Cell Biology part 14 AQA Combined Science

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Name: _____

Class: _____

Date: _____

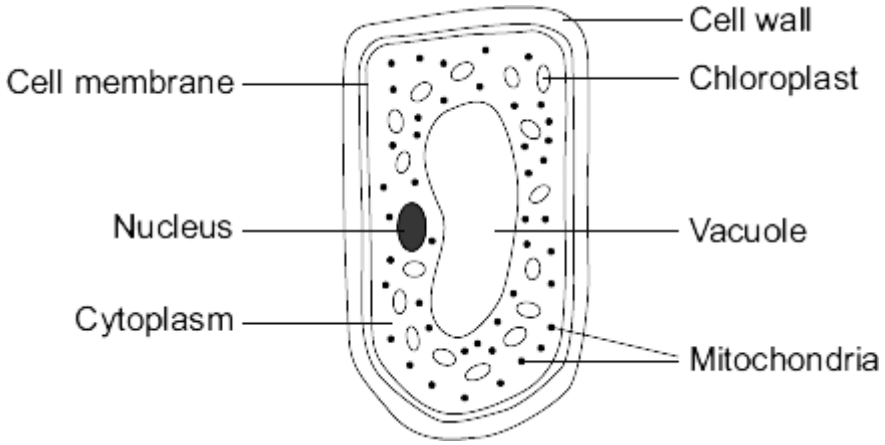
Time: **71 minutes**

Marks: **71 marks**

Comments:

Q1.

The diagram shows a cell from a plant leaf.



(a) Name the part of this cell that:

(i) controls the passage of substances in and out of the cell

_____

(1)

(ii) is filled with cell sap.

_____

(1)

(b) Give the names of **two** parts of the leaf cell that would **not** be found in a human liver cell.

_____ and _____

(2)

(c) The chloroplasts produce oxygen.

Draw a ring around the correct answer to complete the sentence.

The oxygen produced by the chloroplasts passes out of the cell by

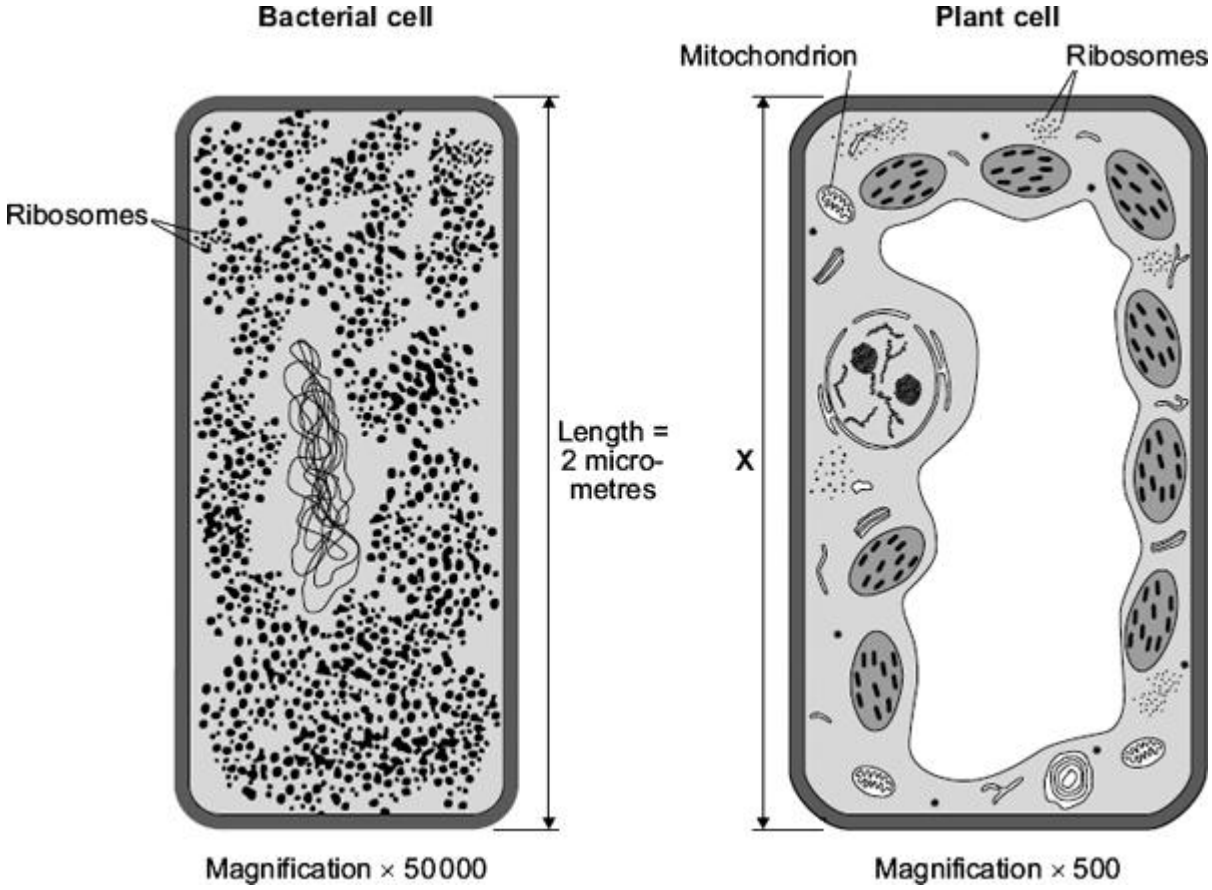
diffusion.
digestion.
respiration.

