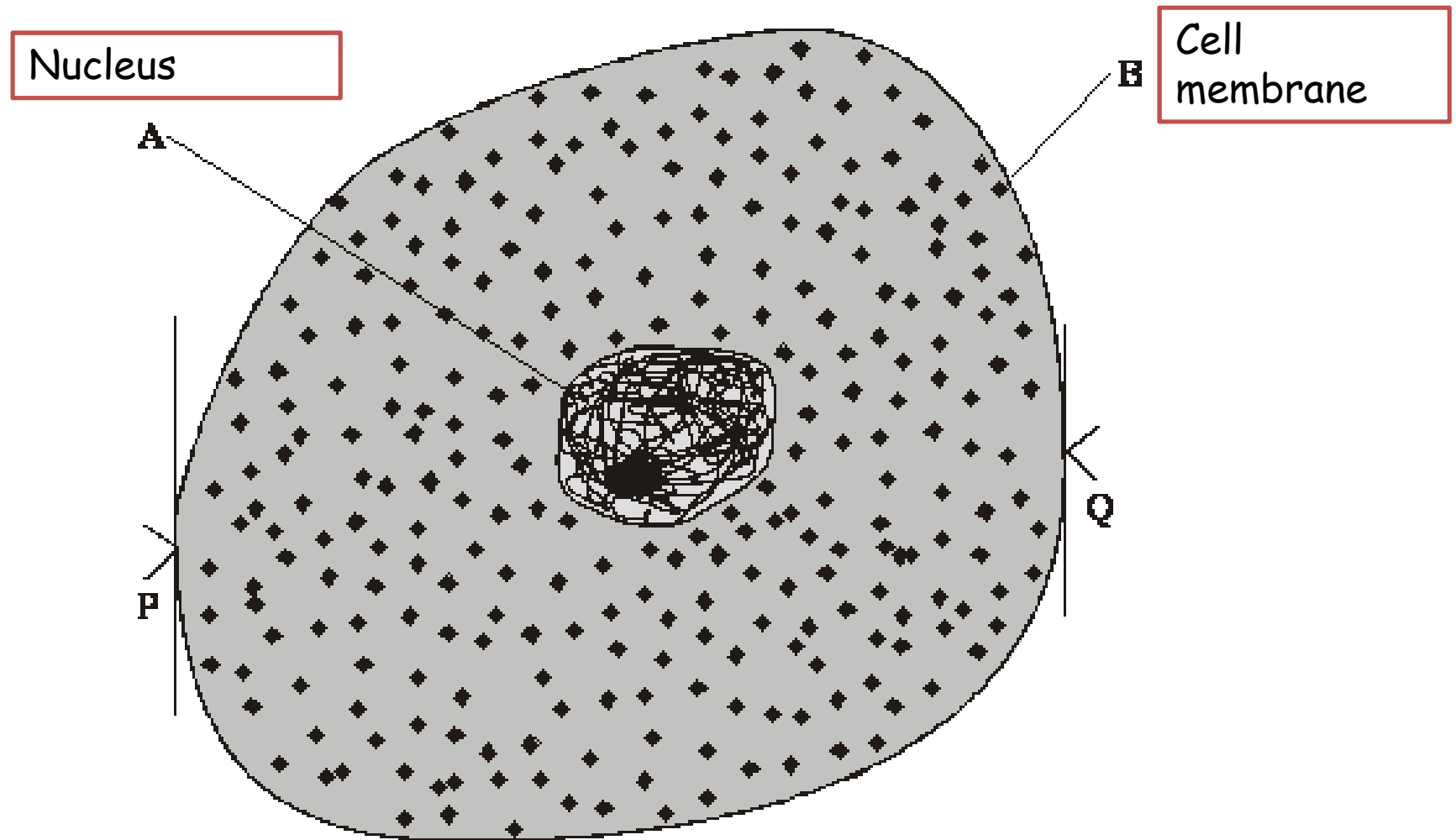
Diffusion happens from a **HIGH** concentration to a **LOW** concentration.

So the plant cells couldn't absorb the mineral ions, they would actually lose the mineral ions by diffusion and they would go into the pond water.

The only way the plant cells could **ABSORB** the mineral ions from the pond water is by **ACTIVE TRANSPORT** which happens from a low concentration to a high concentration

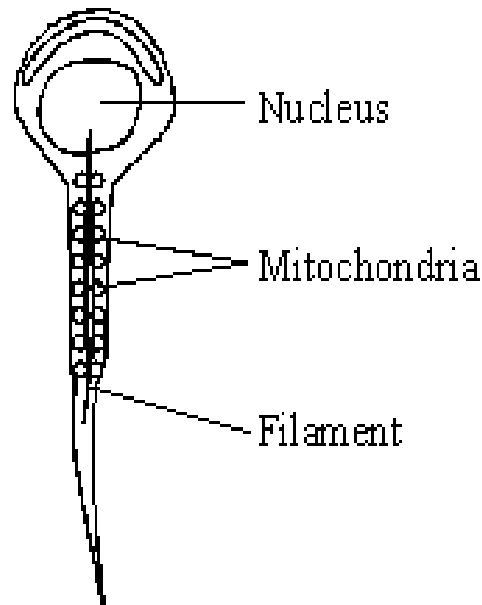
(2)

The diagram shows an animal cell.



- (a) (i) Name structures **A** and **B** by choosing the correct words from the box.

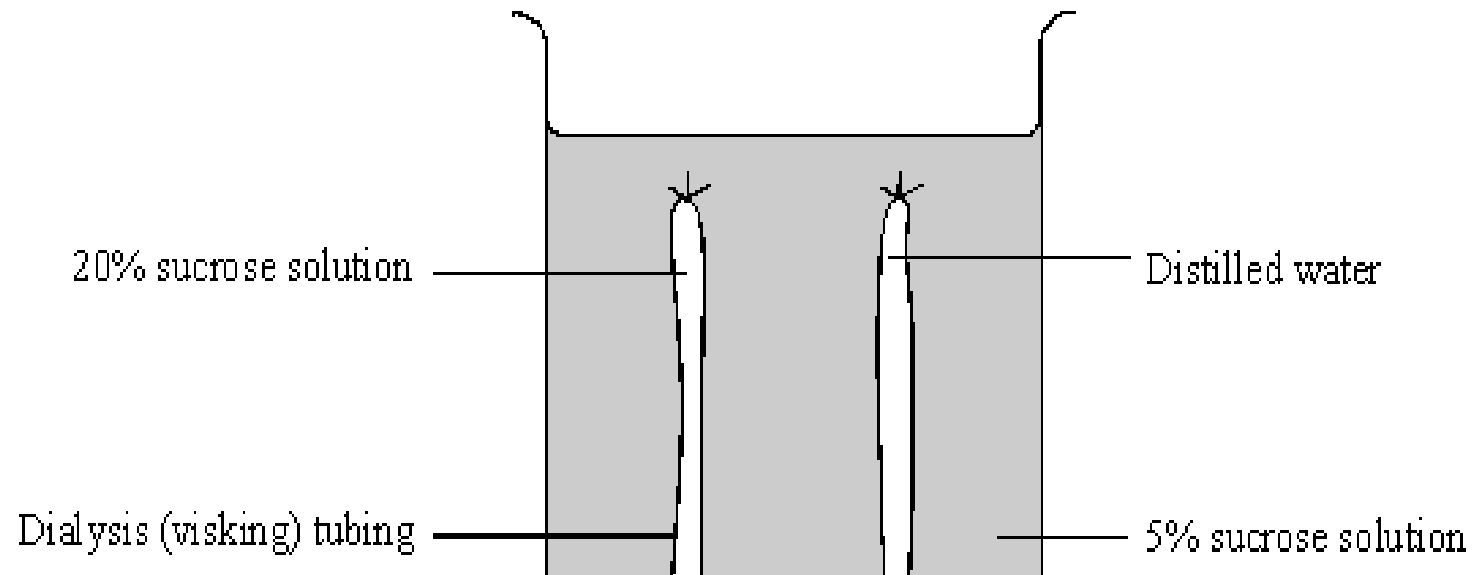
The diagram shows a human sperm. Inside the tail of the sperm is a filament mechanism that causes the side to side movement of the tail, which moves the sperm.



(a) Describe the function of the mitochondria and suggest a reason why they are arranged around the filament near the tail of the sperm.

- energy released or energy transferred or respiration allow provides or gives energy do not allow produces energy or makes energy
- near to the site of movement or energy available quickly
- accept allows more mitochondria to fit in (mitochondria) packed (around filament) or efficient arrangement

Some students set up this experiment to investigate osmosis. They filled two pieces of dialysis [visking] tubing with different liquids and left them both in a beaker of 5% sucrose solution for an hour.



for tube 1:

- expands or gets firmer or bigger or inflates
- it gains water
- because the concentration of water is less than its surroundings

make sure answer is about water movement and not sucrose solution

for tube 2:

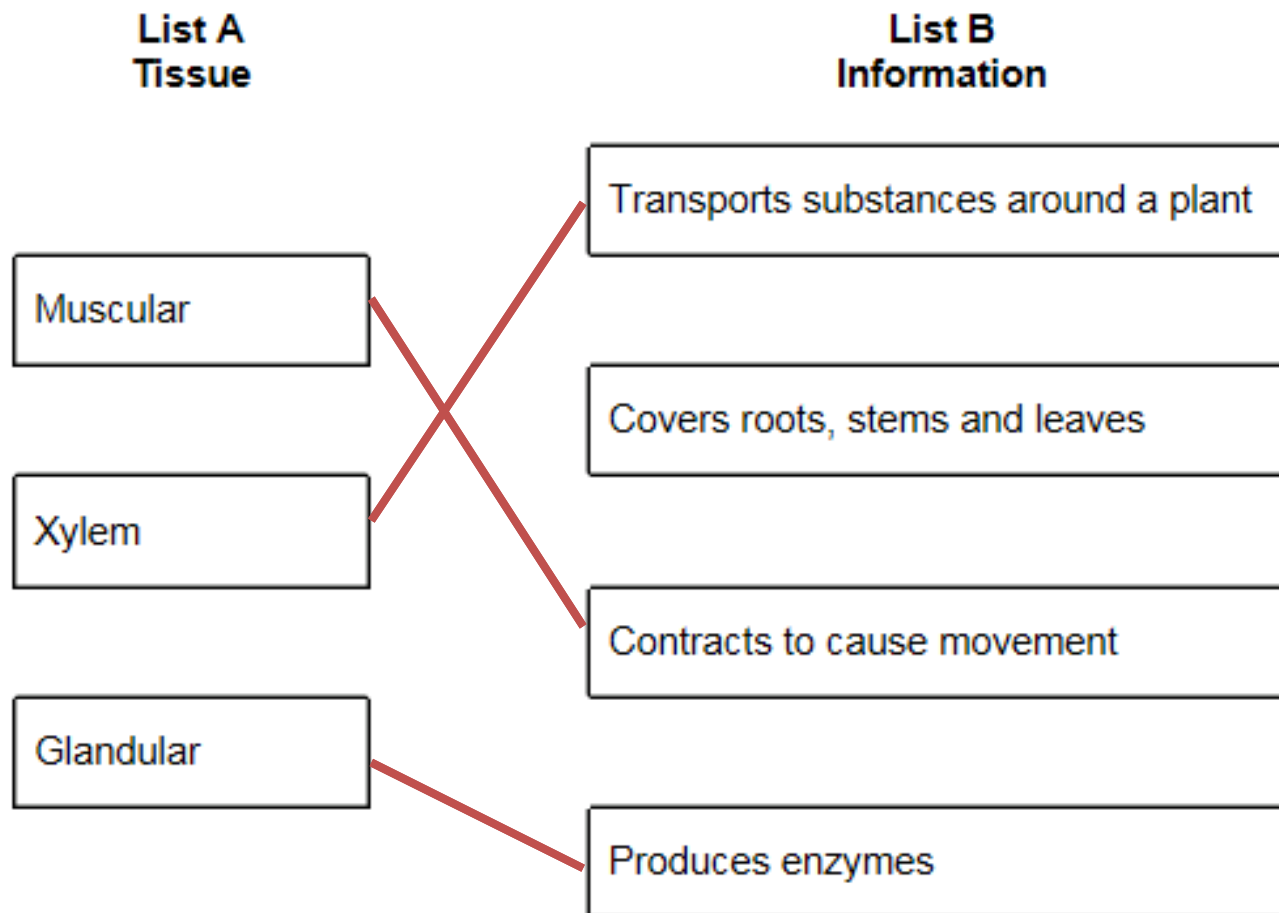
- gets floppy or flaccid or contracts
- it loses water
- because the concentration of water is greater than its surroundings

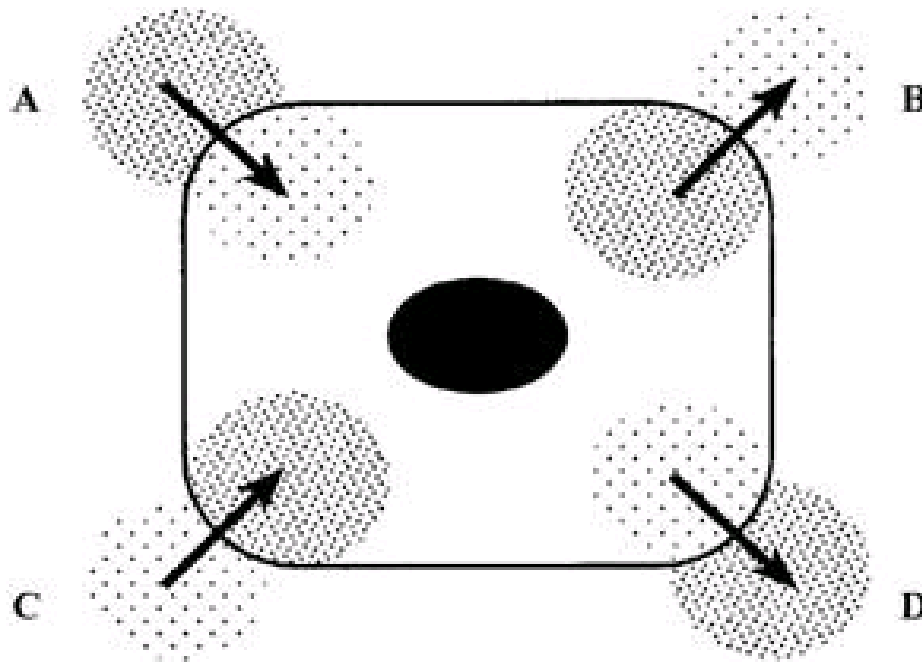
Plants and animals have tissues which carry out different functions.

