**Q1.Figure 1** shows a human cheek cell viewed under a light microscope.

**Figure 1**



© Ed Reschke/Photolibrary/Getty Images

(a)     Label the nucleus **and** cell membrane on **Figure 1**.

**(2)**

(b)     Cheek cells are a type of body cell.

Body cells grow through cell division.

What is the name of this type of cell division?

|  |  |  |
| --- | --- | --- |
|  | Tick **one** box. |  |
|  | Differentiation |  |
|  | Mitosis |  |
|  | Specialisation |  |

**(1)**

(c)     Ribosomes and mitochondria are **not** shown in **Figure 1**.

What type of microscope is needed to see ribosomes and mitochondria?

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**(1)**

(d)     What is the advantage of using the type of microscope you named in part **(c)**?

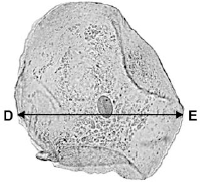
|  |  |  |
| --- | --- | --- |
|  | Tick **one** box. |  |
|  | Cheaper |  |
|  | Higher magnification |  |
|  | Lower resolution |  |

**(1)**

(e)     The cheek cell in **Figure 2** is magnified 250 times.

The width of the cell is shown by the line **D** to **E**.

**Figure 2**



Calculate the width of the cheek cell in micrometres (µm).

Complete the following steps.

Measure the width of the cell using a ruler        .......................................... mm

Use the equation to work out the real width of the cell in mm:

**real size   =**                           ............................................ mm



Convert mm to µm                                           ............................................. µm

**(3)**

(f)     A red blood cell is 8 µin diameter.

A bacterial cell is 40 times smaller.

Calculate the diameter of the bacterial cell.

|  |  |  |
| --- | --- | --- |
|  | Tick **one** box. |  |
|  | 0.02 µm |  |
|  | 0.2 µm |  |
|  | 2.0 µm |  |
|  | 20.0 µm |  |

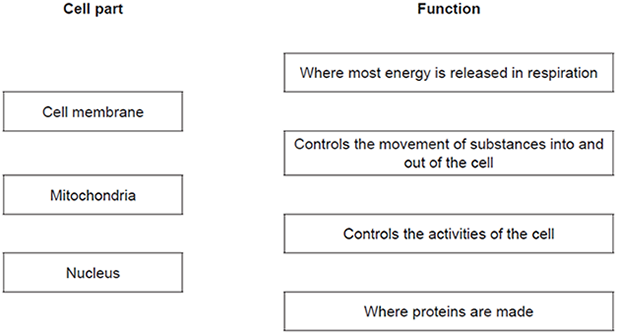
**(1)**

**(Total 9 marks)**

**Q2.**Living organisms are made of cells.

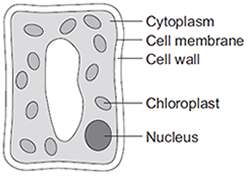
(a)     Animal and plant cells have several parts. Each part has a different function.

Draw **one** line from each cell part to the correct function of that part.



**(3)**

(b)     The diagram below shows a cell from a plant leaf.



Which **two** parts in the diagram above are **not** found in an animal cell?

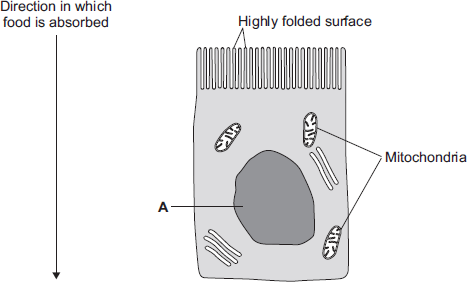
1 ....................................................................................................................

2 ....................................................................................................................

**(2)**

**(Total 5 marks)**

**Q3.**The image below shows an epithelial cell from the lining of the small intestine.



(a)     (i)      In the image above, the part of the cell labelled **A** contains chromosomes.

What is the name of part **A**?

...............................................................................................................

**(1)**

(ii)     How are most soluble food molecules absorbed into the epithelial cells of the small intestine?

Draw a ring around the correct answer.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **diffusion** | **osmosis** | **respiration** |

**(1)**

(b)     Suggest how the highly folded cell surface helps the epithelial cell to absorb soluble food.

........................................................................................................................

........................................................................................................................

**(1)**

(c)     Epithelial cells also carry out active transport.

(i)      Name **one** food molecule absorbed into epithelial cells by active transport.

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**(1)**

(ii)     Why is it necessary to absorb some food molecules by active transport?

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**(1)**

(ii)     Suggest why epithelial cells have many mitochondria.

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**(2)**

(d)     Some plants also carry out active transport.

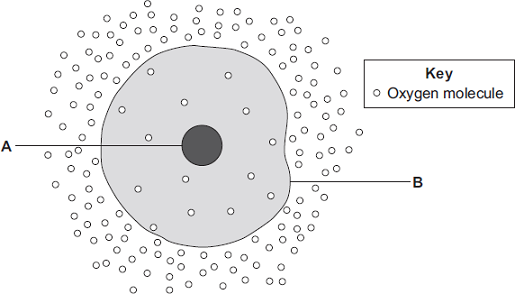
Give **one** substance that plants absorb by active transport.

