Topic Test: OxfordAQA International Combined Science 9204 Biology

Organisation

Name: _____

Class: _____

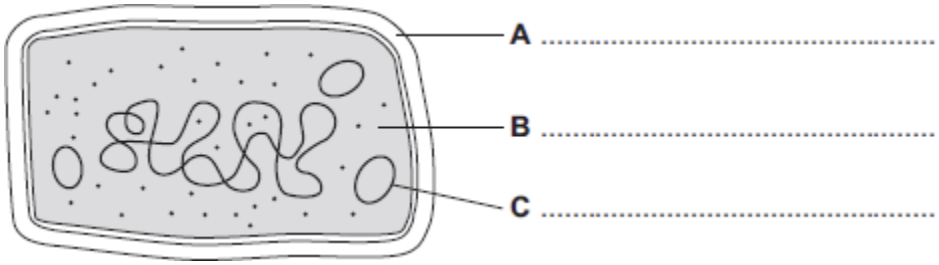
Date: _____

Time: **49 minutes**

Marks: **49 marks**

Comments:

1 (a) The diagram shows the structure of a bacterial cell.



(i) On the diagram use words from the box to label structures **A**, **B** and **C**.

cell membrane	**cell wall**	**chloroplast**	**cytoplasm**	**plasmid**

(3)

(ii) Give **one** difference between the structure of the bacterial cell and an animal cell.

_____

(1)

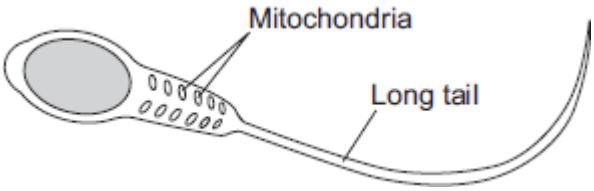
(iii) Name **one** structure that is found in a plant cell but is **not** found in a bacterial or an animal cell.

_____

(1)

(b) Cells can be specialised for a particular job.

The diagram shows the structure of a human sperm cell.



Describe how the long tail and the mitochondria help the sperm to do its job.

Long tail _____

_____

_____

Mitochondria _____

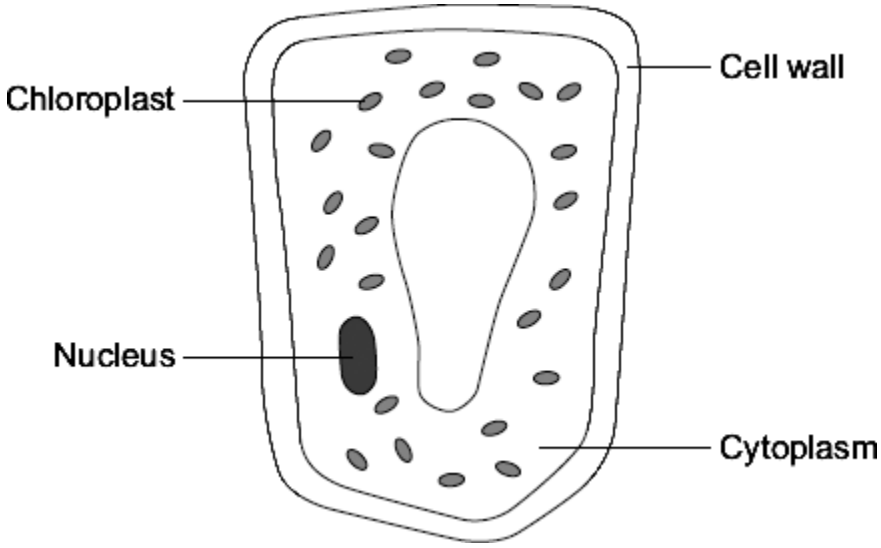
_____

_____

(4)

(Total 9 marks)

2 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.