List A gives three tissues in living organisms.

List B includes information about each tissue.

Draw **one** line from each tissue in **List A** to the correct information about the tissue in **List B**.





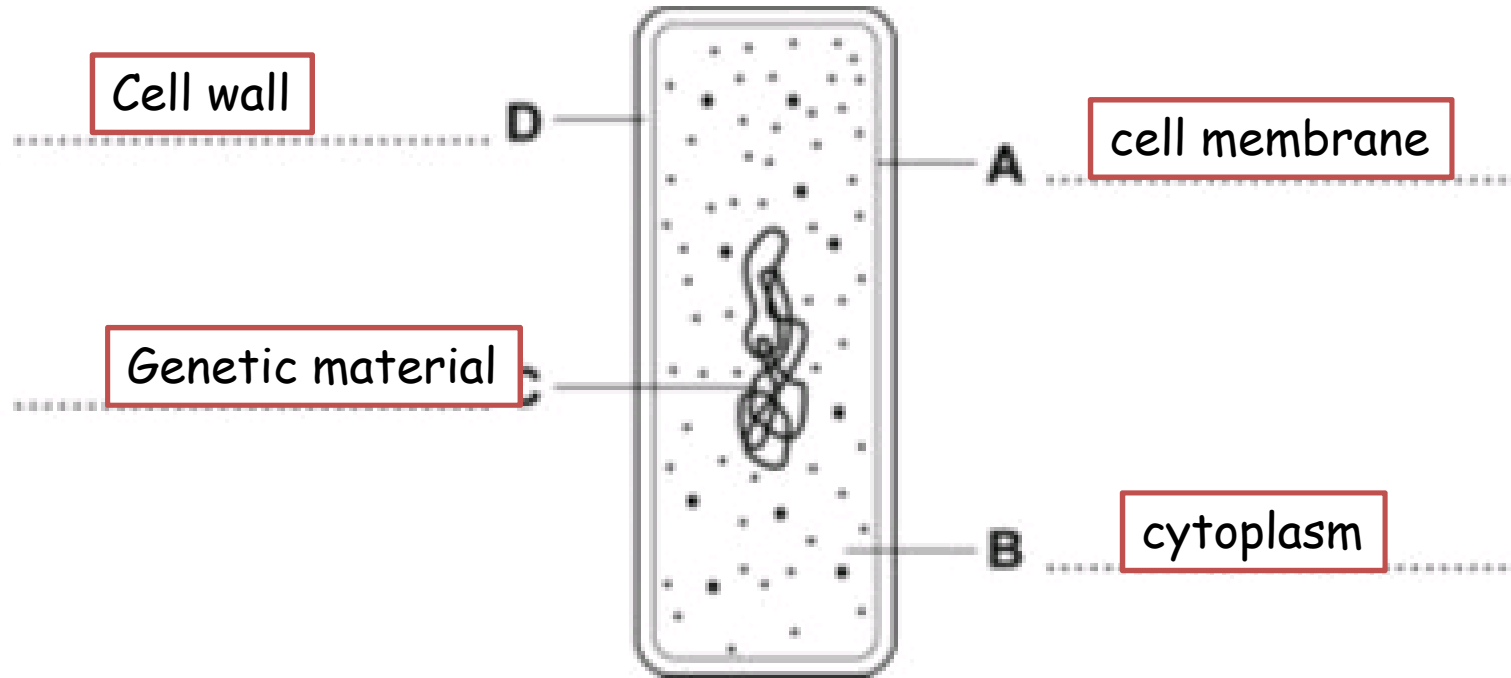
The cell is respiring aerobically.
Which arrow, **A**, **B**, **C** or **D** represents:

(i) movement of oxygen molecules;

(ii) movement of carbon dioxide molecules?

(c) Name the process by which these gases move into and out of the cell.

The diagram shows a bacterium.



On the drawing, name the structures labelled **A**, **B**, **C** and **D**.

Topic you need to know about:

Chapter 1: cells, tissues and organs ✓

Chapter 2: organisms in the environment ✓

Chapter 3: enzymes

Chapter 4: energy from respiration

Chapter 5: simple inheritance in animals
and plants

Chapter 6: old and new species

Chapter 2- organisms in the environment

1. What is the word for the process of photosynthesis? **1. carbon dioxide + water (+ light energy) → glucose + oxygen**

2. What is the chemical equation for photosynthesis? **6CO₂ + 6H₂O (+ light energy) → C₆H₁₂O₆ + 6O₂**

3. Do plants respire?

4. What is a vascular bundle?

5. One of the products of photosynthesis is glucose. How is it transported into the rest of the plant?



remember!
white bits. It is only

6. What is the function of the chloroplast?

7. How can photosynthesis be measured?

8. What is a limiting factor?

9. What does a limiting factor do?

10. What does a limiting factor affect?

11. Starch is a polysaccharide. What is its function?

12. What are the products of photosynthesis?

13. State what is meant by a limiting factor.

14. State the advantages and disadvantages of growing plants in a glasshouse. **14. advantages: bigger yield, growth of crops all year round (and when certain crops are produced out of season they usually sell for more money than when they are in season). Disadvantages: expensive to run, lots of energy needed (lighting, heating etc).**

15. What is the difference between independent, dependent and control variable?

15. independent- change, dependent- measure, control- keep the same (always more than one)

Chapter 2 continued- communities of organisms and their environment

1. Mean is the average, median is the middle number (we

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- 1 Plants like sea splurge that are adapted to harsh conditions next to the sea (salt, few minerals).
- 2 Marram grass stabilises the soil.
- 3 Mosses and lichens establish. Ridges have slacks where rushes and wetland plants grow.
- 4 Shrubs grow in 'dune scrub', small mammals live here.
- 5 Woodlands grow, this is the climax community.

1. What is the difference between a community and an ecosystem?
2. Work out the mean, median and mode for the following data.
3. How can temperature affect the distribution of organisms?
4. How can the distribution of organisms affect the environment?
5. How can the distribution of organisms affect the climate?
6. What is biodiversity?
7. What does 'species richness' mean?
8. What is a quadrat?
9. State the difference between a community and an ecosystem.
10. Name two sampling methods.
11. What is a random number generator?
12. What is a systematic sampling method?
13. Describe the difference between a community and an ecosystem.

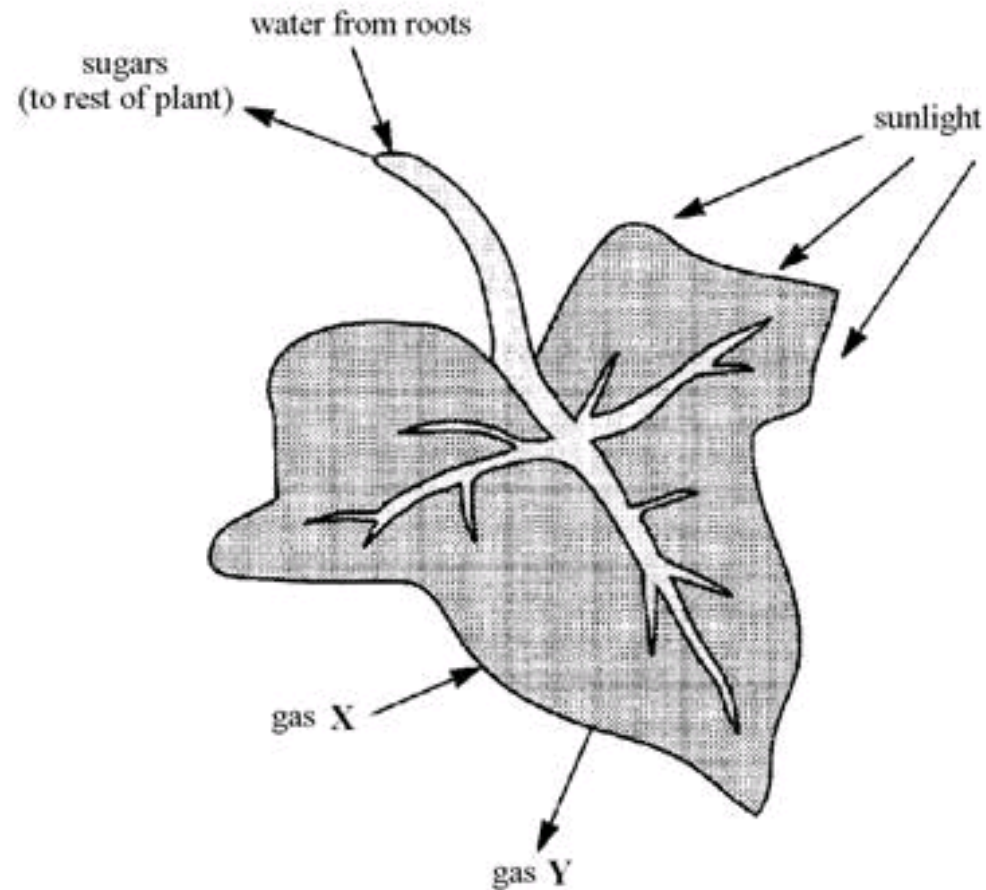
10. S...
13. S...
in an...
an ecosys...
to es...
communit...

However...
- You c...
random num...

- You can use these numbers to find out where you should place your quadrats.
- You can also do this by systematic sampling- a grid is placed on the area you want to find out the total number of organisms of, and then you mark out the quadrats at equal points.

use

The diagram shows a plant leaf during photosynthesis.

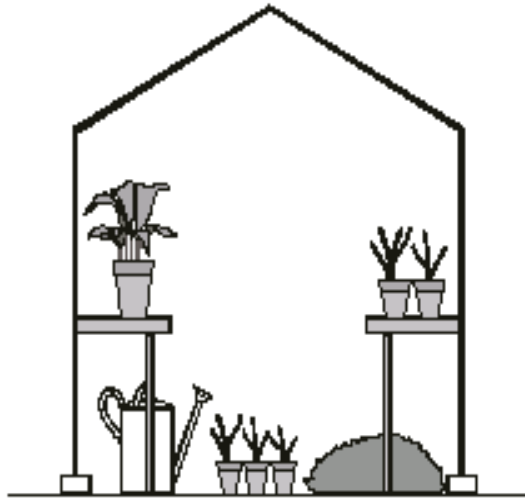


(a) Name:

(i) gas X;

(ii) gas Y.

The diagram shows some plants growing in a greenhouse on a hot summer's day.



Which **one** of the following factors is most likely to limit the rate of photosynthesis at this time?

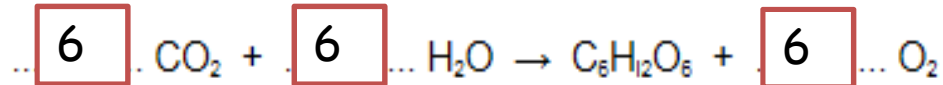
- carbon dioxide concentration
- light intensity
- temperature

Factor . **carbon dioxide concentration** ..

Explain the reason for your answer.

- **since atmospheric concentration very low / value give e.g. 0.03%**
- allow carbon dioxide used up
- **temperature high**
- allow if light chosen as a factor
- **light intensity high**
- allow If temperature chosen as a factor

(a) Balance the following equation for photosynthesis.



(1)

(b) Give range

- any **two** of
 - (presence of) chlorophyll **or** (amount of) chloroplasts
 - accept green leaves (or other green parts)
 - (sufficient) light (intensity)
 - (light) of a suitable wavelength

(2)

(a) Plan

these kinds of cell assists photosynthesis.

each of

Guard cells ...

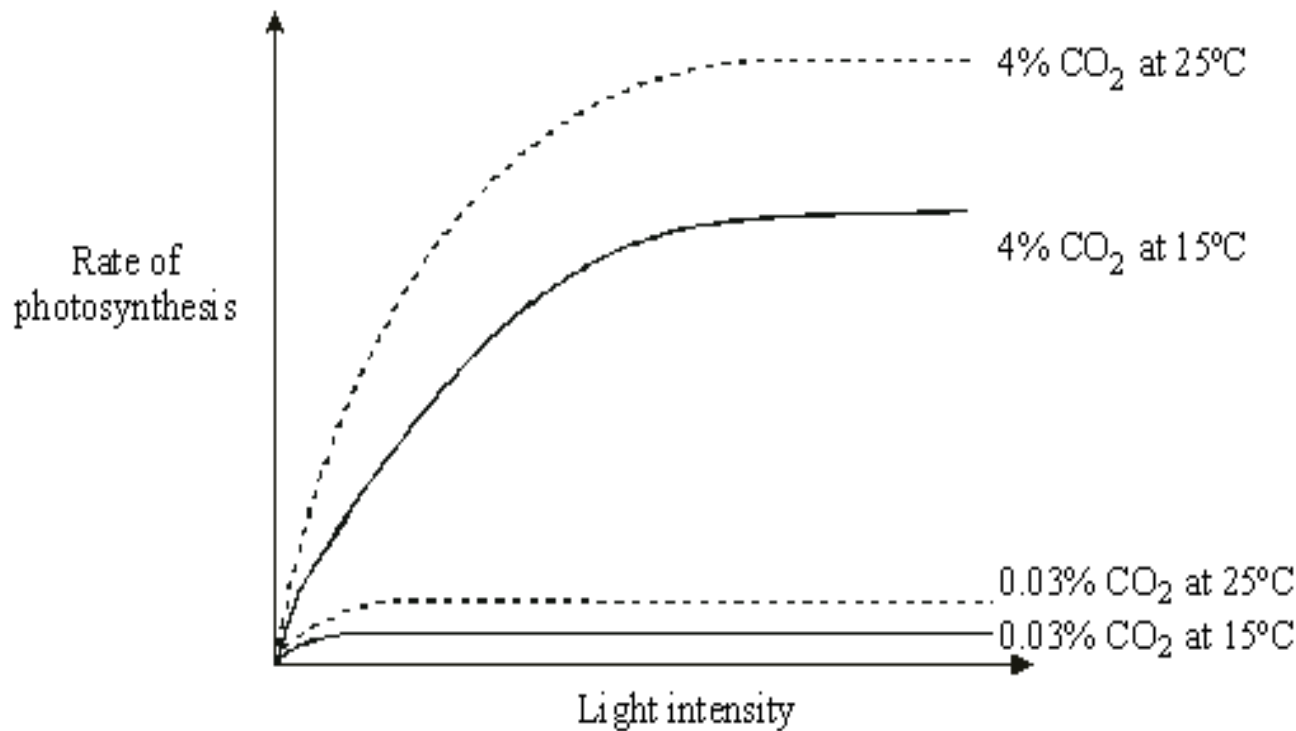
- control by osmosis
- the movement of gases
- Through stomata

Palisade cells

- * near the upper surface
- * contain (a great) many **or** more chloroplasts
- * (so) contain the most chlorophyll

(2)

The graph shows how the rate of photosynthesis is affected by different conditions.