(1)

(Total 5 marks)

Q2.

The diagram shows two cells, a bacterial cell and a plant cell.



(a) (i) Both the bacterial cell and the plant cell contain ribosomes.

What is the function of a ribosome?

_____

_____

(1)

(ii) The plant cell contains mitochondria but the bacterial cell does **not** contain mitochondria.

Give **one** other way in which the plant cell is different from the bacterial cell.

_____

_____

(1)

(b) (i) Both cells are drawn the same length, but the magnification of each cell is different.

The real length of the bacterial cell is 2 micrometres.
Calculate the real length, **X**, of the plant cell. Give your answer in micrometres.

Show clearly how you work out your answer.

_____

_____

_____

X = _____ micrometres

(2)

(ii) Most mitochondria are about 3 micrometres in length.

The plant cell contains mitochondria but the bacterial cell does **not** contain mitochondria.

Use your answer to part (b)(i) and the information in the diagram to suggest why.

_____

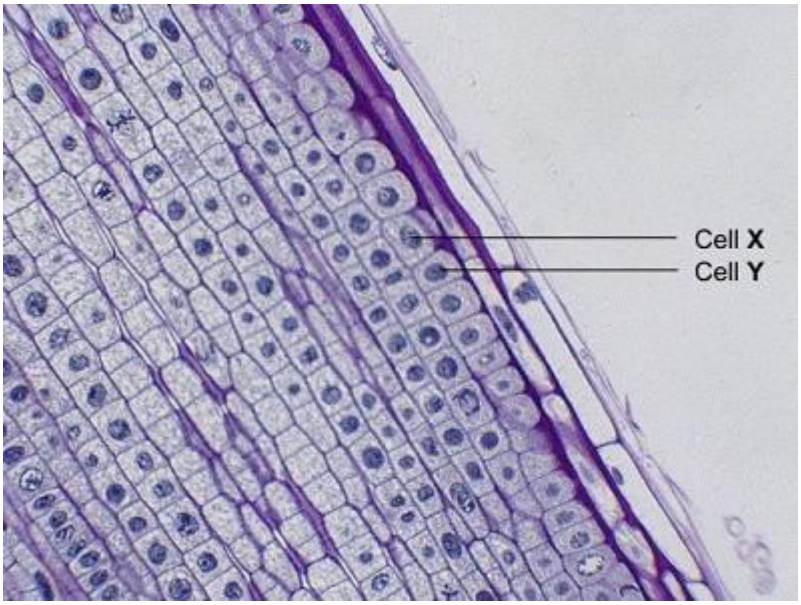
_____

(1)

(Total 5 marks)

Q3.

The photograph shows some cells in the root of an onion plant.



By UAF Center for Distance Education [CC BY 2.0], via Flickr

(a) Cells **X** and **Y** have just been produced by cell division.

(i) Name the type of cell division that produced cells **X** and **Y**.

_____

(1)

(ii) What happens to the genetic material before the cell divides?

_____

(1)

(b) A gardener wanted to produce a new variety of onion.

Explain why sexual reproduction could produce a new variety of onion.

_____

_____

_____

_____

_____

_____

(3)

(Total 5 marks)

Q4.

The diagram shows a strawberry plant.

The parent plant grows side shoots.

New plants grow on the side shoots.

The new plants will all have the same inherited characteristics as the original parent plant.

Complete the sentences to explain why.

Use words from the box.

asexual	**differentiation**	**embryos**	**fertilisation**
gametes	**genes**	**mitosis**	**sexual**

(a) The new plant is produced by _____ reproduction.

(1)

(b) In this type of reproduction, body cells divide by _____

(1)

(c) The new plant has the same _____ as the parent plant.

(1)

(Total 3 marks)

Q5.

(a) **List A** gives four structures in the human body.

List B gives the functions of some structures in the body.

Draw a straight line from each structure in **List A** to the correct function in **List B**.

List A – Structure	**List B – Function**
	Surround and protect the lungs
Alveoli	
	Filter the blood
Veins	
	Carry blood towards the heart
Villi	
	Absorb digested food
Ribs	
	Allow oxygen to enter the blood

(4)

(b) Draw a ring around the correct answer to complete the sentence.

