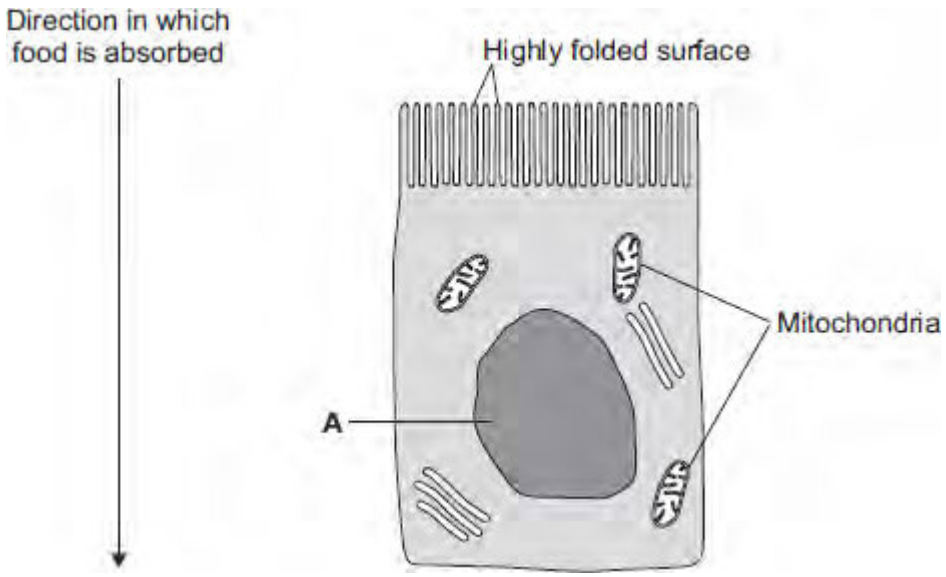
**Q1.** The image below shows an epithelial cell from the lining of the small intestine.




(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.

.....

**(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.

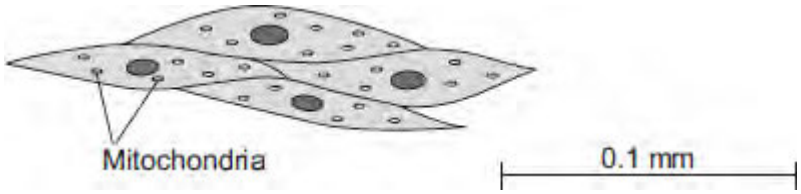
Give **one** substance that plants absorb by active transport.

.....

**(1)**

**(Total 8 marks)**

**Q2.** The image below shows some muscle cells from the wall of the stomach, as seen through a light microscope.




(a) Describe the function of muscle cells in the wall of the stomach.

.....

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.....

.....

**(2)**

(b) **Figure above** is highly magnified.

The scale bar in **Figure above** represents 0.1 mm.

Use a ruler to measure the length of the scale bar and then calculate the magnification of **Figure above**.

.....

.....

.....

.....

Magnification = ..... times

**(2)**

(c) The muscle cells in **Figure above** contain many mitochondria.

What is the function of mitochondria?

.....

.....

.....

.....

**(2)**

(d) The muscle cells also contain many ribosomes. The ribosomes cannot be seen in **Figure above**.

(i) What is the function of a ribosome?

.....

.....

**(1)**

(ii) Suggest why the ribosomes **cannot** be seen through a light microscope.

.....

.....

**(1)**

**(Total 8 marks)**

**Q3.** A student is given a tube containing a liquid nutrient medium. The medium contains one type of bacterium.

(a) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

The student is told to grow some of the bacteria on agar jelly in a Petri dish.

Describe how the student should prepare an uncontaminated culture of the bacterium in the Petri dish.

You should explain the reasons for each of the steps you describe.