(a) What patterns can you find from this graph?

- + light = + photosynthesis
- + light = + photosynthesis to a limit
- limit depends on temp/CO₂ levels
- + CO₂ = + photosynthesis
- + temp = + photosynthesis

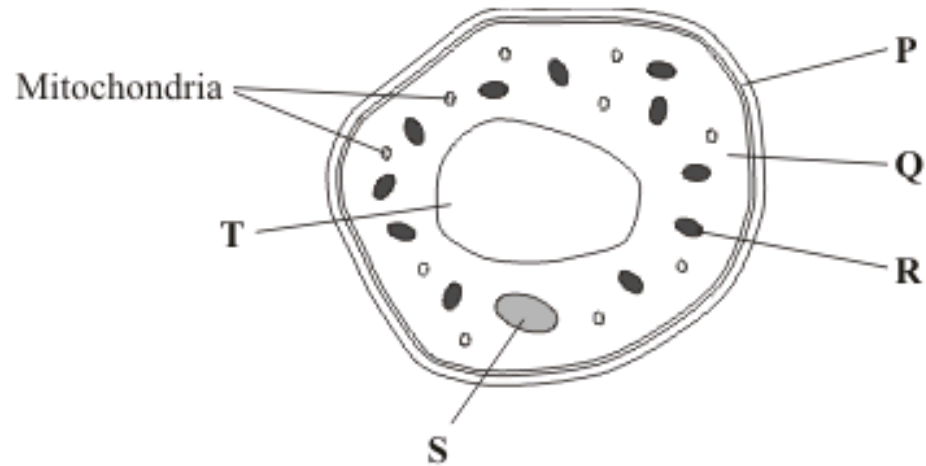
.....

.....

.....

.....

(ii) The diagram shows a cell from a leaf.



Give the letters of **two** parts of the leaf cell which would **not** be found in a sperm cell. and .

(1)

P, R or T (give two only)

light

energy from the sun.

oxygen

comes out of the leaf into the air.

chlorophyll

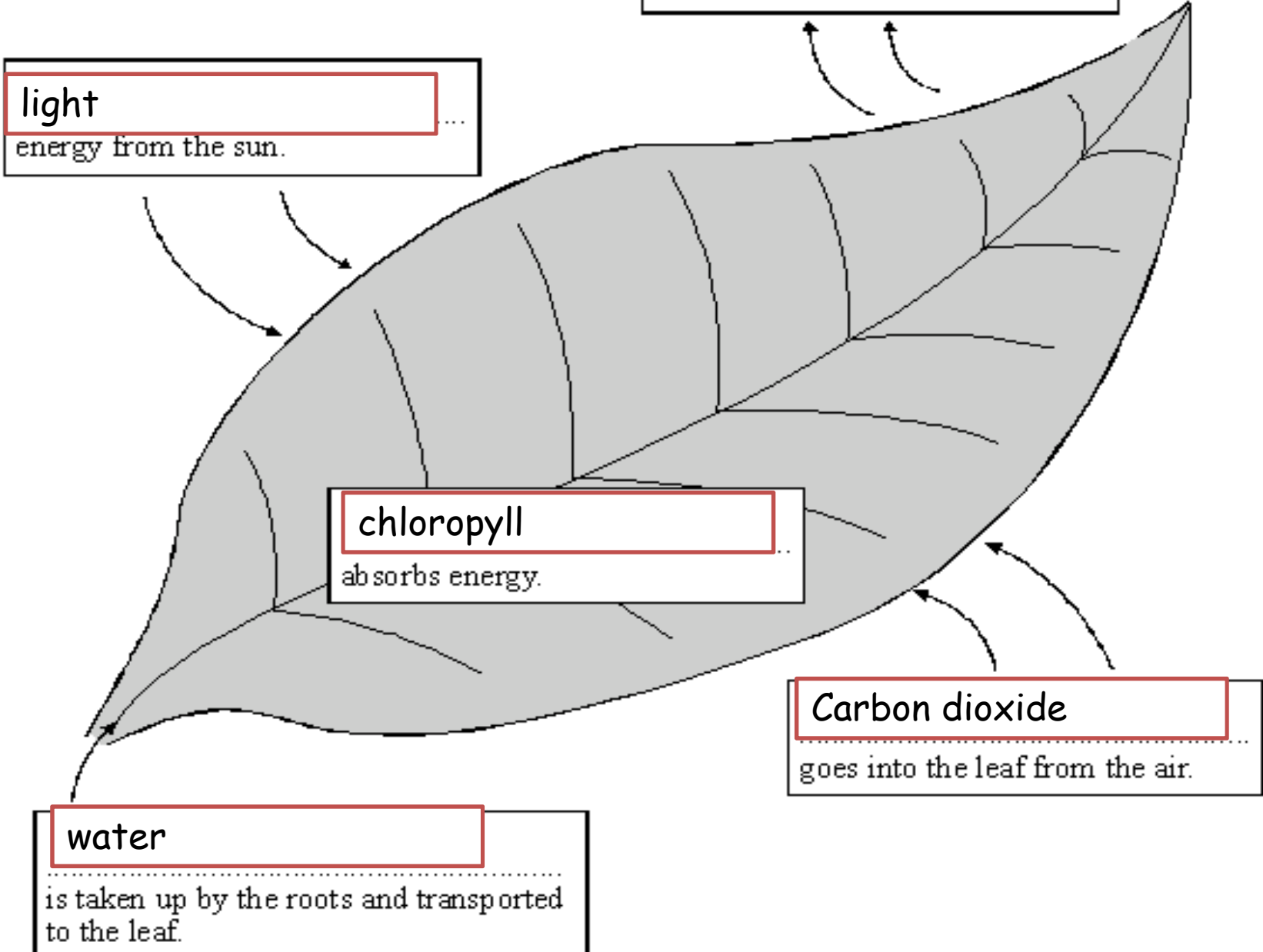
absorbs energy.

Carbon dioxide

goes into the leaf from the air.

water

is taken up by the roots and transported to the leaf.



(b) (i) Complete the following sentence

Sugar/carbohydrate

Glucose in food is a type of When we eat it, it gives us energy.

(1)

(ii) The plant turns some of the glucose into starch. Why is starch useful to the plant?

It can be stored OR
It is insoluble

(1)

(iii) What does

Either of:
- Uses it in respiration
- Turns it into cellulose
- Turns it into protein
- Turns it into lipids

(1)

(c) (i) What is the name of the process outlined in the diagram?

photosynthesis

(1)

(ii) Give **one** way that leaves are adapted to do this process.

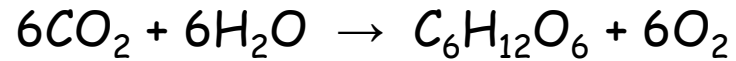
One from:
- They are thin
- They have a large surface area
- They are flat
- They have stomata
- They have air spaces
- They have chloroplasts
- They have veins

(1)

(Total 10 marks)

Photosynthesis takes place the leaves of green plants.

- (a) Write a balanced chemical equation for the formation of glucose by photosynthesis.



(3)

- (b) Describe **two** ways that the rate of photosynthesis can be decreased without lowering the temperature.

1 mark each for any of the following ideas:

lower CO_2 concentration

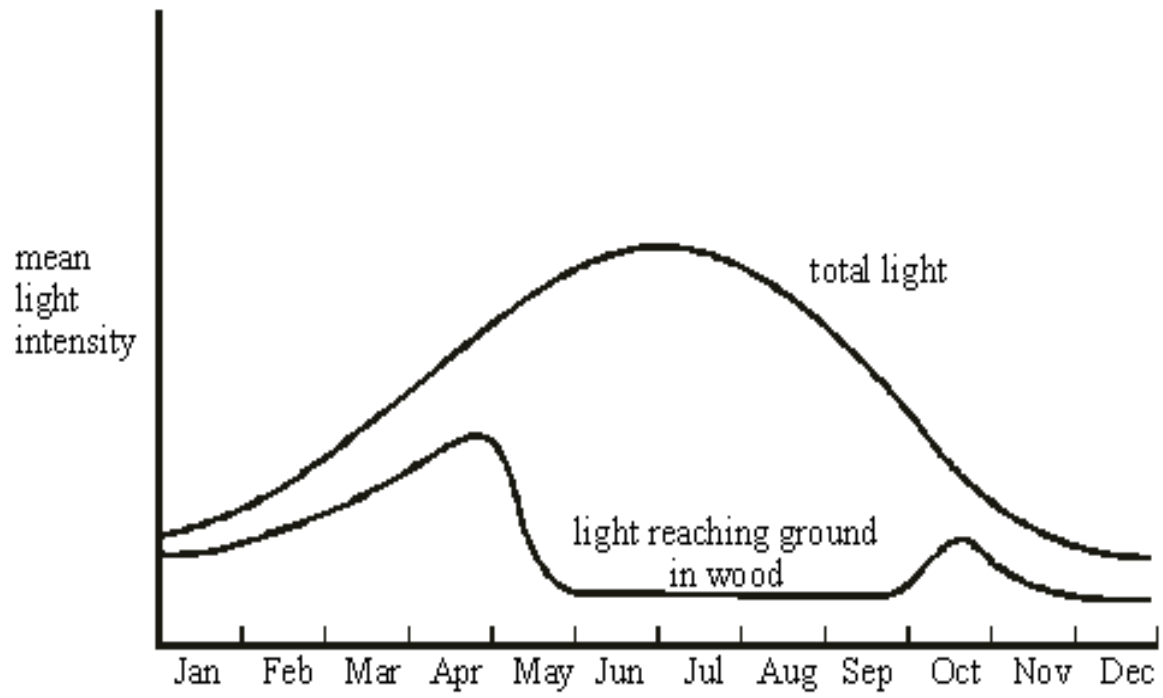
lower light intensity

decrease water availability

alter light wavelength or colour

accept more green light

The graph shows the mean light intensity at different times of the year in an oak wood.



(a) (i) In which month would you expect the rate of photosynthesis in the oak trees to be greatest?

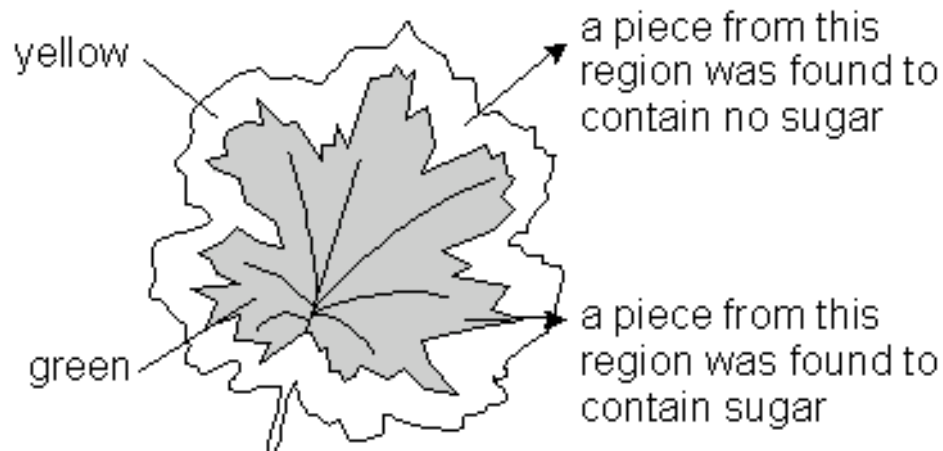
June

(1)

(ii) There are plants living on the ground in the wood. In which month would you expect their rate of growth to be fastest?

April

A plant with variegated (two-coloured) leaves was left in sunlight for several hours. Pieces of one of its leaves were then detached (removed) and tested for sugar. The diagram below shows the results.

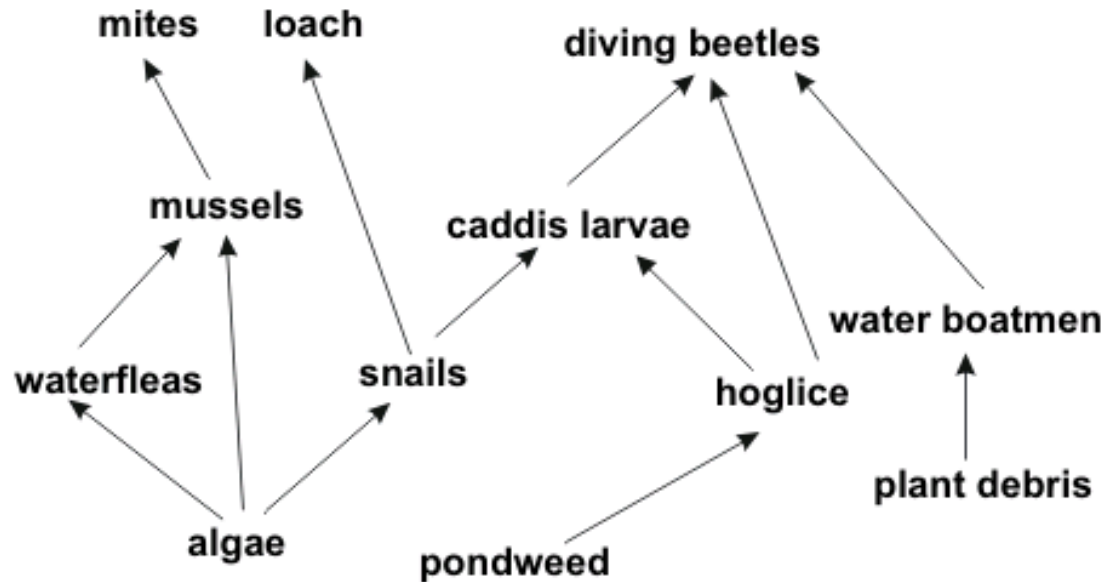


Explain, as fully as you can, why the yellow region of the leaf had not produced sugar.