In the lungs, oxygen enters the blood from the air by

diffusion.

filtration.

respiration.

(1)

(Total 5 marks)

Q6.

The table shows the concentrations of three mineral ions in the roots of a plant and in the water in the surrounding soil.

Mineral ion	Concentration in millimoles per kilogram	
	Plant root	Soil
Calcium	120	2.0
Magnesium	80	3.1
Potassium	250	1.2

(a) (i) The plant roots could **not** have absorbed these mineral ions by diffusion.

Explain why.

_____

_____

_____

(2)

(ii) Name the process by which the plant roots absorb mineral ions.

_____

(1)

(b) How do the following features of plant roots help the plant to absorb mineral ions from the soil?

(i) A plant root has thousands of root hairs.

_____

_____

(1)

(ii) A root hair cell contains many mitochondria.

_____

_____

_____

(2)

(iii) Many of the cells in the root store starch.

_____

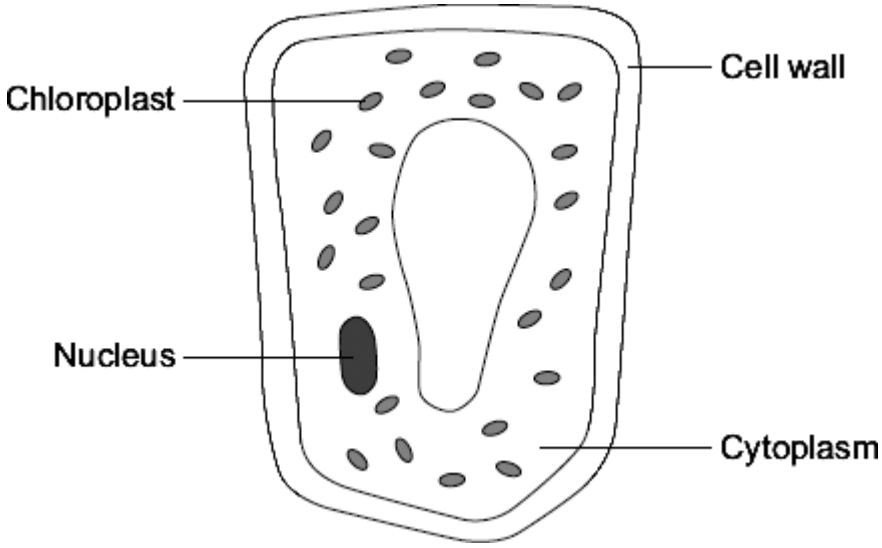
_____

(1)

(Total 7 marks)

Q7.

The diagram shows a plant cell from a leaf.



(a) **List A** gives the names of three parts of the cell.
List B gives the functions of parts of the cell.

Draw a line from each part of the cell in **List A** to its function in **List B**.

List A **Parts of the cell**	**List B** **Functions**
	Where most of the chemical reactions take place
Nucleus	
	Absorbs light energy to make food
Cytoplasm	
	Strengthens the cell
Chloroplast	
	Controls the activities of the cell

(3)

(b) Respiration takes place in the cell.

Draw a ring around the correct answer to complete the sentence.

All cells use respiration to release | energy | oxygen. | sugar. |

(1)

(Total 4 marks)

Q8.

Substances can move into and out of cells.

(a) (i) How does oxygen move into and out of cells?

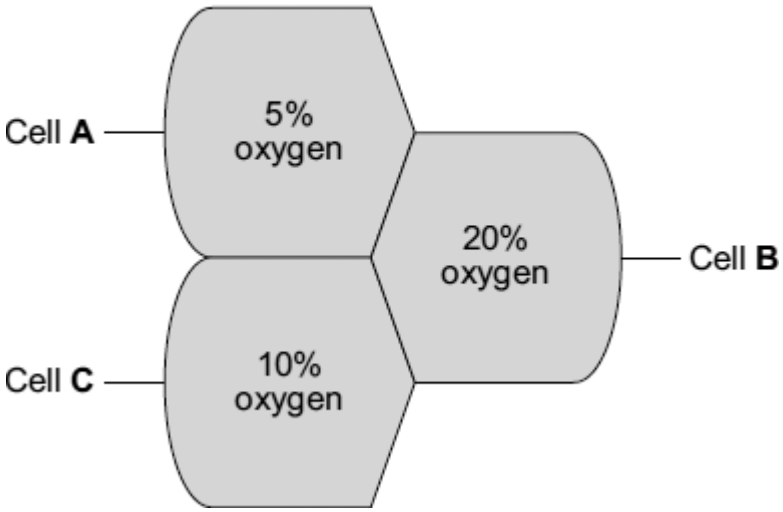
Draw a ring around **one** answer.

diffusion **digestion** **photosynthesis**

(1)

(ii) **Diagram 1** shows the percentage concentration of oxygen in three cells, **A**, **B** and **C**.