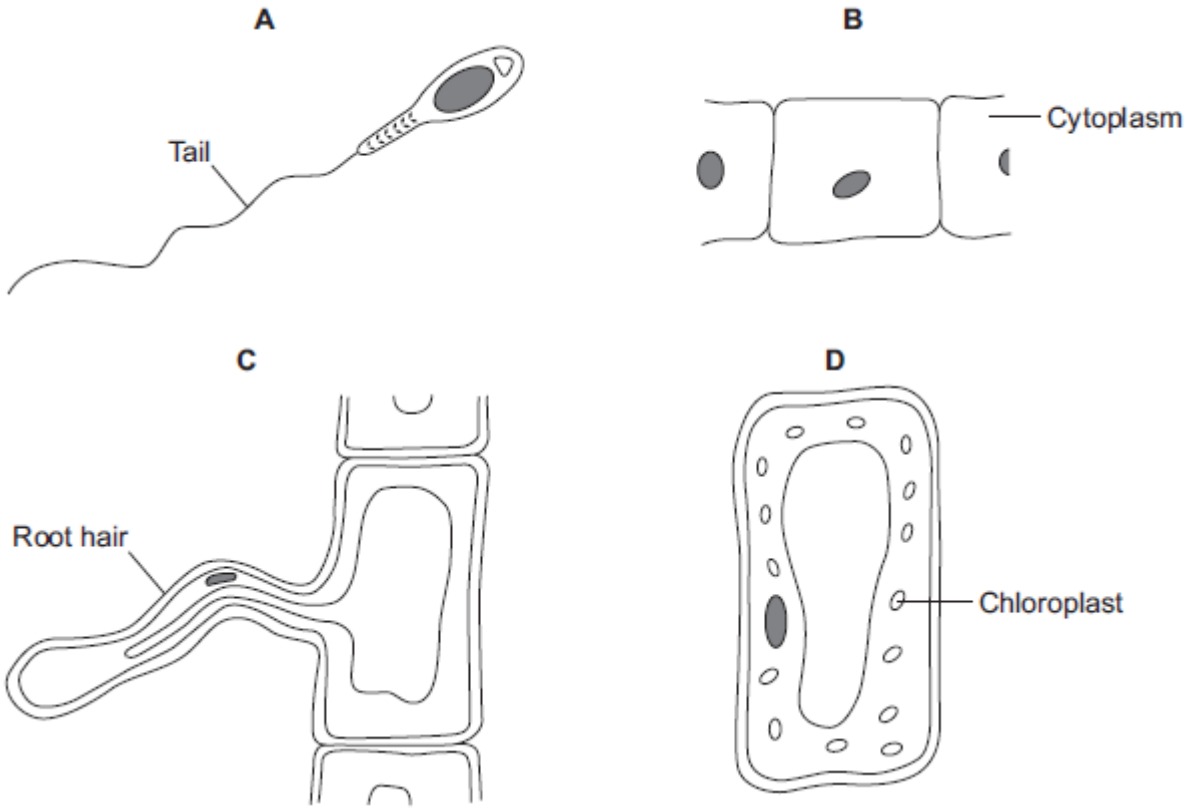
All cells use respiration to release

energy
oxygen.
sugar.

(1)

(Total 4 marks)

3 The diagrams show four types of cell, **A**, **B**, **C** and **D**.
Two of the cells are plant cells and two are animal cells.



(a) (i) Which **two** of the cells are plant cells?

Tick (✓) **one** box.

A and **B** ☐

A and **D** ☐

C and **D** ☐

(1)

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

_____

_____

(1)

(b) (i) Which cell, **A**, **B**, **C** or **D**, is adapted for swimming? ☐

(1)

(ii) Which cell, **A**, **B**, **C** or **D**, can produce glucose by photosynthesis? ☐

(1)

(c) Cells **A**, **B**, **C** and **D** all use oxygen.

For what process do cells use oxygen?