- Does not contain chlorophyll
- which is needed to absorb light or energy

(Total 2 marks)

The diagram below shows a food web for some of the organisms which live in a pond.



(a) (i) Name **one** secondary consumer in this food web.

e.g. mussels/caddis/ loach

(1)

(ii) The algae are small green plants.

Give **three** conditions needed by green plants to produce sugars.

1 water

2 Carbon dioxide

3 light

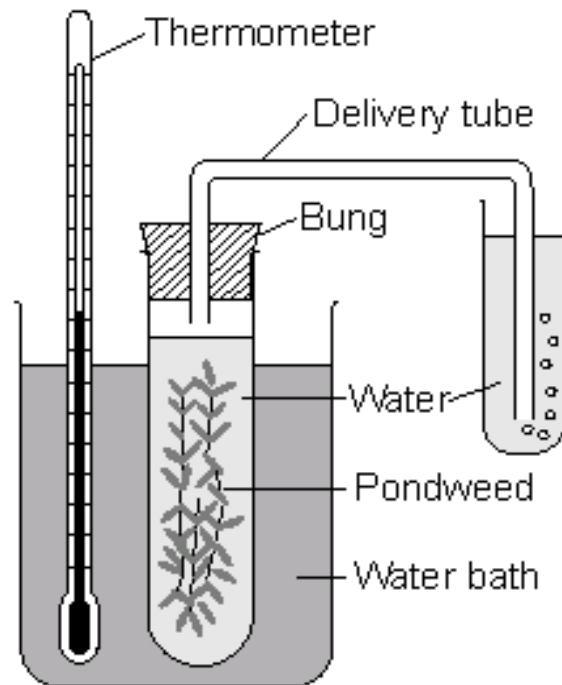
Plants produce food by photosynthesis.

(a) Complete the equation for photosynthesis.

carbon dioxide + ... **water** ... (+ light energy) → glucose + **oxygen**

(2)

Some students investigated the effect of temperature on the rate of photosynthesis in pond weed. They set up the apparatus and altered the temperature using ice and hot water. They counted the number of bubbles given off in a minute at different temperatures.



(b) Why did the students use a water bath?

Keep temperature constant

- (a) Put a tick (✓) in the correct boxes in the table below to show which of the parts given are present in the cells and organisms listed.

	CYTOPLASM	NUCLEUS	CELL WALL	GENES
Leaf mesophyll cell	✓	✓	✓	✓
Sperm	✓	✓		✓

(2)

- (b) (i) What is the main job of a leaf mesophyll cell?

absorbs light/to produce food

(1)

- (ii) Explain **one** way in which the structure of the leaf mesophyll cell helps it to carry out its job.

e.g.
has chlorophyll/chloroplasts
has elongated shape to absorb light

(2)

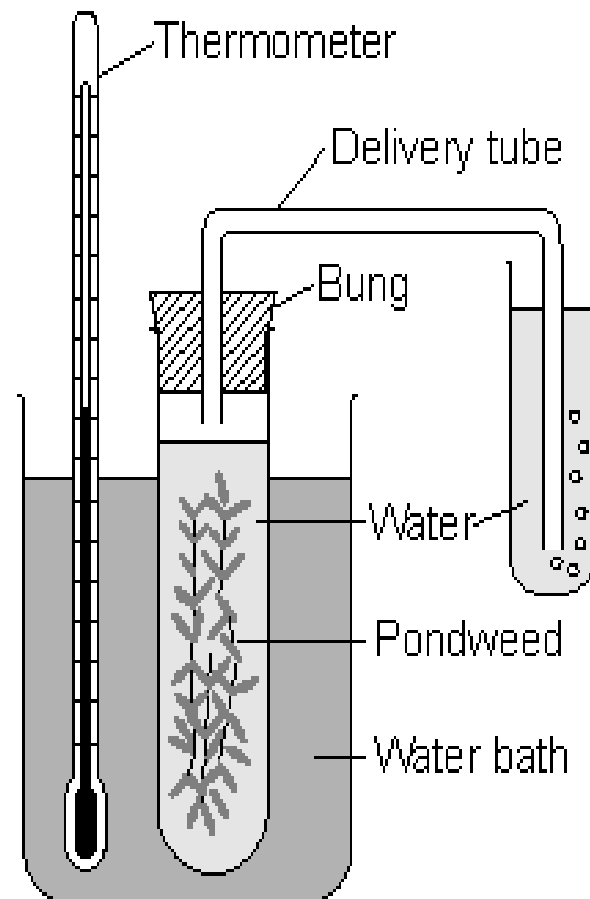
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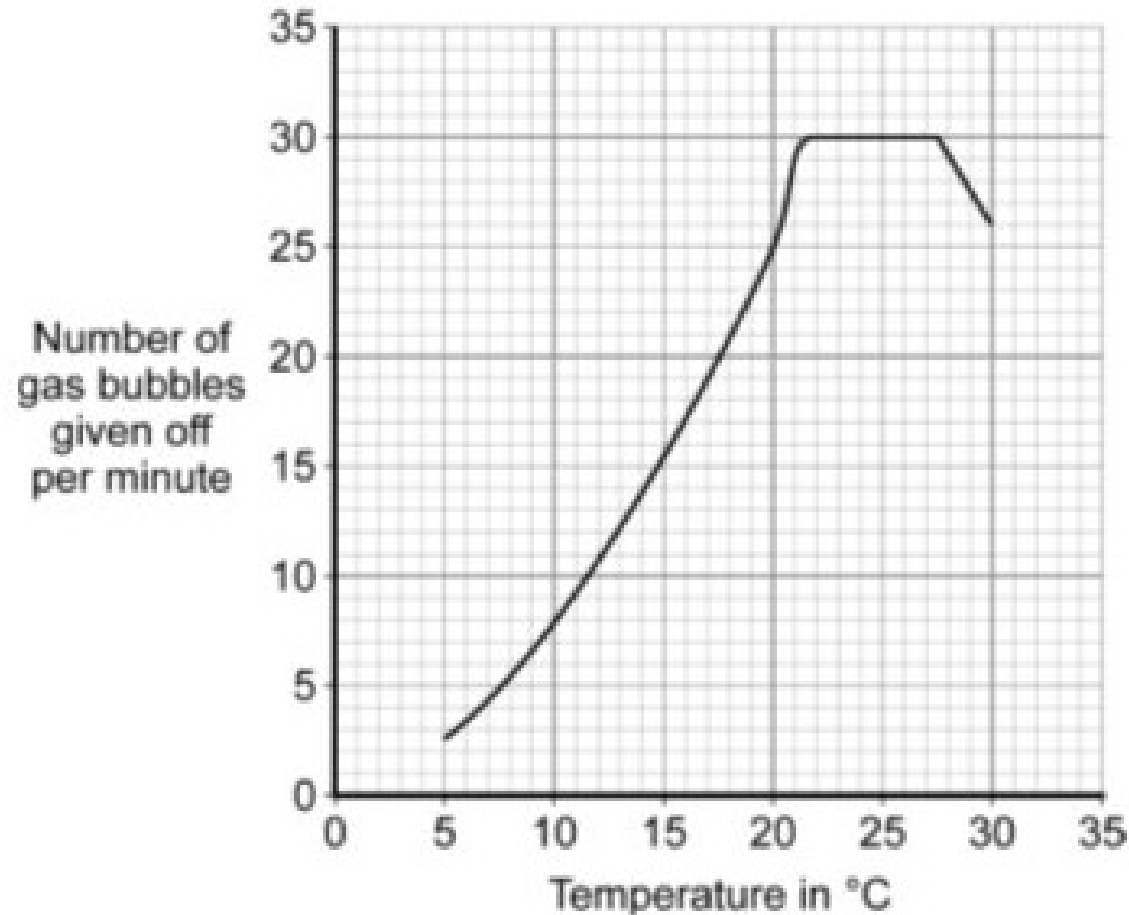


(b) Why did the students use a water bath?

keep temperature constant

Continued from previous slide
(same question)

The graph shows the students' results.

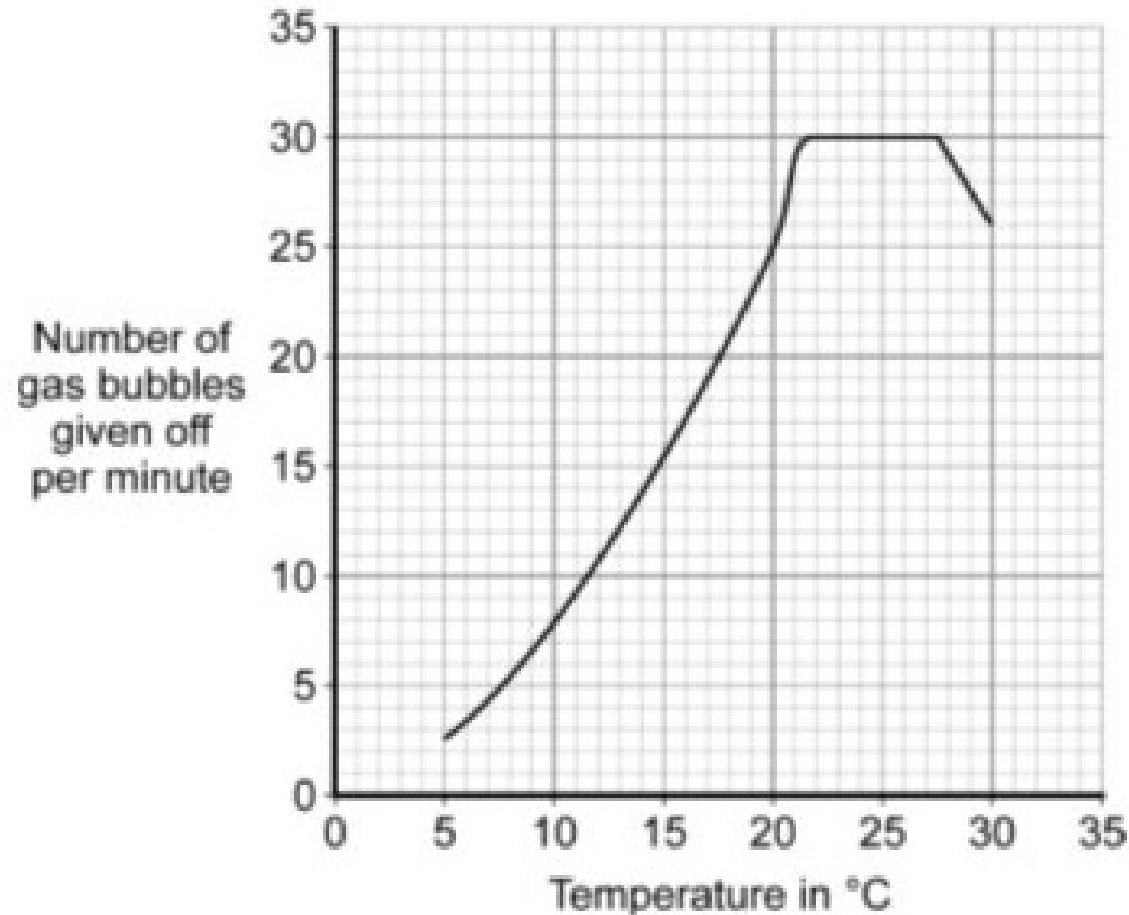


(c) Explain the shape of the graph between 22 °C and 27 °C.

a factor other than temperature is limiting
do **not** accept water 1
eg carbon dioxide

Continued from previous slide
(same question)

The graph shows the students' results.



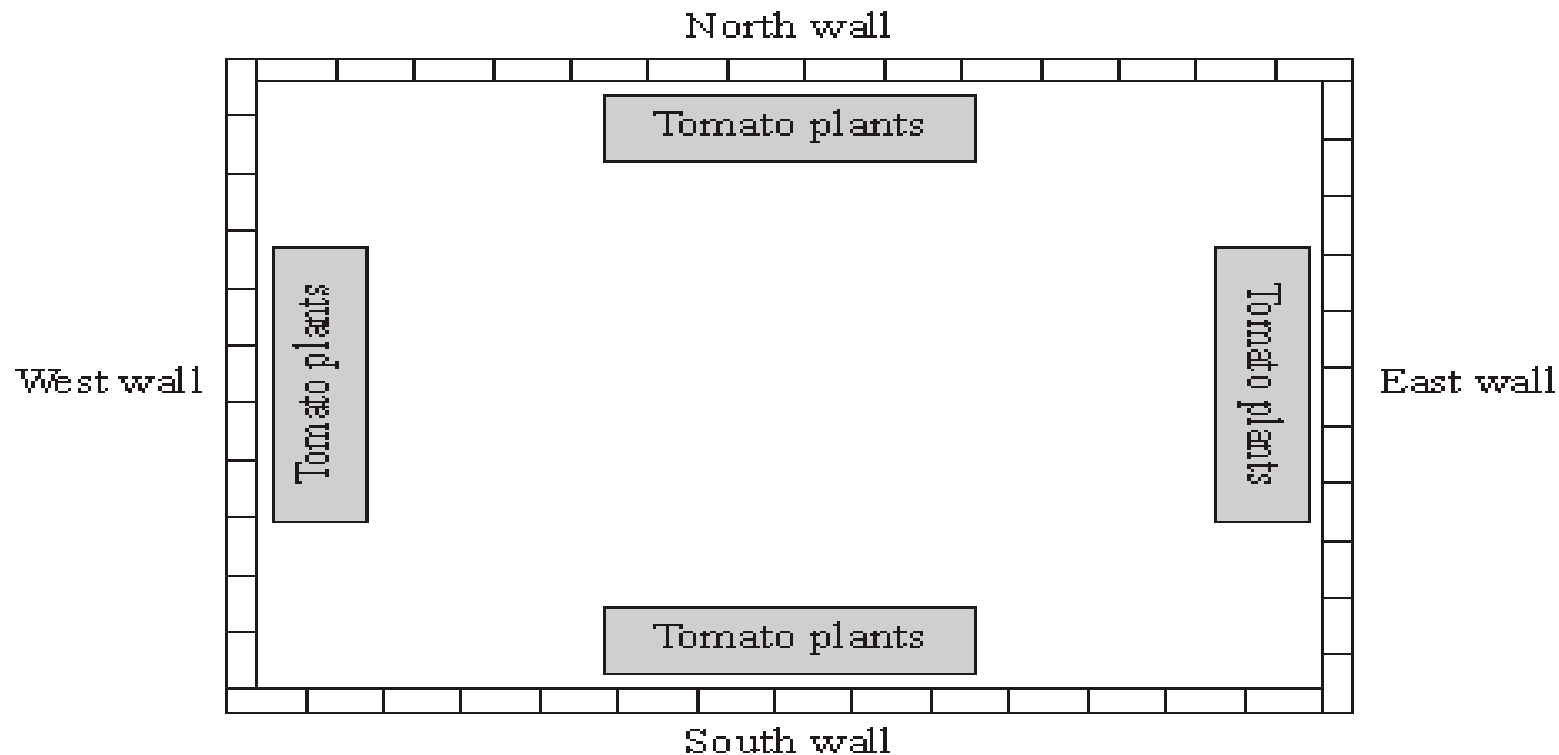
(c) Explain the shape of the graph between 22 °C and 27 °C.

a factor other than temperature is limiting
do **not** accept water 1
eg carbon dioxide

A gardener grows tomatoes.