Diagram 1



Oxygen can move from cell to cell.

Into which cell, **A**, **B** or **C**, will oxygen move the fastest?

(1)

(b) (i) How does water move into and out of cells?

Draw a ring around **one** answer.

breathing **osmosis** **respiration**

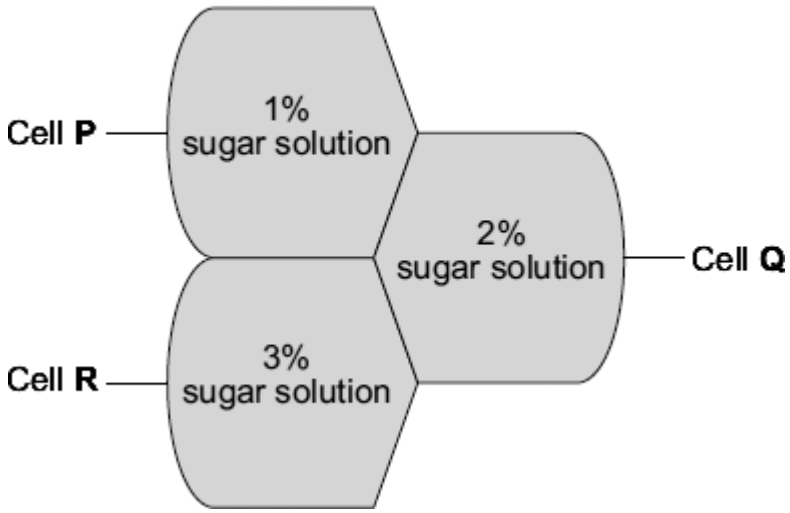
(1)

(ii) Differences in the concentration of sugars in cells cause water to move into or out of cells at different rates.

Diagram 2 shows three different cells, **P**, **Q** and **R**.

The information shows the percentage concentration of sugar solution in cells **P**, **Q** and **R**.

Diagram 2



Water can move from cell to cell.

Into which cell, **P**, **Q** or **R**, will water move the fastest?

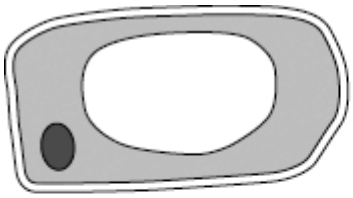
(1)

(Total 4 marks)

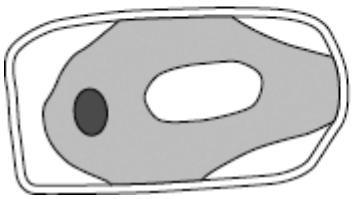
Q9.

The diagram shows the same plant cell:

- after 1 hour in distilled water
- after 1 hour in strong sugar solution.



After 1 hour in distilled water



After 1 hour in strong sugar solution

(a) Describe **two** ways in which the cell in the strong sugar solution is different from the cell in distilled water.

1. _____

_____

2. _____

_____

(2)

(b) Explain how the differences between the cell in the strong sugar solution and the cell in distilled water were caused.

_____

_____

_____

_____

_____

(2)

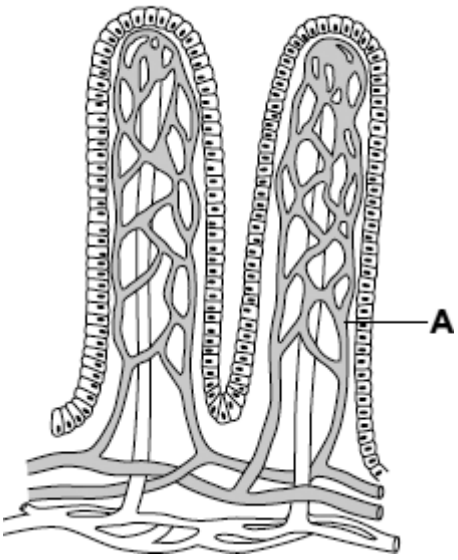
(Total 4 marks)

Q10.

Villi are found in some parts of the digestive system.

Diagram 1 shows two villi.

Diagram 1



(a) Draw a ring around the correct answer to complete each sentence.

(i) Structure **A** is a

muscle.

nerve.

capillary.

(1)

(ii) The villi absorb the products of digestion by

dialysis.