........................................................................................................................

**(1)**

**(Total 8 marks)**

**Q4.**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.

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........................................................................................................................

**(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.

|  |  |  |
| --- | --- | --- |
|  |  | an organ. |
|  | Scientists call a group of similar cells | a system. |
|  |  | a tissue. |

**(1)**

**(Total 6 marks)**

**Q5.**          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.

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**(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)**

**Q6.**          (a)     The diagrams show what happens to the shape of a plant cell placed in distilled water.



(i)      Explain why the cell swells and becomes turgid. Name the process involved.

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**(2)**

(ii)     Give **one** feature of the cell wall which allows the cell to become turgid.

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**(1)**

(b)     Describe the change which will occur if a piece of peeled potato is placed in a concentrated sugar solution and explain why this change occurs.

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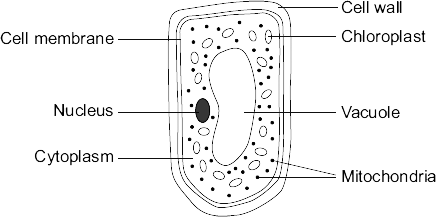
.....................................................................................................................................

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**(3)**

**(Total 6 marks)**

**Q7.**          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.

|  |  |
| --- | --- |
|  | diffusion. |
| The oxygen produced by the chloroplasts passes out of the cell by | digestion. |
|  | respiration. |

**(1)**

**(Total 5 marks)**

**Q8.**          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.

...............................................................................................................

...............................................................................................................

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...............................................................................................................

**(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.

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...............................................................................................................

**(2)**

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

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...............................................................................................................

**(1)**

**(Total 7 marks)**

**M1.**(a)     nucleus labelled correctly

**1**

cell membrane labelled correctly

**1**

(b)     mitosis

**1**

(c)     electron (microscope)

**1**

(d)     higher magnification

**1**

(e)     45 (mm)

**1**

45 / 250 **or** 0.18 (mm)

*allow ecf*

**1**

180 (µm)

**1**

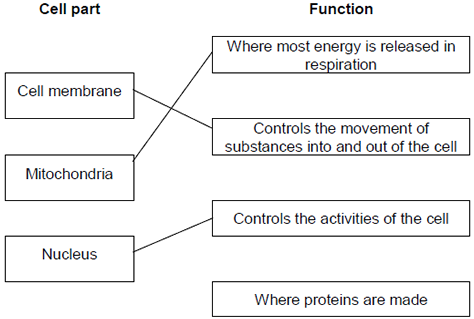
*allow 180 (µm) with no working shown for* ***3*** *marks*

(f)     0.2 µm

**1**

**[9]**

**M2.**(a)



*extra lines cancel*

**3**

(b)     Cell wall

*in either order*

**1**

Chloroplast

*allow (permanent) vacuole*

**1**

**[5]**

**M3.**(a)     (i)      nucleus

**1**

(ii)     diffusion

**1**

(b)     increases / larger surface area (for diffusion)

*ignore large surface area to volume ratio*

**1**

(c)     (i)      sugar / glucose

*accept amino acids / other named monosaccharides*

**1**

(ii)     against a concentration gradient

**or**

from low to high concentration

**1**

(iii)    (active transport requires) energy

**1**

(from) respiration

**1**

(d)     minerals / ions

*accept named ion ignore nutrients*

***do not accept*** *water*

**1**

**[8]**

**M4.**(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 outside’*

*ignore along / across gradient*

**1**

(c)     a tissue

**1**

**[6]**

**M5.**          (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 up the concentration gradient*

*allow water goes down its 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) wall

*accept animal cells have no (cell) wall*

*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]**

**M6.**          (a)     (i)      water (molecules) enter(s) (the cell)

***or*** *water (molecules) pass(es) through the (semi-permeable) cell membrane*

**1**

by osmosis

***or*** *because the concentration of water is*

*greater outside (the cell than inside it*

*the vacuole)*

*accept because of the concentration*

*gradient provided there is no contradiction*

**1**

(ii)     any **one** from

(it is) elastic

(it is) strong

(it is fully) permeable (to water)

***or*** *water can pass through it*

*do not credit semi-permeable*

*do not credit cell membrane is semi-permeable*

**1**

(b)     (the piece of) potato shrinks

***or*** *loses its turgor*

***or*** *becomes flabby*

***or*** *becomes flaccid*

***or*** *plasmolysis occur*

***or*** *cytoplasm pulls away from the cell wall*

(because) concentration of sugar

***or*** *because concentration of water*

**1**

(solution) is greater than concentration inside the cell / vacuole

*inside the cell / vacuole is greater than concentration (of water) outside*

**1**

water is drawn out of the cell

**1**

**[6]**

**M7.**         (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]**

**M8.**         (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*

**1**

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]**