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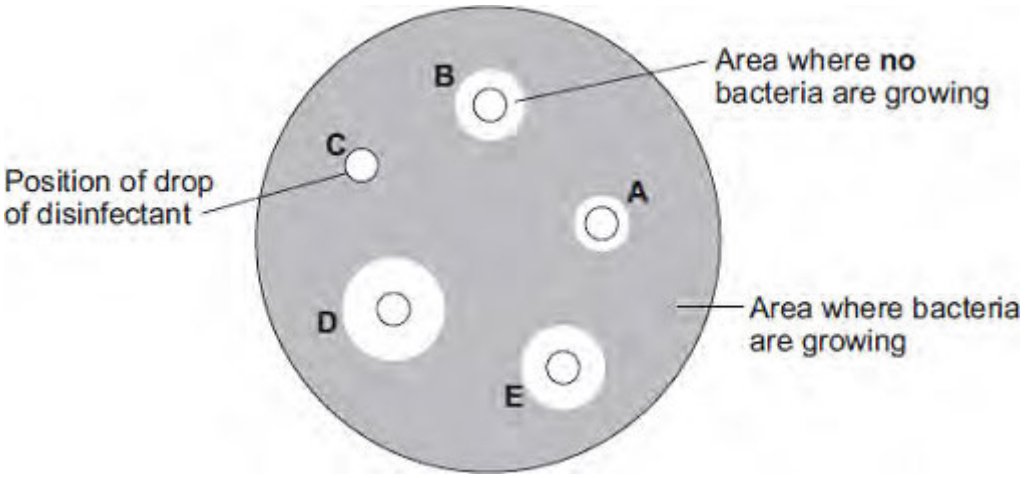
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**(6)**

(b) After the culture had been prepared, the student added one drop of each of five disinfectants, **A**, **B**, **C**, **D** and **E**, onto the culture.

The diagram shows the appearance of the Petri dish 3 days later.




(i) There are areas on the agar jelly where **no** bacteria are growing.

Why?

.....

.....

**(1)**

(ii) The student concluded that disinfectant **D** would be the best for using around the home.

Give **one** reason why the student might be correct.

.....

.....

.....

Give **one** reason why the student might **not** be correct.

.....

.....

.....

**(2)**

**(Total 9 marks)**

**Q4.**Some infections are caused by bacteria.

(a) The genetic material is arranged differently in the cells of bacteria compared with animal and plant cells.

Describe **two** differences.

.....

.....

.....

.....

**(2)**

(b) Tuberculosis (TB) is an infection caused by bacteria.

The table below shows the number of cases of TB in different regions of southern England from 2000–2011.

**Number of cases of TB per 100 000 people**

| Year | London | South East | South West |
|---|---|---|---|
| 2000 | 37 | 5 | 3 |
| 2001 | 36 | 6 | 4 |
| 2002 | 42 | 6 | 6 |
| 2003 | 42 | 7 | 4 |
| 2004 | 42 | 7 | 5 |
| 2005 | 49 | 8 | 5 |
| 2006 | 44 | 8 | 3 |
| 2007 | 43 | 8 | 5 |
| 2008 | 44 | 8 | 5 |
| 2009 | 44 | 9 | 6 |
| 2010 | 42 | 9 | 5 |
| 2011 | 45 | 10 | 5 |

(i) How does the number of cases of TB for London compare with the rest of southern England?

.....

.....

.....

**(1)**

(ii) Describe the pattern in the data for cases of TB in the South East.

.....

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**(1)**

(iii) Describe the pattern in the data for cases of TB in the South West.

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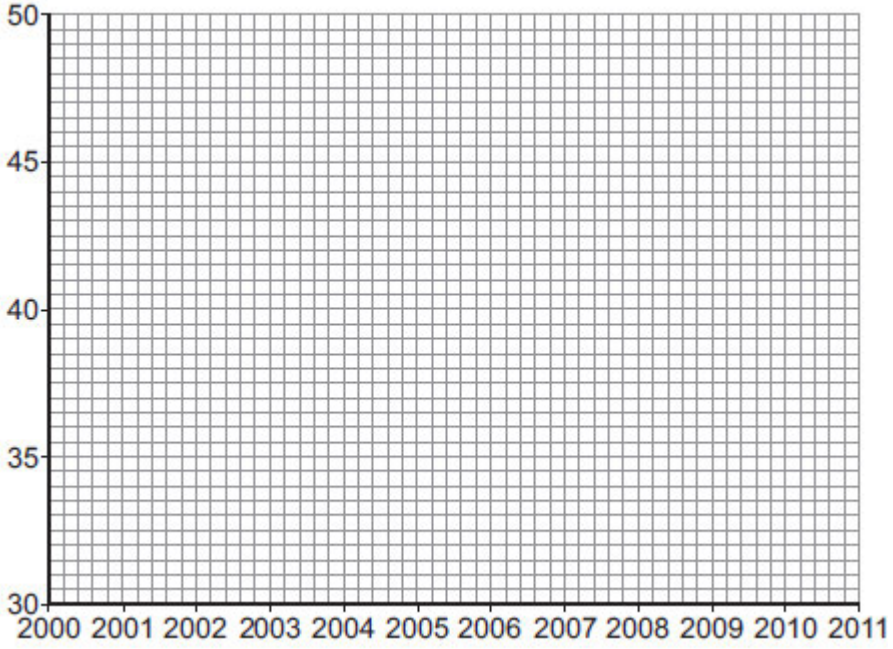
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**(2)**

(c) (i) On the graph paper below:

- plot the number of cases of TB in **London**
- label both the axes on the graph
- draw a line of best fit.