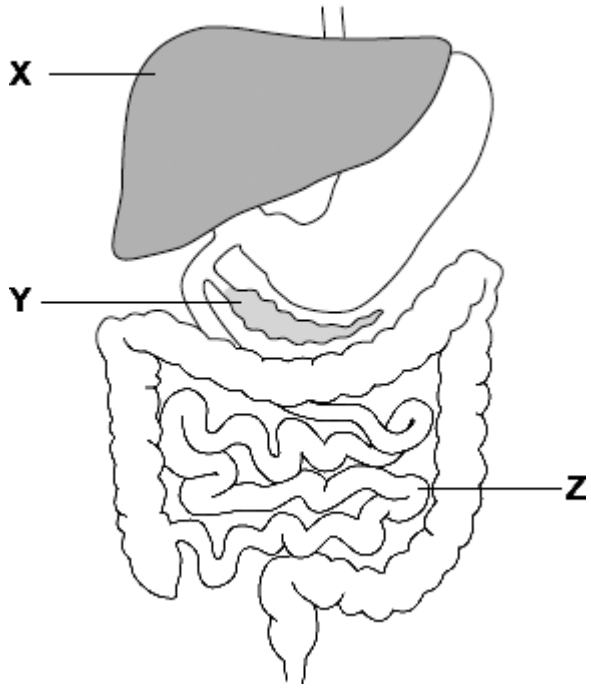
diffusion.

osmosis.

(1)

(b) **Diagram 2** shows the digestive system.

Diagram 2



(i) In which part of the digestive system, **X**, **Y** or **Z**, are most villi found?

(1)

(ii) There are about 2000 villi in each cm^2 of this part of the digestive system.

Why is it helpful to have lots of villi?

_____

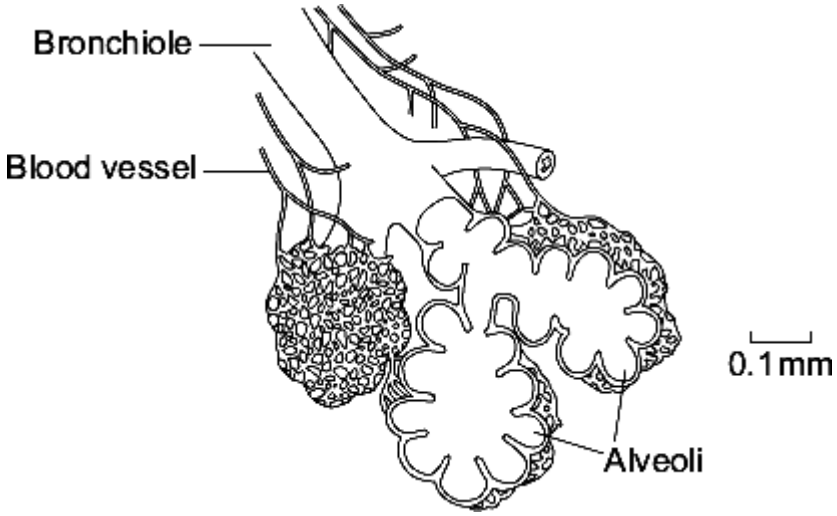
_____

(1)

(Total 4 marks)

Q11.

The human lung has about 80 million alveoli.
The diagram shows some alveoli in a human lung.



(a) Give **three** features of the alveoli that allow large amounts of oxygen to enter the blood.

1. _____

_____

2. _____

_____

3. _____

_____

(3)

(b) (i) Name the process by which oxygen passes from the air into the blood.

_____

(1)

(ii) Breathing allows large amounts of oxygen to enter the blood.

Explain how breathing does this.

_____

_____

_____

_____

(2)

(Total 6 marks)

Q12.

Read the following information about how the small intestine absorbs sugars.

- The blood absorbs glucose and some other sugars, like xylose, from the small intestine.
- Glucose molecules are the same size as xylose molecules, but glucose is absorbed more quickly than xylose.
- Experiments with pieces of intestine show that the uptake of oxygen by the intestine is 50 % higher in the presence of glucose than in the absence of glucose. Xylose does not have this effect on the uptake of oxygen.
- The cells lining the small intestine have many mitochondria.

Explain how this information provides evidence that glucose is absorbed by the small intestine using *active transport*.

_____

_____

_____

_____

_____

_____

_____

_____

_____

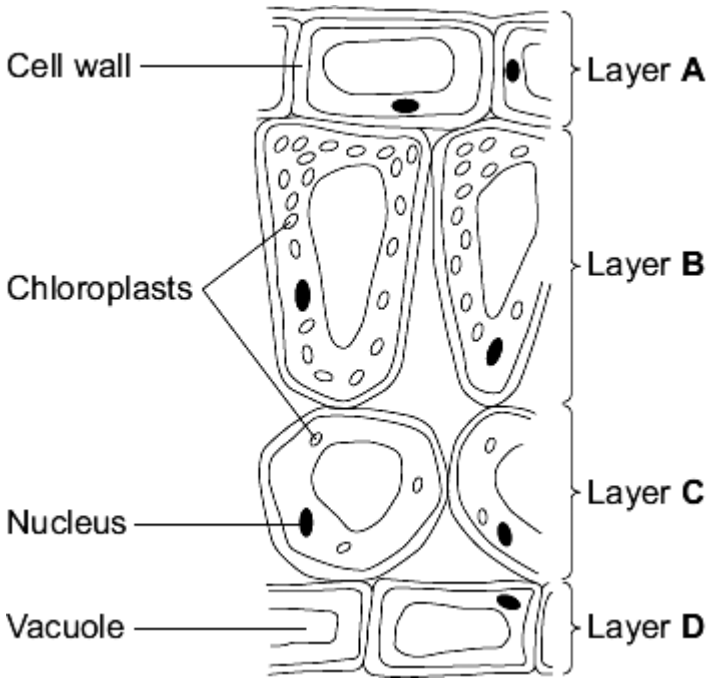
_____

(Total 4 marks)

Q13.