He wants to find out how to get the biggest mass of tomatoes.

He plants different varieties of tomato against different walls in his garden.



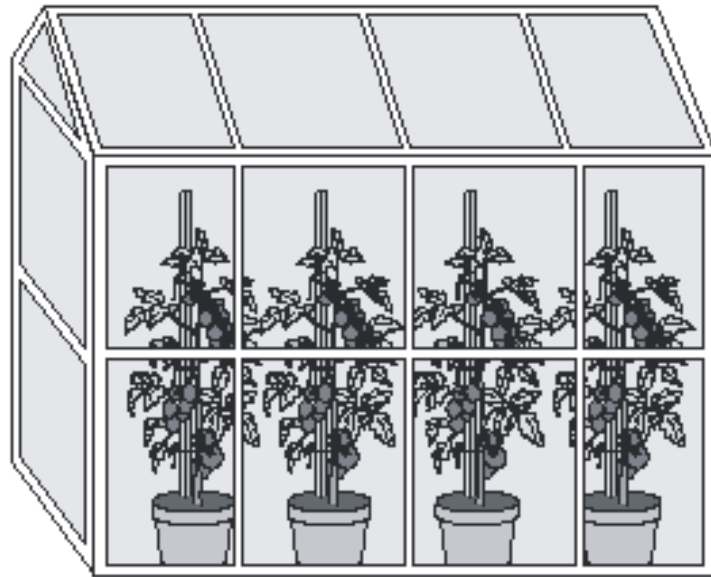
Use these results to answer the questions.

(a) The gardener wants his test to be a fair test.

Name **one** condition which should be kept the same.

.....
.....

- any **one** from:
- (type of / amount of) soil / minerals / nutrients / pH
 - amount of water / time of watering
 - space between plants / plants and wall
 - time for growth



- (a) Suggest **one** way in which a grower could increase the yield of tomatoes from plants growing in his greenhouse.

.....
.....

any **one** from:

- increase / give light
- increase temperature / make warmer
- increase / give CO₂

(b) any **two** from:

- cheaper

allow grow faster / more grown

- better quality / flavour

ignore size

- available all year

accept converse if clear that answer refers to use of British tomatoes

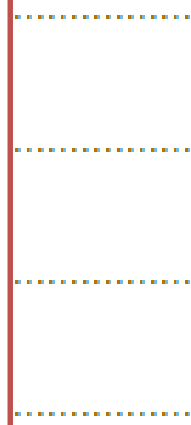
allow 'Fair Trade'

(ii) Importing tomatoes may be more damaging to the environment than selling tomatoes grown in this country.

Explain why.

any **two** from:

- greater distance **or** more food miles **or** more transport
idea of more needed only once
- transport needs (more) energy / **fuel**
- reference to eg greenhouse effect / global warming / pollution / CO₂ release / carbon footprint
ignore ozone



(2)
(Total 5 marks)

(a) (i) Complete the word equation for photosynthesis.

carbon dioxide + **Water** (+ light energy) → glucose + **Oxygen**

(2)

(ii) Most of the carbon dioxide that a plant uses during photosynthesis is absorbed from the air.

Give **one** other source of carbon dioxide for a plant.

Draw a ring around your answer.

the soil **respiration in the plant** **osmosis in the plant** **water**

(1)

Green plants are able to make their own food.

Complete each sentence by drawing a ring around the correct answer in the box.

(a) Green plants make their own food during the process of

diffusion

photosynthesis

respiration

(1)

(b) This process can be summarised by the equation:

carbon dioxide + water → glucose +

mineral salts

light

oxygen

(1)

(a) The equation describes the process of photosynthesis.

carbon dioxide + **water** + light energy → glucose + **oxygen**

(i) Write in the names of the **two** missing substances.

(2)

(ii) Name the green substance which absorbs the light energy.

Chlorophyll (cant get a mark for saying chloroplast as it is a component not a substance. You can get a mark if you say chlorophyll which is found inside chloroplasts though)

(b) (i) In bright sunlight, the concentration of carbon dioxide in the air can limit the rate of photosynthesis. Explain what this means.

light intensity / temperature is high enough for higher rate
or light /

temperature is not limiting

low CO_2 available or not enough CO_2

available or rate would be higher with CO_2

(ii) Give **one** environmental factor, other than CO_2 concentration, which can limit the rate of photosynthesis.

temperature

allow water / rain

allow (too) cold / hot as a minimum

allow wave length / frequency / colour

ignore ions

ignore heat

Photosynthesis takes place in green plants.

(a) Name the substance that combines with water in photosynthesis.

carbon dioxide/ CO_2

(1)

(b) Where does water enter the plant?

through the roots/root hairs
do **not** accept leaves

(1)

(c) Name **two** products of photosynthesis.

oxygen

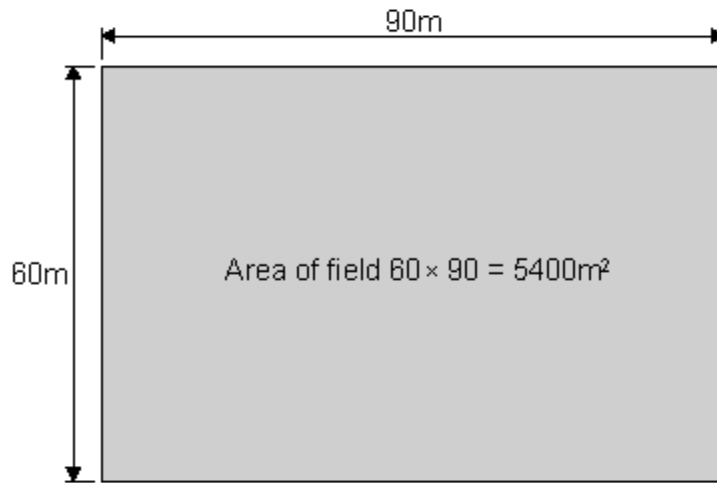
(2)

A class of students was set the task of estimating the number of dandelions on the school field.

To do this, they decided to use sampling squares called quadrats.

Each quadrat had an area of 1 m^2 .

The diagram shows the dimensions of the school field.



(a) Which is the best way of using quadrats in this investigation?

Tick (✓) **one** box.

Statement	Tick (✓)
Place all the quadrats where there are lots of plants.	
Place all the quadrats randomly in two different sample areas.	<input checked="" type="checkbox"/>
Place all the quadrats where all four types of plant are growing.	

Describe the uses made by plants and algae of the glucose produced during photosynthesis.

glucose can be used for respiration by the plant

1

production of fat or oil

1

production of cellulose

1

production of proteins

(Total 4 marks)

These are the results for one student, Mary.

Quadrat number	Number of dandelions
1	3
2	3
3	6
4	2
5	1
6	2
7	0
8	3
9	2
10	0

Calculate the mean number of dandelions per quadrat counted by Mary.
Show clearly how you work out your answer.

.....
.....

Mean number of dandelions

Topic you need to know about:

Chapter 1: cells, tissues and organs ✓

Chapter 2: organisms in the environment ✓

Chapter 3: enzymes ✓

Chapter 4: energy from respiration

Chapter 5: simple inheritance in animals
and plants

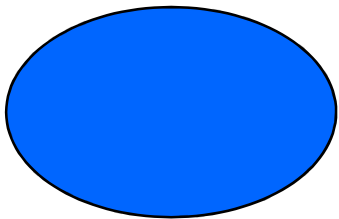
Chapter 6: old and new species

Use of enzymes	Detail	Advantage	Disadvantage
Biological detergent	Contain proteases and lipases. Work better at lower temperatures than non-biological detergents. So reduces energy costs.	Helps to remove stains Lower temp needed Reduces energy costs	Might irritate some people's skin. The enzymes may go into rivers and harm the water life. Using low temperature may not kill pathogens on clothes.
Baby food	Proteases used in baby food to pre-digest the food.	Helps baby's digestive system to cope with protein.	May trigger allergic reactions
Slimming foods	The enzyme isomerase can convert glucose into fructose. Fructose is sweeter so you need less of it.	Fructose is sweeter than glucose, so a smaller amount is needed. This makes fructose syrup a useful ingredient in slimming foods .	Enzymes such as isomerase are expensive to produce (used to convert glucose into fructose)

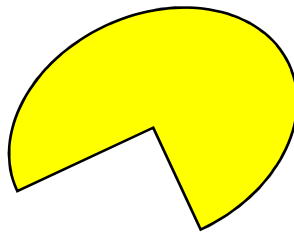
16. What are the uses of enzymes in industry?

What are enzymes?

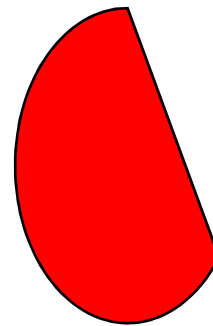
- Enzymes are **proteins** found in the body.
- They **speed up** chemical reactions like digestion.
- We can refer to enzymes as '**biological catalysts**'
- All enzymes are **specific** (they only act on one type of reaction)
- A lot of them end in '**ase**', but not all of them
- Enzymes are not used in the reaction, they just speed it up. So they can be **re-used**



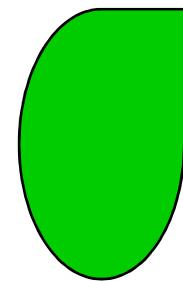
catalase



amylase



pepsin



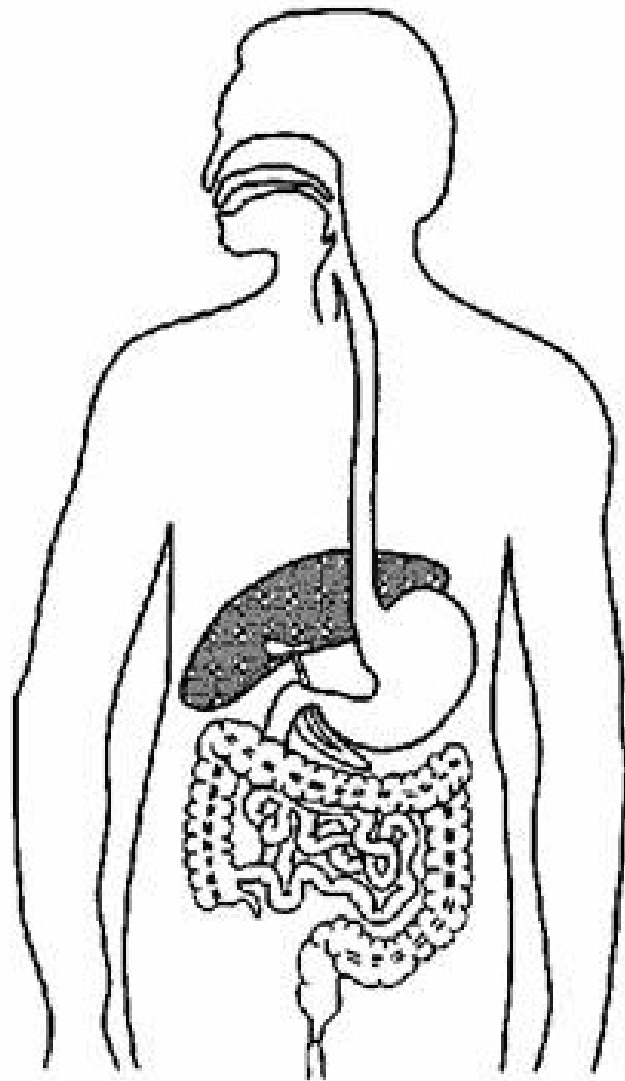
trypsin

How much can you remember so far?

1. Enzymes are proteins. this means that you can't use different enzymes on the same reaction.
2. All enzymes have an active site.
3. Enzymes can be re used as they don't take part in the reaction other than speeding it up.
4. Another term for an enzyme is a biological catalyst.

The diagram shows the digestive system.

Label me



Summary of Enzyme Location and Action

Enzyme	Location	Catalyses the breakdown of:
Carbohydrase (Amylases)	<ul style="list-style-type: none">▪ salivary glands▪ pancreas▪ small intestine	starch into sugars
Protease	<ul style="list-style-type: none">▪ stomach▪ pancreas▪ small intestine	proteins into amino acids
Lipase	<ul style="list-style-type: none">▪ pancreas▪ small intestine	lipids (fats and oils) into fatty acids and glycerol



(a) Complete the following sentences about digestive enzymes.

(i) Amylase works in the **mouth or saliva** where it is involved in the digestion of **starch** to **Maltose or glucose** (3)

(ii) Lipase works in the **Small intestine** where it is involved in the digestion of **Fats/lipids** to **Fatty acids or glycerol** (3)

(b) Which gland produces:

(i) amylase; **salivary**
accept pancreas (1)

(ii) lipase?
pancreas
accept small intestine or ileum (1)

(Total 8 marks)

We use enzymes in industry. These are some of the properties of enzymes:

- they work at low temperatures and this can save energy
- they work at atmospheric pressures and therefore use less expensive equipment
- they are easily broken down by high temperature or the wrong pH
- they are soluble in water, so it is difficult to separate them from water-soluble products
- they are very expensive to buy.

(a) Use the information above to answer this question.