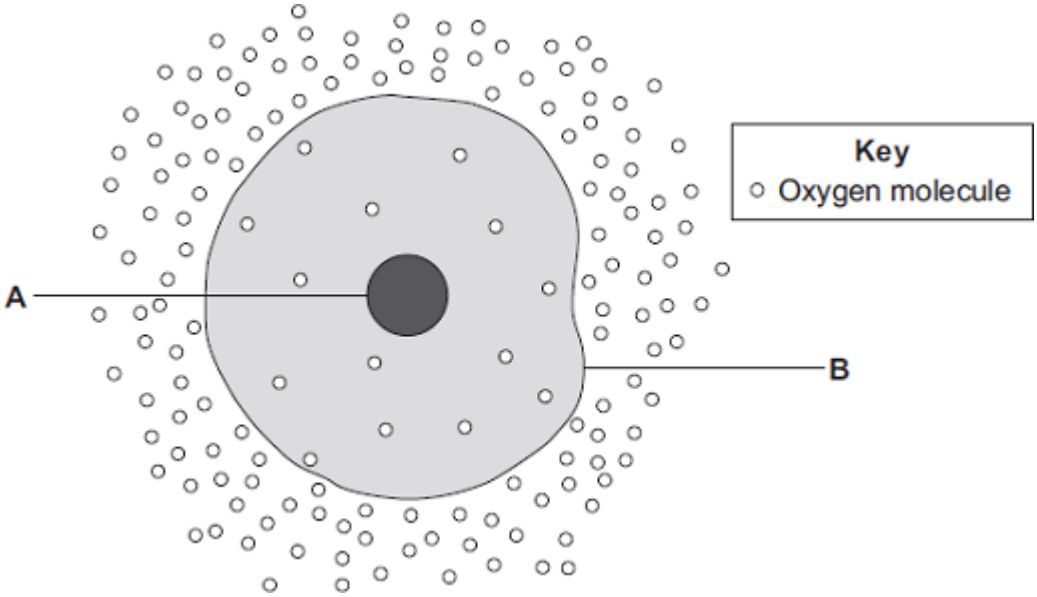
Draw a ring around **one** answer.

osmosis **photosynthesis** **respiration**

(1)

(Total 5 marks)

4 The diagram shows a cell.



(a) (i) Use words from the box to name the structures labelled **A** and **B** .

cell membrane	chloroplast	cytoplasm	nucleus

A _____

B _____

(2)

(ii) The cell in the diagram is an animal cell.

How can you tell it is an animal cell and **not** a plant cell?

Give **two** reasons.

1. _____

_____

2. _____

_____

(2)

(b) Oxygen will diffuse into the cell in the diagram.

Why?

Use information from the diagram.

_____

_____

(1)

(c) The cell shown in the diagram is usually found with similar cells.

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

Scientists call a group of similar cells

- an organ.
- a system.
- a tissue.

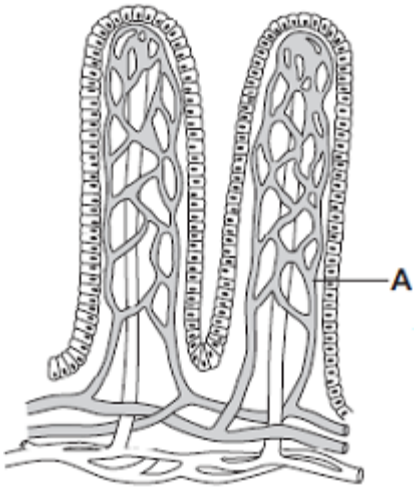
(1)

(Total 6 marks)

5 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.

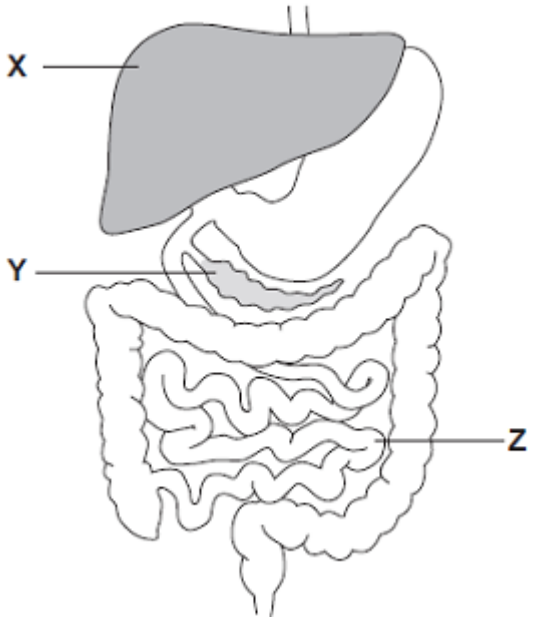
diffusion.