Leaves are made from layers of cells.

The diagram shows a section through part of a leaf.



(a) (i) Which word in the table describes layer **A**?

Tick (✓) **one** box.

Layer A	Tick (✓)
Tissue	
Organ	
Cell	

(1)

(ii) Which word describes a whole leaf?

Draw a ring around **one** answer.

organ **tissue** **organism**

(1)

(b) (i) Which **two** layers of cells, **A**, **B**, **C** and **D**, can photosynthesise?

Use information from the diagram to help you.

Tick (✓) **two** boxes.

Layer **A** ☐

Layer **B** ☐

Layer **C** ☐

Layer **D** ☐

(2)

(ii) Give **one** reason for your answer.

_____

_____

(1)

(c) List **X** gives the names of two parts of a cell.
List **Y** gives information about parts of a cell.

Draw **one** line between each part of the cell in list **X** and information about it in list **Y**.

List X **Part of a cell**	**List Y** **Information**
	Controls the passage of substances into the cell
Vacuole	
	Contains the cell sap
Nucleus	
	Controls the activities of the whole cell

(2)

(Total 7 marks)

Q14.

Cells contain a solution of salts and sugars.

A student is investigating how cells change when they are put into water.

(a) The student:

- looks at a plant cell using a microscope
- adds water to the cell.

The plant cell swells up.

Explain why, as fully as you can.

_____

_____

_____

_____

_____

_____

(3)

(b) When **animal** cells are put in water, they swell up, and then burst.
When **plant** cells are put in water, they swell up, but do **not** burst.

How does the structure of plant cells prevent them from bursting?

_____

_____

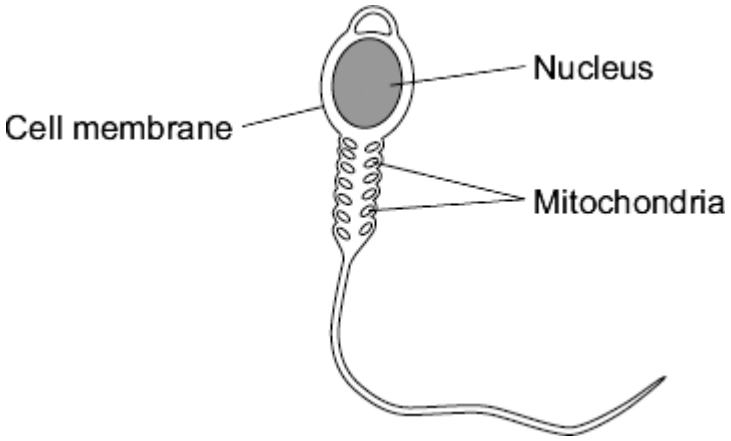
(1)

(Total 4 marks)

Q15.

Cells in the human body are specialised to carry out their particular function.

(a) The diagram shows a sperm cell.



The sperm cell is adapted for travelling to, then fertilising, an egg.

(i) How do the mitochondria help the sperm to carry out its function?

_____

_____

(1)

(ii) The nucleus of the sperm cell is different from the nucleus of body cells.

Give **one** way in which the nucleus is different.

_____

(1)

(b) Stem cells from human embryos are used to treat some diseases in humans.

Explain why.

_____

_____

_____

(2)

Q1.

(a) (i) (cell) membrane

1

(ii) vacuole

1

(b) any **two** from:

- (cell) wall
- chloroplast(s)
  ignore chlorophyll
- vacuole
  ignore cell sap

2

(c) diffusion

1

[5]

Q2.

(a) (i) makes / produces / synthesises protein / enzyme

1

(ii) plant cell has nucleus / vacuole / chloroplasts / chlorophyll
or plant cell is <u>much</u> larger
'It' = plant cell
allow correct reference to DNA or chromosomes
allow plant cell has fewer ribosomes
allow cellulose (cell wall)

1

(b) (i) 200
*correct answer with or without working gains **2** marks*
*if answer incorrect, allow **1** mark for* $\frac{2 \times 50,000}{500}$ ***or*** $\frac{100,000}{500}$
***or** 100*

2

(ii) bacterial cell is too small / bacterial cell about same size as a mitochondrion / 'no room'
ignore references to respiration

1

[5]

Q3.