(i) Give **two** advantages of using enzymes in industry.

1

- work at low temperatures / save energy

- work at low or atmospheric pressures / need less expensive equipment

2

(ii) Give **two** disadvantages of using enzymes in industry.

any **two** from:

- easily broken down by high temperature / low pH
- difficult to separate from water-soluble products
- very expensive to buy

Describe the roles of the liver and the pancreas in the digestion of fats.

pancreas produces lipase
which breaks down / digests fats into fatty acids and
glycerol
liver produces bile / hydrogen carbonate
which neutralises acids / makes alkaline
provides optimum / best / most effective pH for lipase /
enzyme action
bile emulsifies fats / description
increasing the surface area for lipase / enzyme to act on
any five for 1 mark each
(digestion is in stomach / liver / pancreas - penalise only
once)

(Total 5 marks)



Glutton up a gum tree

Along the banks of the Cygnet River on Kangaroo Island, the branches of the dying gum trees stretch out like accusing fingers. They have no leaves. Birds search in vain for nectar-bearing flowers.

The scene, repeated mile upon mile, is an ecological nightmare. But, for once, the culprit is not human. Instead, it is one of the most appealing mammals on the planet – the koala. If the trees are to survive and provide a food source, koalas must die. If they are

Illegal killing has already
for their guns. Why not cat
farmer Andrew Kelly. "Four
fought, bit and scratched lik

Use the information from
arguments for and again

pros e.g.:

gum trees survive therefore less soil erosion
therefore food webs not disrupted
if no culling, whole Koala population may die
easier to cull because Koalas are difficult to catch

cons e.g.:

Koala's 'right to life' / ethical issue
better to transfer to reserves on mainland than kill
could use tranquillisers to catch without killing
could allow population to stabilise naturally
max 4 of the above; max 3 pros or cons.

- (a) A food contains protein. Describe, in as much detail as you can, what happens to this protein after the food is swallowed.

digested / broken down / made soluble
by protease enzyme
in stomach in small intestine / from
stomach / from pancreas
into amino acids
amino acids / small molecules absorbed
into blood

The table shows the amounts of carbohydrate, fat and protein in 100 g portions of five foods, A - E.

FOOD	MASS IN 100 g PORTION (g)		
	CARBOHYDRATE	FAT	PROTEIN
A	0	1	20
B	50	2	8
C	0	82	0
D	12	0	1
E	20	0	2

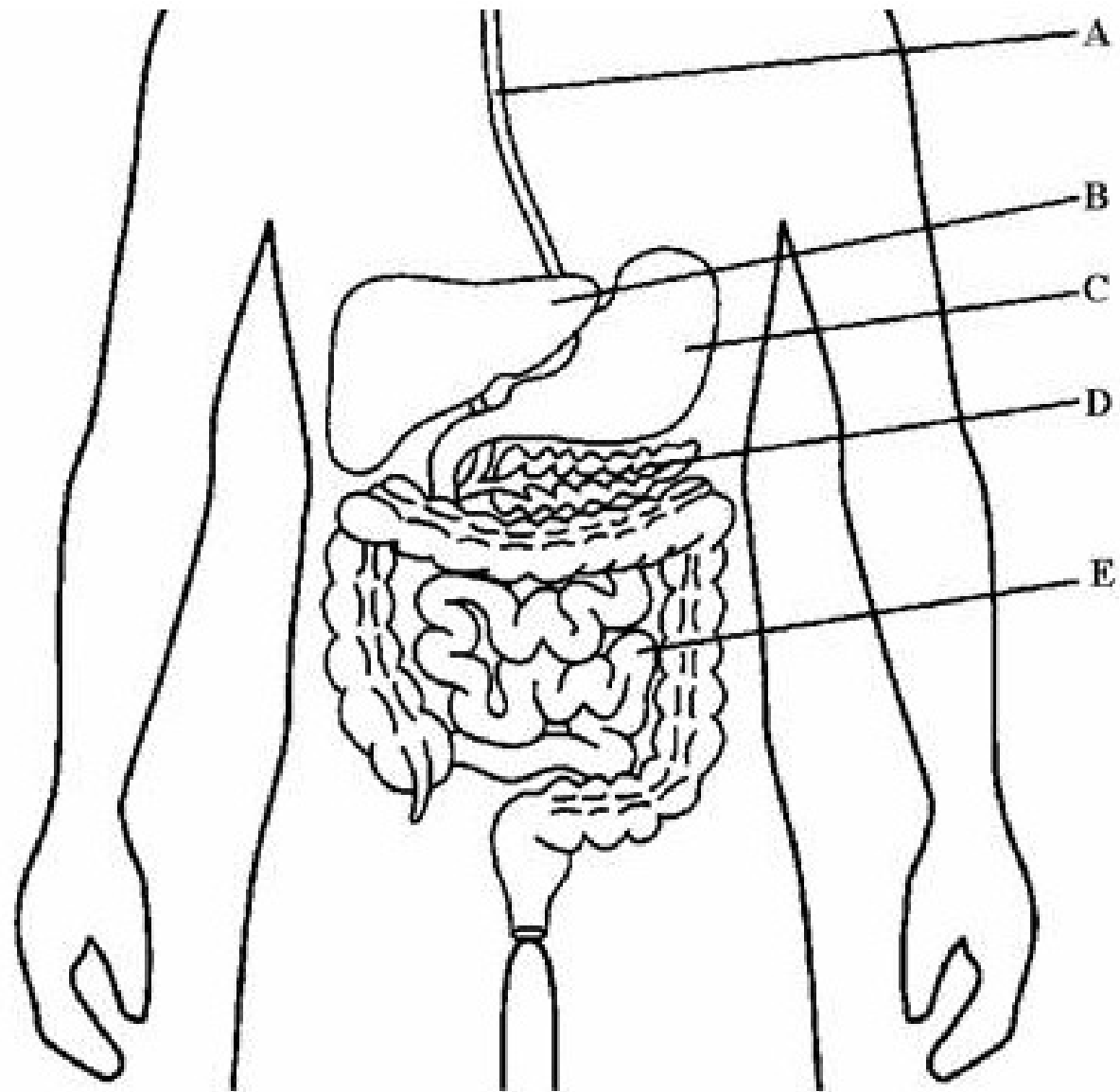
(a) A person eats 50 g of food E.

How much carbohydrate would the person eat?

10

g

(1)



(i) Name part **B**.

liver

(a) Complete the table to give one site where digestive substances are made.

Digestive substance	One site of production
bile	liver
amylase	mouth or salivary glands or small intestine or pancreas
lipase	Pancreas (accept small intestine)
protease	stomach or small intestine or pancreas

(4)

(b) Describe **two** ways that the mouth can break down starchy foods.

- teeth breakdown food
accept chewing
- amylase **or** saliva (breaks down starch)

(2)

(a) (i) Name the organ which **makes** bile.

liver

(1)

(a) (i) What name is given to an enzyme which catalyses the breakdown of protein?

protease

(1)

(ii) What product is formed when protein is broken down by the enzyme?

amino acids

(1)

Bile is produced in the liver, stored in the gall bladder, then released into the small intestine.

(a) Explain how bile affects the digestion of food in the small intestine.

any **two** from:

- neutralises acid / makes conditions alkaline / raises pH

- enzymes (in small intestine) work (more/most effectively)

or stop/prevents enzymes being denatured

- emulsifies fats/lipids **or**

description of emulsification

do **not** accept breakdown unqualified

- larger surface area

(2)

Topic you need to know about:

Chapter 1: cells, tissues and organs ✓

Chapter 2: organisms in the environment ✓

Chapter 3: enzymes ✓

Chapter 4: energy from respiration ✓

Chapter 5: simple inheritance in animals
and plants

Chapter 6: old and new species

Chapter 4- energy from respiration

1. What is respiration?
 2. What does respiration provide?
 3. What is the chemical equation for aerobic respiration?
 4. What is the word equation for aerobic respiration?
 5. Why are mitochondria called the powerhouses of the cell?
 6. What can we use to store energy?
 7. What is glycogen?
 8. What is the difference between aerobic and anaerobic respiration?
 9. What happens if we exercise vigorously?
 10. What is anaerobic respiration?
 11. What is the difference between aerobic and anaerobic respiration?
 12. What is the word equation for anaerobic respiration?
 13. What are the products of anaerobic respiration?
 14. What are the advantages of anaerobic respiration?
 15. What does an 'oxygen debt' mean?
1. One of the most important life processes. It is a chemical reaction that releases energy from food.
2. Energy. Energy allows us to WORK!
3. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$
4. glucose + oxygen \rightarrow carbon dioxide + water (+ energy)
5. Mitochondria is the site of respiration where energy is released.
7. Muscles need a constant amount of glucose in your blood.
8. Respiration needs oxygen and produces carbon dioxide. These gases are also transported around the body.
10. Respiration with little/no oxygen provides the increased blood supply that muscles need during activity.
13. Lactic acid
14. Energy is generated fast and it means we can still do exercise for a bit longer even if we haven't got a big supply of oxygen.
- However, it produces energy FASTER than aerobic respiration.
15. Once we stop working hard after vigorous exercise, our muscles are still breathing deeply. This is because our bodies are trying to gain back the extra oxygen.
- contract.

- (i) What is the name of the process which takes place in living cells in your body and which releases energy from oxygen and glucose?

(aerobic) respiration

(1)

- (ii) Name the **two** products of the process in part (i).

carbon dioxide

and

water (vapour)

(1)

(Total 2 marks)

Paula is training for a marathon. When she runs, her heart beats faster than it does when she is resting.

Complete the sentences, using words from the box.

blood	breathe	carbon dioxide	glucose
heat	nitrogen	oxygen	respire

When she is running, Paula's muscle activity increases. To do this, her muscle cells
..... **respire** at a faster rate to give her more energy. Her muscles need to
be supplied with .. **Oxygen/glucose** .. and **Oxygen/glucose**
more quickly. Her heart beats faster to increase the flow of..... **blood**
which carries the products **Carbon dioxide/heat** and
.. **Carbon dioxide/heat** .. away from her muscles.

(Total 6 marks)

(a) The air you breathe in and the air you breathe out are different.

Use the names of gases from this box to complete the **three** spaces.

argon carbon dioxide nitrogen oxygen water vapour

Compared to the air you breathe in, the air you breathe out contains:

- more
- more
- less

(3)

(b) The process of aerobic respiration takes place in your cells.

(i) Complete the space in the word equation for this process.

+ oxygen → carbon dioxide + water

(1)



Complete the **two** spaces in the passage.

The cells in our muscles respire anaerobically during vigorous exercise. This results in debt and the production of acid.

(2)

(a) (i) Complete the word equation for the process of aerobic respiration.

Glucose + → carbon dioxide + water

(1)

(ii) Which organ removes carbon dioxide from your body?

(1)

(b) Use names from the box to complete the **two** spaces in the passage.

carbon dioxide	lactic acid	nitrogen	oxygen
water			

Anaerobic respiration can occur when an athlete does vigorous exercise.

This is because there is not enough in the body.

The product of anaerobic respiration is .

(2)

(Total 4 marks)

Topic you need to know about:

Chapter 1: cells, tissues and organs ✓

Chapter 2: organisms in the environment ✓

Chapter 3: enzymes ✓

Chapter 4: energy from respiration ✓

Chapter 5: simple inheritance in animals and plants ✓

Chapter 6: old and new species

Chapter 5- simple inheritance in plants and animals

1. What is a cell?

2. What is a karyotype?

3. Where is it found?

4. What is a chromosome?

5. What is a gene?

6. What is an allele?

7. Name two examples of alleles.

8. What is a dominant allele?

9. What is a recessive allele?

10. Describe the structure of a chromosome.

11. What is a mutation?

12. How can mutations occur?

13. What are the effects of mutations?

14. What is variation?

15. What is a continuous variation?

16. What did Darwin discover about variation?

17. Some alleles are dominant and some are recessive.

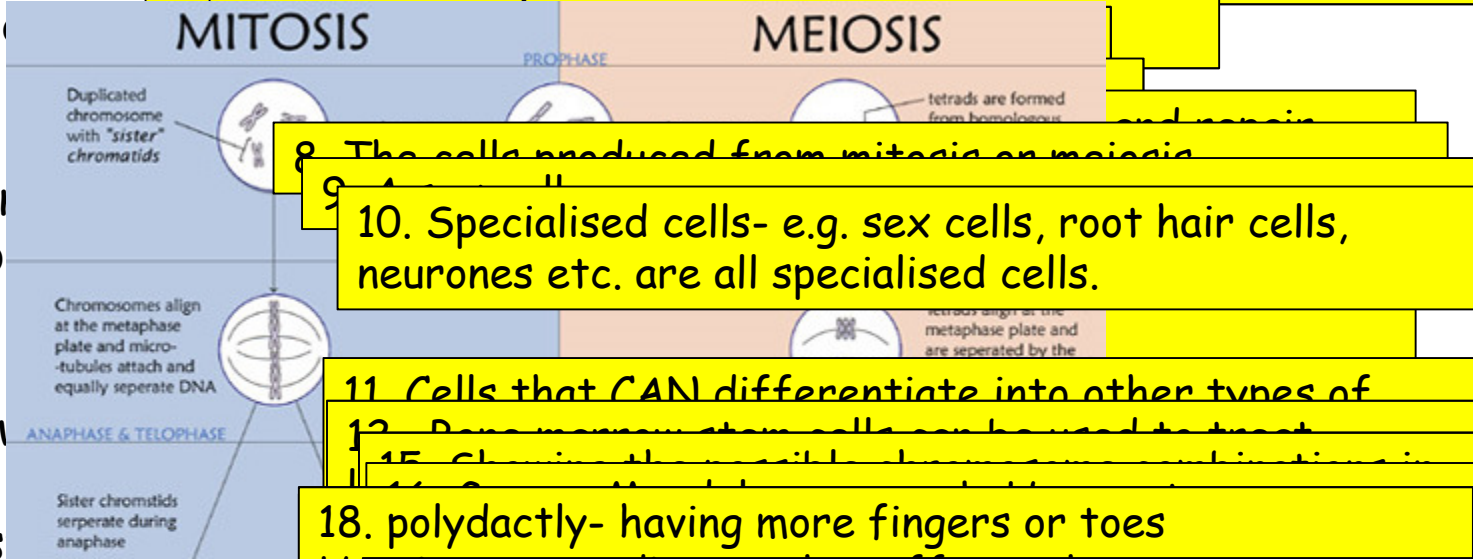
18. Give examples of dominant and recessive alleles.