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?

_____

_____

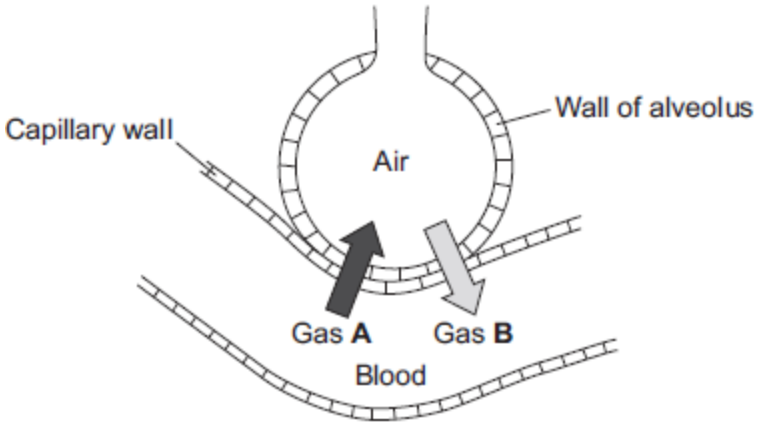
(1)

(Total 4 marks)

6 Gas exchange takes place in the lungs.

The diagram shows an alveolus next to a blood capillary in a lung.

The arrows show the movement of two gases, **A** and **B**.



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

Gases **A** and **B** move by

diffusion.
osmosis.
respiration.

(1)

(ii) Gas **A** moves from the blood to the air in the lungs.

Gas **A** is then breathed out.

Name Gas **A**.

_____

(1)

(iii) Which cells in the blood carry Gas **B**?

Draw a ring around the correct answer.

platelets **red blood cells** **white blood cells**

(1)

(b) The average number of alveoli in each human lung is 280 million.

The average surface area of 1 million alveoli is 0.25 m^2.

Calculate the total surface area of a human lung.

_____

Answer _____ m^2

(2)

(c) An athlete trains to run a marathon. The surface area of each of the athlete's lungs has increased to 80 m^2.

Give **one** way in which this increase will help the athlete.

_____

_____

(1)

(Total 6 marks)

7 Plant roots absorb water from the soil by osmosis.

(a) What is osmosis?

_____

_____

_____

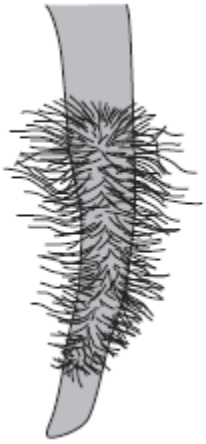
_____

_____

_____

(3)

(b) The image below shows part of a plant root.



The plant root is adapted for absorbing water from the soil.

Use information from the diagram to explain how this plant root is adapted for absorbing water.

_____

_____

_____

_____

_____

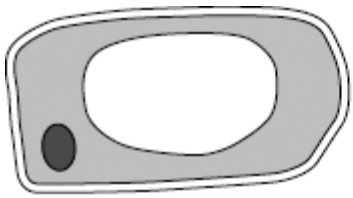
_____

(3)

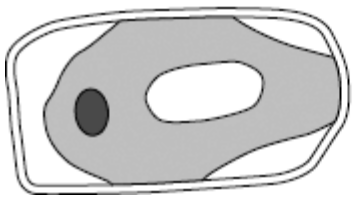
(Total 6 marks)

8 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.