(a) (i) mitosis

correct spelling only

1

(ii) replicates / doubles / is copied / duplicates

accept cloned
ignore multiplied / reproduced

1

(b) fertilisation occurs / fusion (of gametes)

accept converse for asexual, eg none in asexual / just division in asexual

1

so leading to mixing of genetic information / genes / DNA / chromosomes

genes / DNA / chromosomes / genetic information comes from 1 parent in asexual
ignore characteristics

1

one copy (of each allele / gene / chromosome) from each parent
or
gametes produced by meiosis
or
meiosis causes variation

meiosis must be spelt correctly

1

[5]

Q4.

(a) asexual

1

(b) mitosis

1

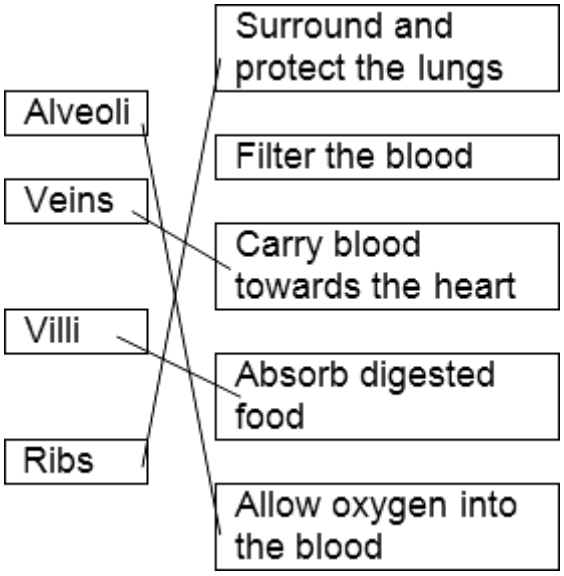
(c) genes

1

[3]

Q5.

(a)



*4 correct = **4** marks*
*3 correct = **3** marks*
*2 correct = **2** marks*
*1 correct = **1** mark*
extra line from a structure cancels the mark

4

(b) diffusion

1

[5]

Q6.

(a) (i) diffusion is down the concentration gradient
for a description of diffusion
ignore along / across gradients

1

to enter must go up / against the concentration gradient
accept by diffusion ions would leave the root

or

concentration higher in the root / plant

or

concentration lower in the soil

1

(ii) active transport
allow active uptake

1

(b) (i) (root hairs →) large surface / area

1

(ii) (aerobic) respiration
*do **not** allow anaerobic*

releases / supplies / provides / gives energy

accept make ATP (for active transport)

*do **not** allow 'makes / produces / creates' energy*

1

(iii) starch is energy source / store (for active transport)

allow starch can be used in respiration

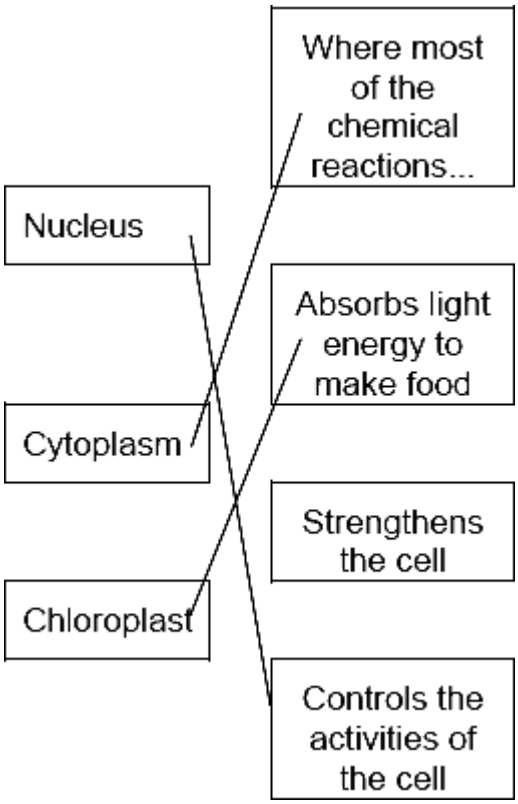
*do **not** allow 'makes / produces / creates' energy*

1

[7]

Q7.

(a)



***1** mark for each correct line*

mark each line from left hand box

two lines from left hand box cancels mark for that box

3

(b) energy

1

[4]

Q8.

(a) (i) diffusion

1

(ii) A

1

(b) (i) osmosis

1

(ii) R

1

[4]

Q9.