19. Give examples of continuous and discontinuous variation.

20. What is a Punnett square?

2. A pair of chromosomes. 22 chromosomes

4. Strands of genetic information that is MADE in the nucleus. somes.



8. The cells produced from mitosis or meiosis.

9. Specialised cells.

10. Specialised cells- e.g. sex cells, root hair cells, neurones etc. are all specialised cells.

11. Cells that CAN differentiate into other types of cells.

12. Bone marrow stem cells can be used to treat leukaemia.

15. Chemicals that can be used to cause mutations in cells.

18. polydactyly- having more fingers or toes

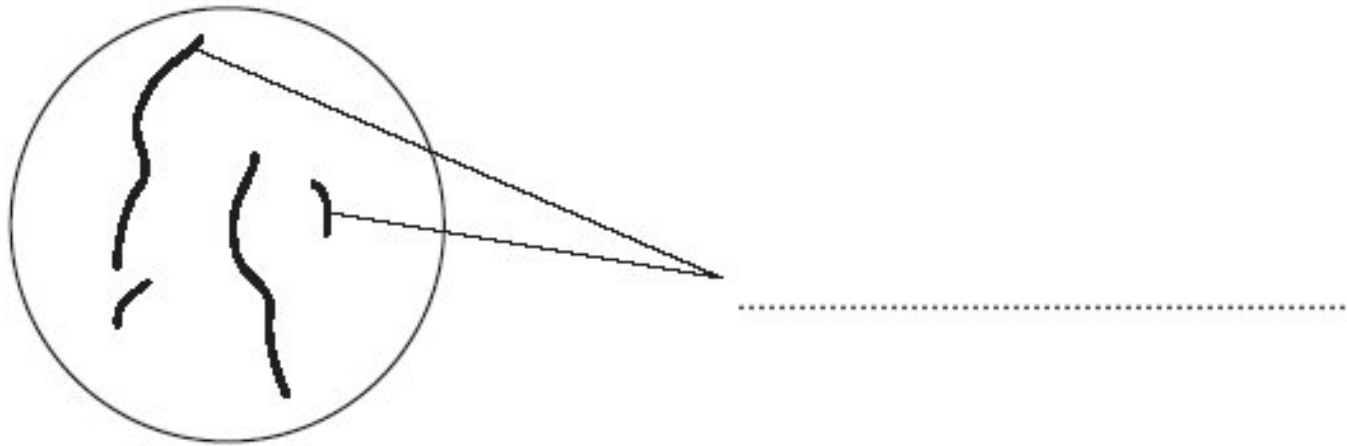
20. If a couple has a history of a genetic disease, the woman's embryo can be taken and screened to see if the potential baby has alleles for that disease.

☺ The couple can prepare if their child may have the disease (e.g. save money or have counselling to support them) or the couple may decide to go through abortion.

☹ May be used to test for other alleles- e.g. eye colour or intelligence or sporting ability, aborting babies that are not 'normal'- some may see this as unethical.

Diagram 1 shows the nucleus of a body cell as it begins to divide by mitosis.

Diagram 1



(a) Use a word from the box to label **Diagram 1**.

alleles

chromosomes

gametes

(1)

asexual	eggs	gametes	fertilisation	inheritance
ovaries	sexual	sperms	testes	variation

The genetic information from the mother is carried in the **eggs**
which are made in the **ovaries**

The genetic information from the father is carried in the **sperm**
which are made in the **testes**

In **sexual** reproduction, offspring are produced that are genetically
different from either parent.

This happens because genetic information from each parent is carried in the
gametes and joined together during **fertilisation**
to develop into a fetus.

In **asexual** reproduction, genetically identical offspring are
produced because no mixing of genetic material takes place.

In the 1850s an Austrian monk, called Gregor Mendel, carried out a series of investigations on heredity.

(i) What plants did he use for his investigations?

peas

(1)

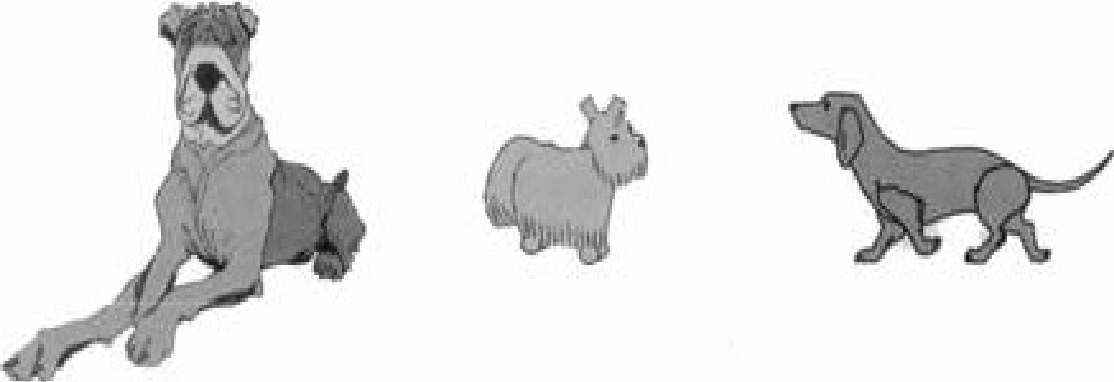
Meiosis and mitosis are different types of division in human cells. Compare the two processes by referring to where each takes place and the kind of products that are made.

meiosis	mitosis
sexual	asexual
gametes	growth
ovary or testes or gonads	all other cells
half number of chromosomes	same number of chromosomes
haploid or 23 chromosomes	diploid or 46 chromosomes
reassortment or variation possible or not identical	no reassortment or no variation or identical
4 cells produced	2 cells produced
2 divisions	1 division

(Total 6 marks)

These are all dogs. They are *in the same species*.

Type:	Great Dane	Yorkshire Terrier	Standard Dachshund
Weight:	54 kg	3.5 kg	9 kg
Height to shoulder:	57 cm	25 cm	20 cm



The image contains three line drawings of dogs. On the left is a large Great Dane lying down. In the middle is a small Yorkshire Terrier sitting. On the right is a Standard Dachshund standing and facing left.

(a) What does it mean to be *in the same species*?

breed (together)

accept have same number of chromosomes
do **not** accept have the same number of genes
to produce **fertile offspring**

(2)

(b) Complete the following sentences.

- When dogs reproduce the **male or testes** produces sperm in the **testes or male** and the female produces eggs in the **ovary or ovaries**
- Sperm and eggs are also called **gametes**
- During mating, the sperm and eggs fuse together. This is known as **fertilisation**
- Once this has happened the **fetus or zygote or embryo** starts to develop in the uterus of the mother.

(6)

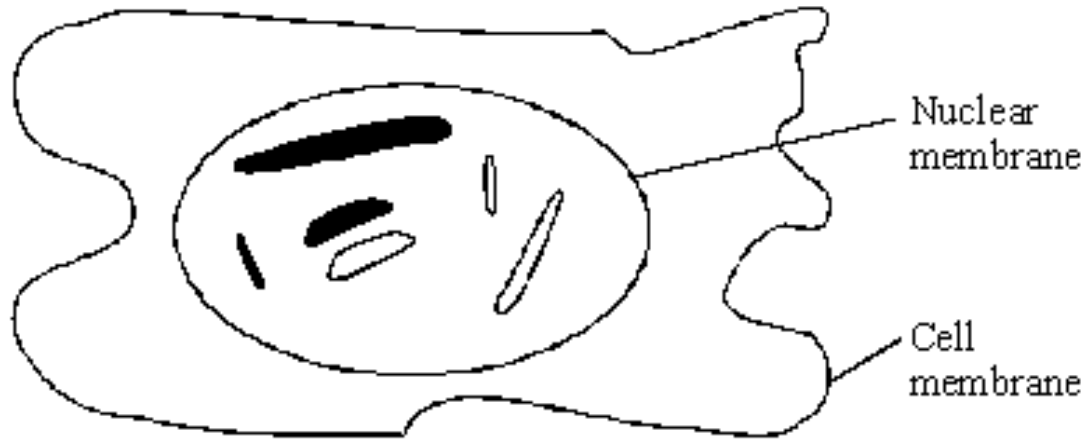
(c) Explain why puppies have some of the characteristics of both parents.

genetic information or genes or chromosomes or DNA
do not accept characteristics by itself

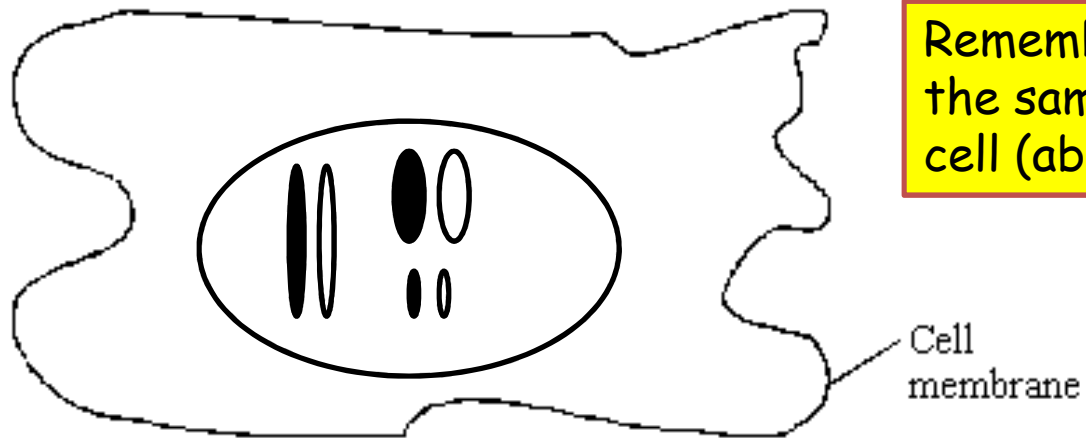
(comes) from two parents
accept from both parents

(2)

(a) The diagram shows a normal body cell which has six chromosomes.



(i) Complete the diagram below to show **one** cell produced from this cell by *mitosis*.

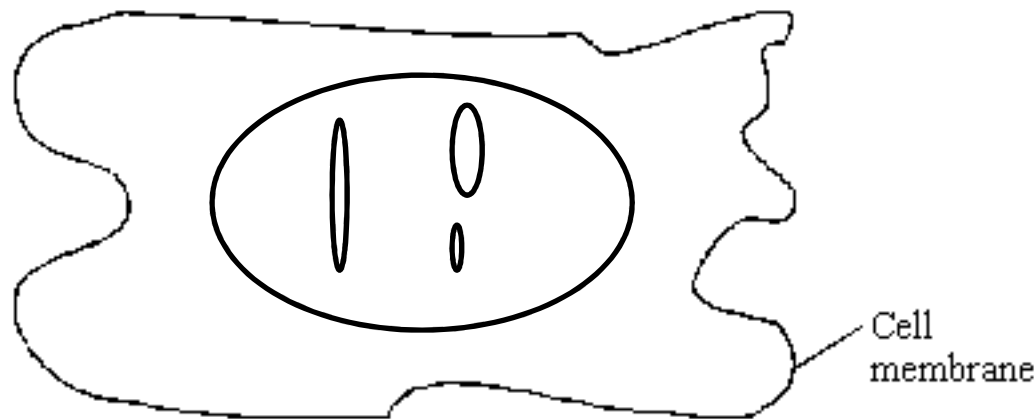


Remember- mitosis produces the same thing as the parent cell (above)

(a) The diagram shows a normal body cell which has six chromosomes.



(ii) Complete the diagram below to show **one** cell produced from the original cell by *meiosis*.



Remember meiosis produces **GAMETES** (sex cells) so they have **HALF** the amount of DNA. You could have kept the dark ones or the light chromosomes (makes no difference, as long as you show you now have half!)

Topic you need to know about:

Chapter 1: cells, tissues and organs ✓

Chapter 2: organisms in the environment ✓

Chapter 3: enzymes ✓

Chapter 4: energy from respiration ✓

Chapter 5: simple inheritance in animals and plants ✓

Chapter 6: old and new species ✓

Chapter 6- origins of life on Earth

1. What is a fossil?

2. How

3. How

4. Fossils

5. Why

6. Why

7. Why

8. Sta

9. Sta

10. Why

Leaves



Darwin's Finches ADAPTIVE RADIATION

Buds / Fruit



Seeds



Insects



Grubs



Tool Using Finch



her species

(a) Explain, as fully as you can, how natural selection leads to evolution.

variation / mutation 1

individuals with characteristics most suited to environment survive, allow survival of the fittest 1

genes passed to next generation or these individuals reproduce 1

(3)

There is a large amount of evidence that evolution is taking place.

(a) Scientists are uncertain about how life started on Earth.

Explain why.

.....

..... there is a lack of valid / reliable evidence

..... because the early organisms were soft bodied or

..... because remains were destroyed by geological action

.....

(2)

(b) Salamanders are terrestrial amphibians.

The diagram shows the distribution of four different species of salamander in a country.

populations of salamanders became isolated / separated	1
by areas between mountains	1
there was genetic variation in these isolated communities	1
natural selection acted differently on these isolated communities	1
eventually resulting in interbreeding being no longer possible and so new species have been formed	1

Originally, there was only one species of salamander in the country.

Suggest an explanation for the development of the four different species.

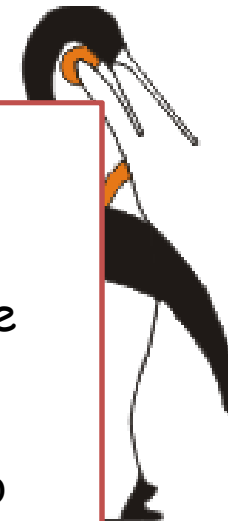
(b) Most penguins live in cold climates. The modern penguin best adapted for cold conditions is the emperor penguin.

Scientists have found fossils of a 'giant' penguin which they have called *Icadyptes*.