**(4)**

(ii) Suggest why a student thought the value for 2005 in London was anomalous.

.....

.....

**(1)**

(d) People can be vaccinated against TB.

Suggest how a vaccination programme would reduce the number of people with TB.

Details of how a vaccine works are **not** required.

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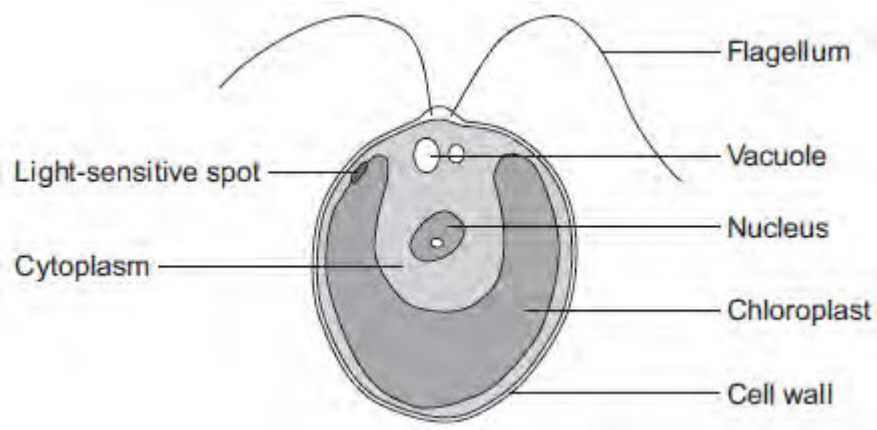
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**(2)**

**(Total 13 marks)**

**Q5.**The diagram below shows a single-celled alga which lives in fresh water.




(a) Which part of the cell labelled above:

(i) traps light for photosynthesis

.....

**(1)**

(ii) is made of cellulose?

.....

**(1)**

(b) In the freshwater environment water enters the algal cell.

(i) What is the name of the process by which water moves into cells?

.....

**(1)**

(ii) Give the reason why the algal cell does not burst.

.....

.....

**(1)**

(c) (i) The alga can photosynthesise.

Complete the **word** equation for photosynthesis.

water + ..... $\xrightarrow{\text{Light energy}}$ ..... + oxygen

**(2)**

(ii) The flagellum helps the cell to move through water. Scientists think that the flagellum and the light-sensitive spot work together to increase photosynthesis.

Suggest how this might happen.

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**(2)**

(d) Multicellular organisms often have complex structures, such as lungs, for gas exchange.

Explain why single-celled organisms, like algae, do **not** need complex structures for gas exchange.

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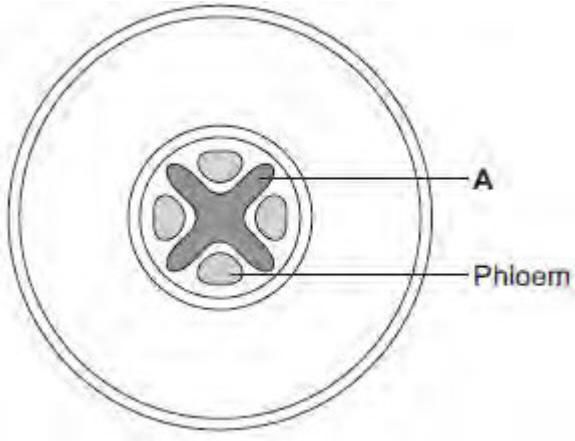
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**(3)**

**(Total 11 marks)**

**Q6.** The diagram below shows a cross-section of a plant root. The transport tissues are labelled.




(a) (i) What is tissue **A**?

Draw a ring around the correct answer.

**cuticle** **epidermis** **xylem**

**(1)**

(ii) Name **two** substances transported by tissue **A**.

1 .....

2 .....

**(2)**

(b) Phloem is involved in a process called translocation.

(i) What is translocation?

.....

.....

.....

**(1)**

(ii) Explain why translocation is important to plants.

.....

.....

.....

.....

**(2)**

(c) Plants must use active transport to move some substances from the soil into root hair cells.

(i) Active transport needs energy.

Which part of the cell releases most of this energy?

Tick (✓) **one** box.

mitochondria ☐

nucleus ☐

ribosome ☐

**(1)**

(ii) Explain why active transport is necessary in root hair cells.

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**(2)**

**(Total 9 marks)**