_____

_____

_____

_____

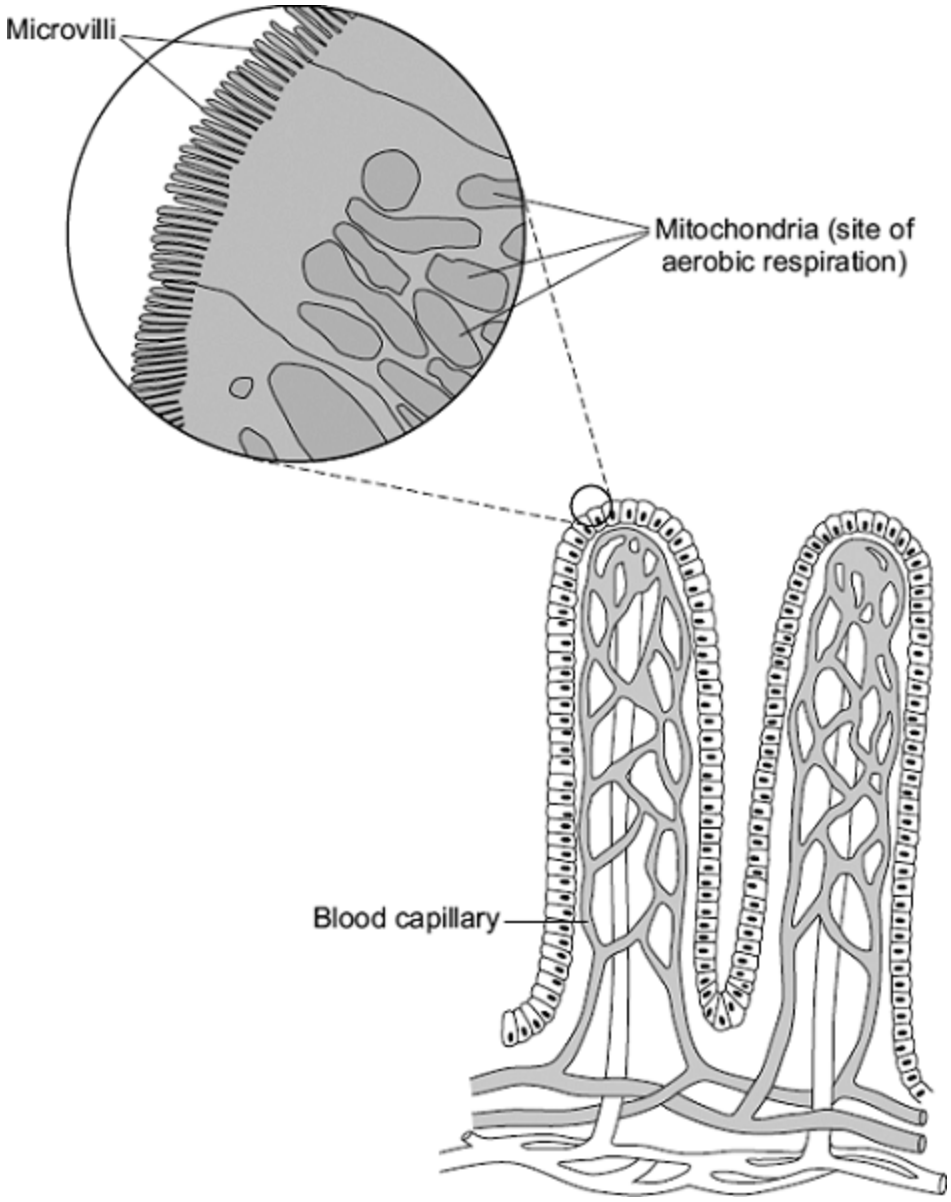
_____

(2)

(Total 4 marks)

9 The villi of the small intestine absorb the products of digestion.

The diagram shows two villi. It also shows parts of some of the surface cells of a villus, as seen with an electron microscope.



Describe and explain how the villi are adapted to maximise the rate of absorption of the products of digestion.

(Total 5 marks)

1 (a) (i) **A** − (cell) wall

1

B − cytoplasm

1

C − plasmid

1

(ii) bacterium cell has cell wall / no nucleus / no mitochondria / plasmids present

accept its DNA / genetic material is not enclosed / it has no nuclear membrane

it = bacterium cell

accept converse for animal cell

ignore flagella

1

(iii) any **one** from:

- chloroplast

  ignore chlorophyll
- (permanent) vacuole

1

(b) (Long tail) moves the sperm / allows the sperm to swim

1

towards the egg

allow correct reference to other named parts of the female reproductive system

1

(Mitochondria) release <u>energy</u> (for movement / swimming)

allow supply / produce / provide

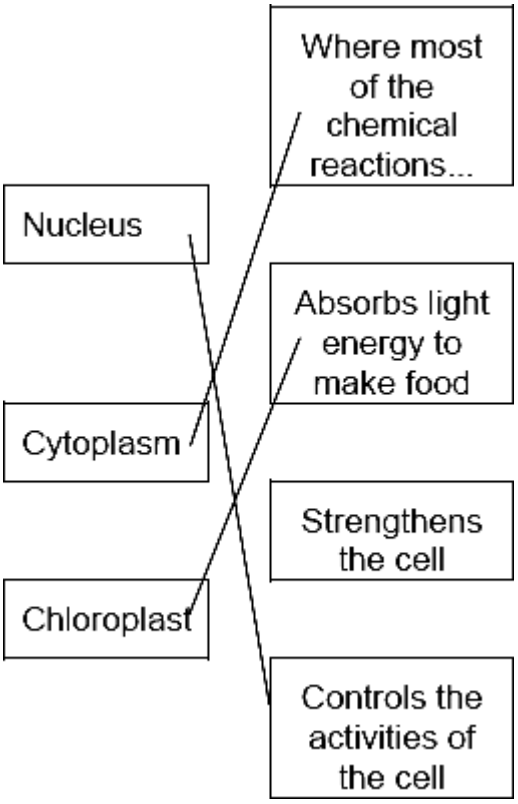
1

in respiration

1

[9]

2 (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]

3 (a) (i) **C** and **D**

no mark if more than one box is ticked

1

(ii) any **one** from:

*do **not** allow if other cell parts are given in a list*

- (have) cell wall(s)
- (have) vacuole(s)

1

(b) (i) **A**

apply list principle

1

(ii) **D**

apply list principle

1

(c) respiration

apply list principle

1

[5]

4

(a) (i) A = nucleus

1

B = (cell) membrane

1

(ii) any **two** from:

ignore shape

- no (cell) wall
- no (large / permanent) vacuole
- no chloroplasts / chlorophyll

2

(b) because high to low oxygen / concentration **or** down gradient

allow 'more / a lot of oxygen molecules <u>outside</u>'

ignore along / across gradient

1

(c) a tissue

1

[6]

5

(a) (i) capillary

1

(ii) diffusion

1

(b) (i) Z

ignore any names

1

(ii) <u>large</u> / <u>increased</u> surface / area

allow <u>all</u> food absorbed

or to absorb <u>more</u> food
or improved diffusion

1

[4]

6

(a) (i) diffusion

1

(ii) carbon dioxide

accept CO_2 / CO2

*do **not** accept CO^2*

1

(iii) red blood cells

1

(b) 70

if no / incorrect answer then

70 000 000

or

*280 x 0.25 gains **1** mark*

ignore doubling the answer

2

(c) allows more gas / oxygen / CO_2 (exchange)

*do **not** accept air*

1

[6]

7 (a) any **three** from:

- (water through a) partially permeable

  accept 'semi permeable' / selectively permeable
- membrane
- from dilute to (more) concentrated solution

  allow 'from a high concentration of water to a lower concentration (of water)'
  allow 'from high water potential to low water potential'
  allow 'down a concentration gradient of water'

  *do **not** accept 'along a concentration gradient of water'*
- (it's a) passive (process)

  allow requires no energy

3

(b) (there are) many <u>hairs</u> **or** thin <u>hairs</u> **or** <u>hairs</u> are one cell thick

1

(which gives) large / increased surface area **or** short diffusion pathway

1

(so there is) more diffusion / osmosis (of water into the root)

ignore absorption

1

[6]

8 (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]

9

D – *many* microvilli (1)
Ex – provide large surface area (1)

five *points made*

max ***3*** *descriptions*

max ***3*** *explanations*

D – *many* capillaries / *good* blood supply (1)
Ex – maintain concentration / diffusion gradient **or** quickly removes food (1)

D – thin wall / one cell thick surface / capillaries near surface (1)

allow villi are thin

ignore villi are one cell thick

Ex – short distance for food to travel (1)

D – *many mitochondria (1)*
Ex – provide energy / ATP for active uptake / transport (1)

[5]