The diagram shows how the size of modern penguins compares with *Icadyptes*.

any **two** from:

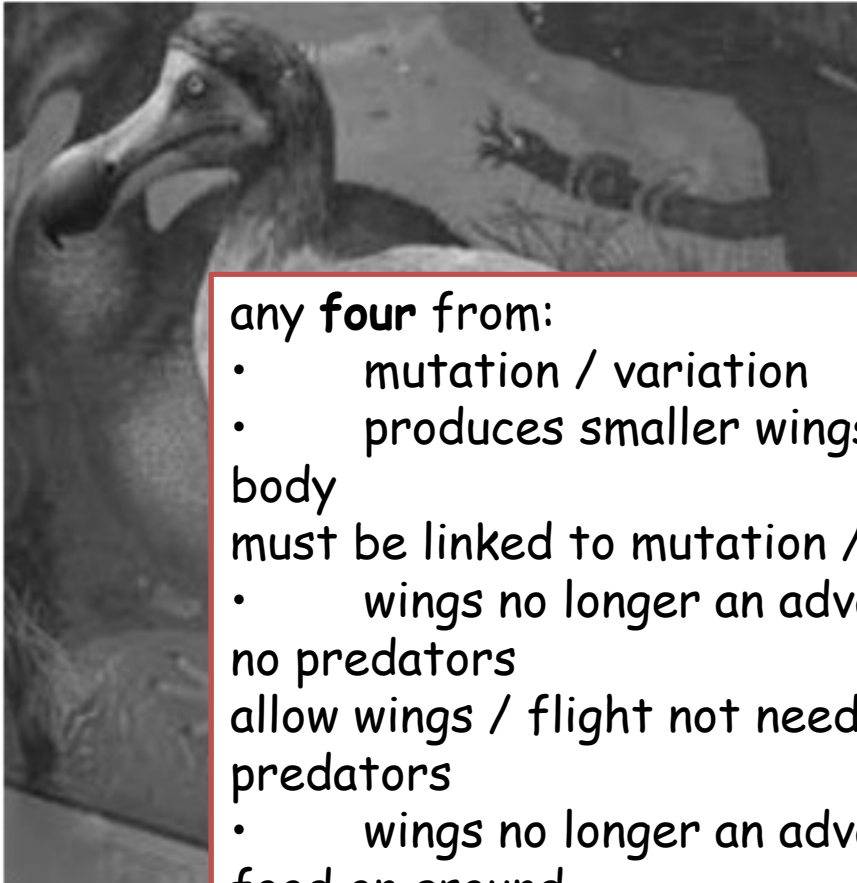
- similar in size to Emperor penguin
or bigger than all penguins
- large size is adaptation to cold climate
- since less heat loss per unit of body volume
or smaller surface area /volume ratio



Height	63 cm	68 cm	90 cm	1.2 m	1.5 m
	Rockhopper	Peruvian	King	Emperor	<i>Icadyptes</i>

The scientists were surprised to discover that *Icadyptes* lived in warm seas at a time when the Earth's climate was much warmer than it is now.

Explain why the scientists were surprised that *Icadyptes* lived in warm seas.



any **four** from:

- mutation / variation
 - produces smaller wings / fatter body
- must be linked to mutation / variation
- wings no longer an advantage since no predators
- allow wings / flight not needed as no predators
- wings no longer an advantage since food on ground
- allow wings / flight not needed as food on ground
- fatter body can store more energy when fruit scarce
 - successful birds breed / pass on genes

The dodo lived on a small island with few predators. It was a lot of fruit on the island. The birds became much heavier,

(a) Suggest an explanation for the flightless dodo.

There were no predators on the island. There were pigeon-like birds. Gradually, the birds

became the flightless dodo.

- (b) The dodo became extinct about 80 years after Dutch sailors first discovered the island in the eighteenth century.

Scientists are uncertain about the reasons for the dodo's extinction.

Suggest an explanation for this uncertainty.

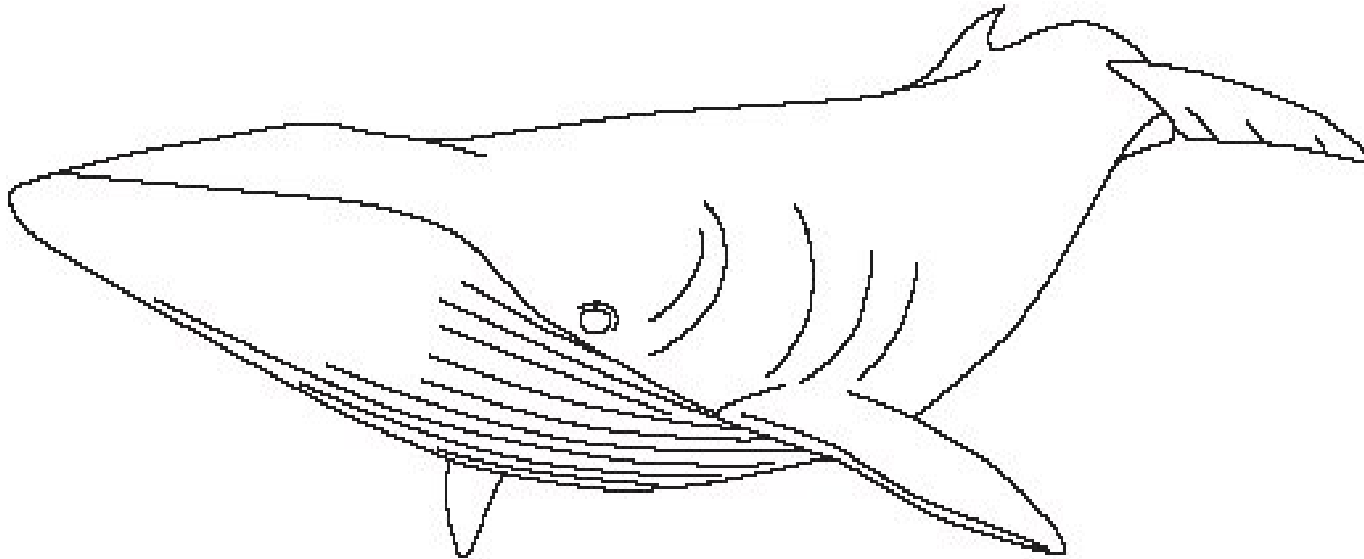
any **one** from:

- evidence has all gone
- no scientists on island at time to record evidence
- no records (from sailors)

(1)

(a) **Figure 1** shows a minke whale. Whales live in the sea.

Figure 1



Write down **two** ways in which the body of the whale is adapted for swimming.

1

any **two** from:

- streamlined / shape reduces friction / long and thin / smooth surface

OWTTE

2

- fins / flippers / tail / paddle

do **not** accept 'arms' or 'legs'

- structures that push against water

(a) What evidence might scientists have that the great ape existed?

fossils / teeth / bones / skeleton / foot prints
allow cave drawings
do **not** accept scientists have seen them

(1)

(b) The drawing is an artist's impression of what the giant ape might have looked like.

Why do scientists not know exactly what the animal looked like?

only (some) bones remain / soft parts have decayed
accept 'no-one has ever seen one'
allow no photos, no pictures, no drawings

(c) Scientists do not know why this giant ape became extinct.

Suggest **two** reasons why this giant ape became extinct.

1

.....

2

any **two** from:

- hunted by human
 - (new) predator
- allow more predators
- (new) competitor
 - (new) disease
 - environment changed /
named environmental change
- allow natural disaster
- prey extinct / loss of food
supply
- ignore not enough food

Biology data analysis questions

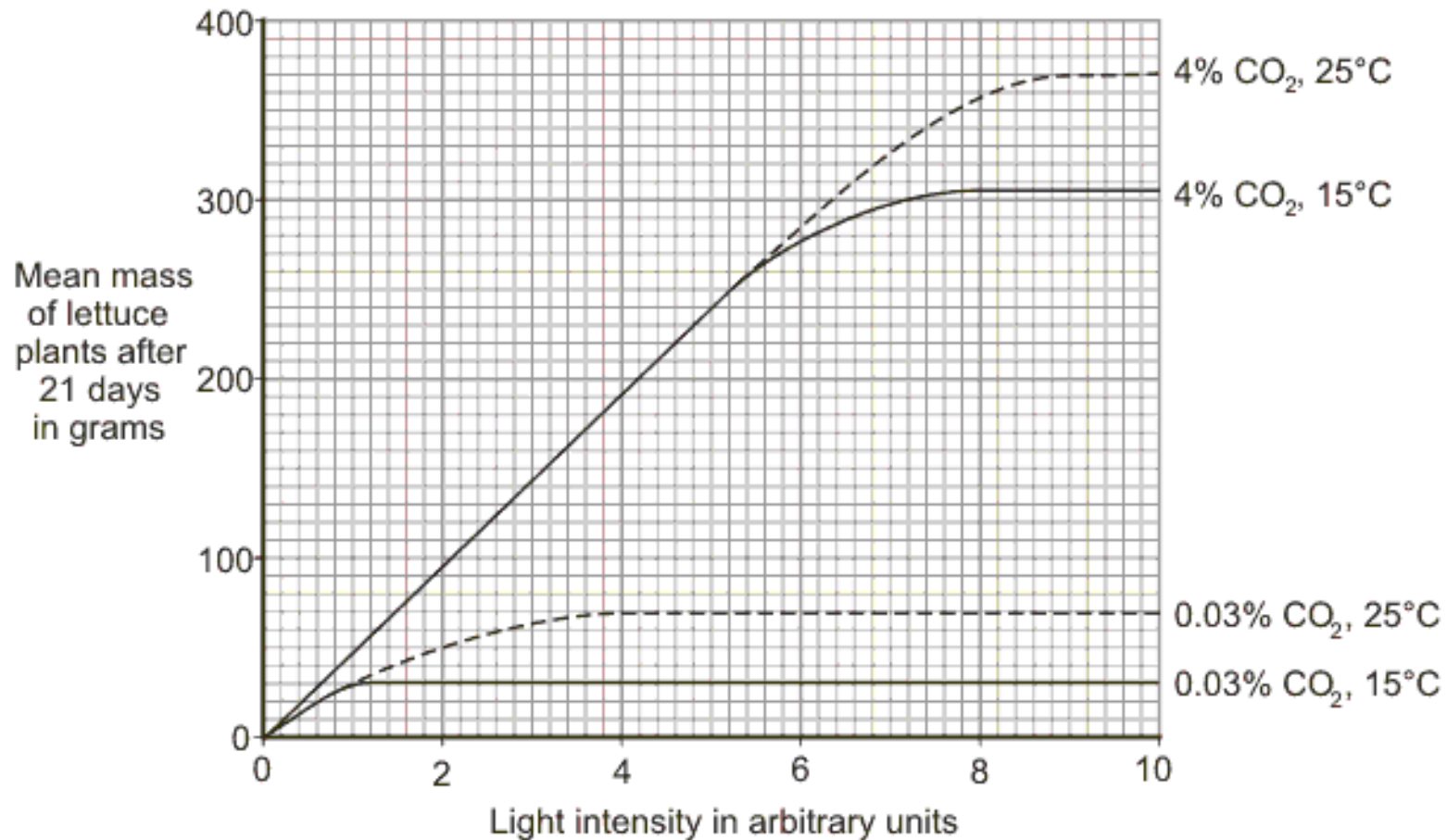
Tube	Solution in test tube	Mass of seedling after 14 days in g
A	Pure water	0.10
B	All the mineral salts a seedling needs for healthy growth	0.45
C	All the mineral salts a seedling needs for healthy growth but no nitrate	0.30

(c) Give **two** conclusions that you can make from the students' results.

1 plants with all mineral salts grew best

2 plants with mineral salts but no nitrate grow better than
 without any mineral salts

(2)
 (Total 4 marks)

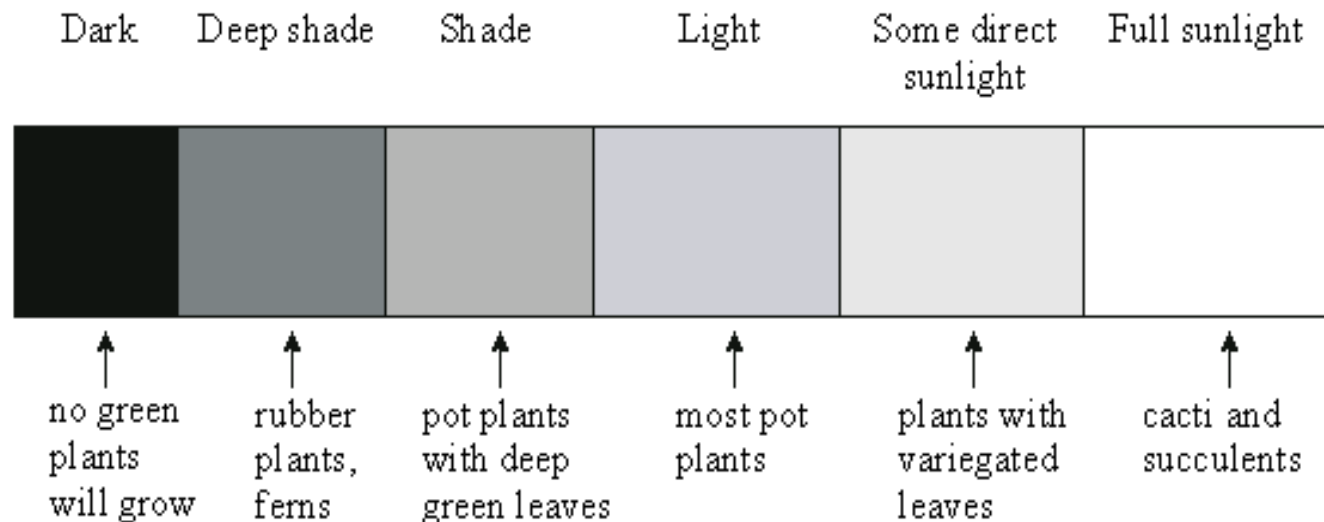


- (a) Describe and explain the effect of increasing light intensity on the mean mass of lettuce plants at 4% carbon dioxide and 15 °C.

((mean) mass) increases up to 7 / 8 units (of light) then levels off
 light limiting factor up to 7 / 8 units
 for photosynthesis
 other factor / temperature limiting above 7 / 8 units

Give them the light they need!

Amount of light essential for satisfactory development



Use information from the diagram to answer the following questions.

- (i) Name **one** type of plant which could live on the floor of a dense forest in the middle of summer.

..... **rubber plant/fern**

(1)

- (ii) Explain the reason for your answer to (i) above.

Because it can tolerate low levels of light