(a) *correct names of cell components are required*
it = cell in sugar solution

any **two** from:

accept reverse only if clearly stated answer refers to cell in distilled water

- smaller vacuole
- smaller / less cytoplasm
  allow protoplasm for cytoplasm
- cell membrane / cytoplasm not (fully) against cell wall
  accept plasmolysed / flaccid / less turgid

or
cell membrane / cytoplasm (partly) pulled away from cell wall
ignore reference to nucleus / water
ignore explanations

or
space / liquid / sugar solution between cell membrane / cytoplasm and cell wall

2

(b) water passed / moved out (of cell) by osmosis / diffusion
accept reverse answer if clearly refers to cell in distilled water

1

more concentrated (solution) outside
assume reference to concentration refers to solute concentration unless answer refers to water concentration

or
less concentrated (solution) inside
or
lower <u>water</u> concentration outside
*accept references to hypertonic / hypotonic solutions **or** water potential*

or
higher <u>water</u> concentration inside

1

[4]

Q10.

(a) (i) capillary

1

(ii) diffusion

1

(b) (i) Z

ignore any names

1

(ii) large / increased surface / area / **or** to absorb more food **or** improved diffusion

allow all food absorbed

1

[4]

Q11.

(a) large surface / large area

1

thin / short distance (from air to blood) / one cell thick / two cells thick

1

good blood supply / many capillaries / capillary network / many blood vessels

ignore moist surface

1

(b) (i) diffusion

ignore gaseous exchange

1

(ii) brings (more) oxygen / air into the lungs / alveoli

1

keeps O_2 level high in alveoli

or

maintains concentration difference (between alveoli and blood) / keeps O_2 concentration in alveoli > O_2 concentration in blood gains **2** marks

1

[6]

Q12.

active transport needs energy **or** diffusion is not energy-dependent

1

any **three** from:

- (energy from) aerobic respiration
- more respiration with O_2 **or** more energy release with O_2
- (aerobic) respiration / energy release occurs in mitochondria

*do **not** allow anaerobic*

- xylose / other sugars absorbed by diffusion / not by active transport
  allow active transport is selective / specific
  ***or** active transport can distinguish glucose and xylose*

3

[4]

Q13.

(a) (i) tissue
extra box ticked cancels the mark

1

(ii) organ
extra ring drawn cancels the mark

1

(b) (i) Layer B
*each extra box ticked cancels **1** mark*

1

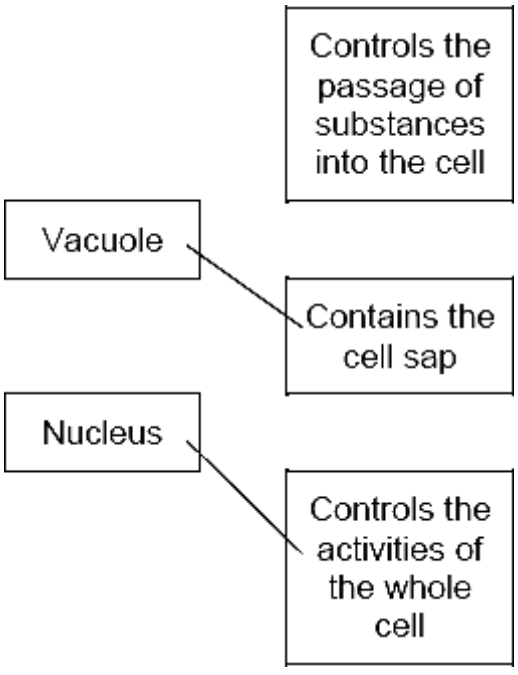
Layer C

1

(ii) (contain) chloroplasts / chlorophyll
other parts disqualify

1

(c)



*two correct = **2** marks*
*one correct = **1** mark*
extra line from a part of a cell cancels the mark

2

[7]

Q14.

(a) because water enters (the cell / it / named cell)

*do **not** accept salt / sugar / solution entering*

1

by osmosis / diffusion

if osmosis / diffusion not given accept concentration inside cell greater than outside cell

assume concentration refers to solute concentration unless answer indicates otherwise

allow water goes <u>up</u> the concentration gradient

allow water goes <u>down its</u> concentration gradient

*do **not** accept if diffusion of salt / sugar*

1

through a partially permeable membrane

*allow semi / selectively permeable membrane **or** description*

1

(b) (plant cells) have (cell) <u>wall</u>

accept animal cells have no (cell) <u>wall</u>

ignore reference to cell membrane

*do **not** accept reference to other organelles **or** any implication that animal cells have a cell wall eg plant cells have a thicker cell wall*

1

[4]

Q15.

(a) (i) release energy

allow provide / supply / give energy

*do **not** accept produce / create / generate / make energy*

*do **not** allow release energy for respiration*

1

(ii) contain half the (number of) chromosomes **or** contains one set of chromosomes **or** contains 23 chromosomes

allow genetic information / DNA / genes / alleles instead of chromosomes

accept haploid

1

(b) any two from:

- (stem cells) are unspecialised / undifferentiated

  allow description eg 'no particular job'

- are able to become differentiated **or** can form other types of cell / tissue / organ

- stem cells can / able to divide / multiply

2

[4]