

- 1 Respiration is one of the characteristics of living things.

Tick (✓) **two** boxes to show two other characteristics of **all** living things.

| | |
|---------------------|--|
| breathing | |
| excretion | |
| growth | |
| photosynthesis | |
| sexual reproduction | |

[2]

[Total: 2]

- 2 All living organisms show the same seven characteristics.

State **four** of the characteristics of living organisms.

1

2

3

4 [4]

[Total: 4]

- 3 Energy is used to maintain body temperature.

State **three other** uses of energy in humans.

1

2

3 [3]

[Total: 3]

- 4 Describe **one** way in which all vertebrates differ from arthropods.

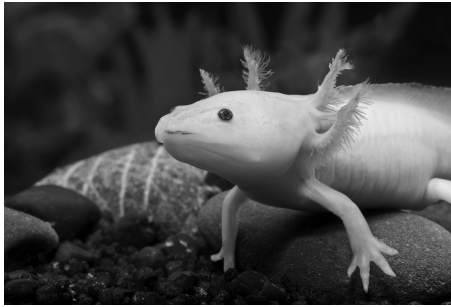
.....

.....

..... [1]

[Total: 1]

- 5 Acid rain can damage aquatic organisms such as the amphibian shown in the photograph.



Suggest why amphibians are vulnerable to pollutants such as acid rain.

.....

.....

.....

.....

..... [2]

[Total: 2]

- 6 Prokaryotes, Animals and Plants are three of the five kingdoms of organisms.

State the names of the **two other** kingdoms

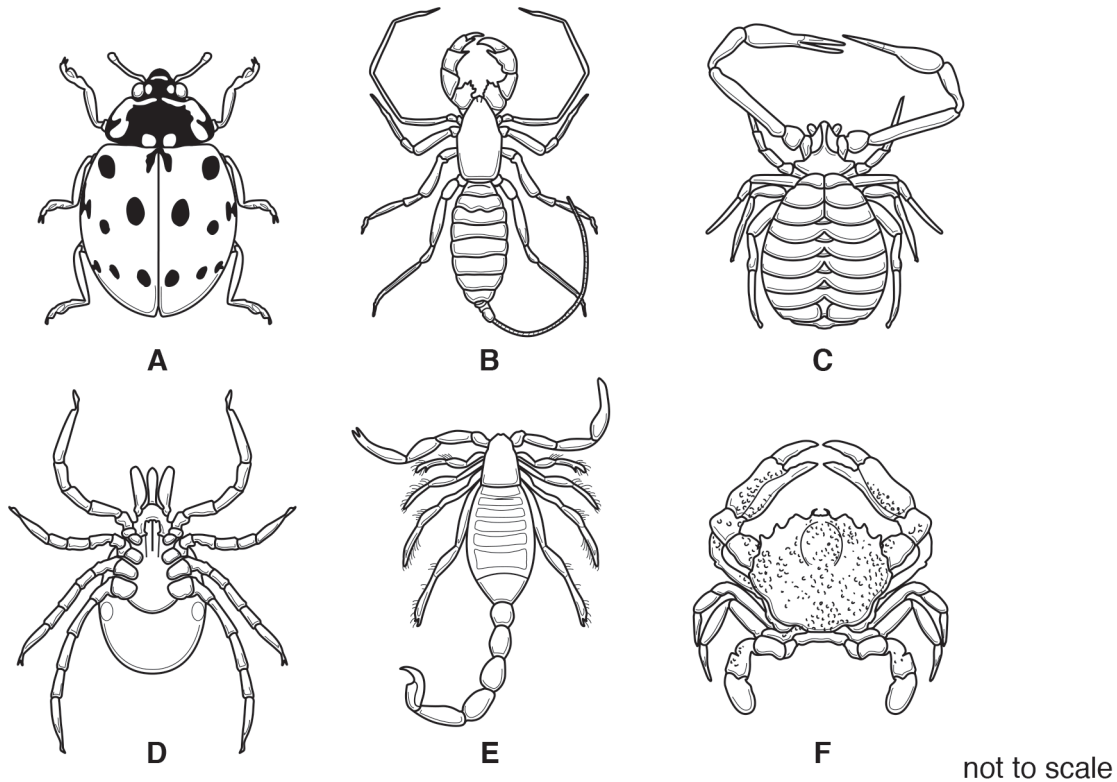
1

2 [2]

[Total: 2]

- 7 Spiders are classified as arachnids. Arachnids are one of the main groups of arthropods.

The diagram shows six arthropods, four of which are arachnids.



State **two** common features of all arachnids that can be used to distinguish them from other arthropods.

1

2 [2]

[Total: 2]

- 8 All living organisms are placed into groups according to their features.

Myriapods are one of the main groups of arthropods.

State **two** features of myriapods that can be used to distinguish them from other arthropods.

1

2 [2]

[Total: 2]

- 9 Diagram A is a branching key that can be used to identify different types of crustaceans.

diagram A

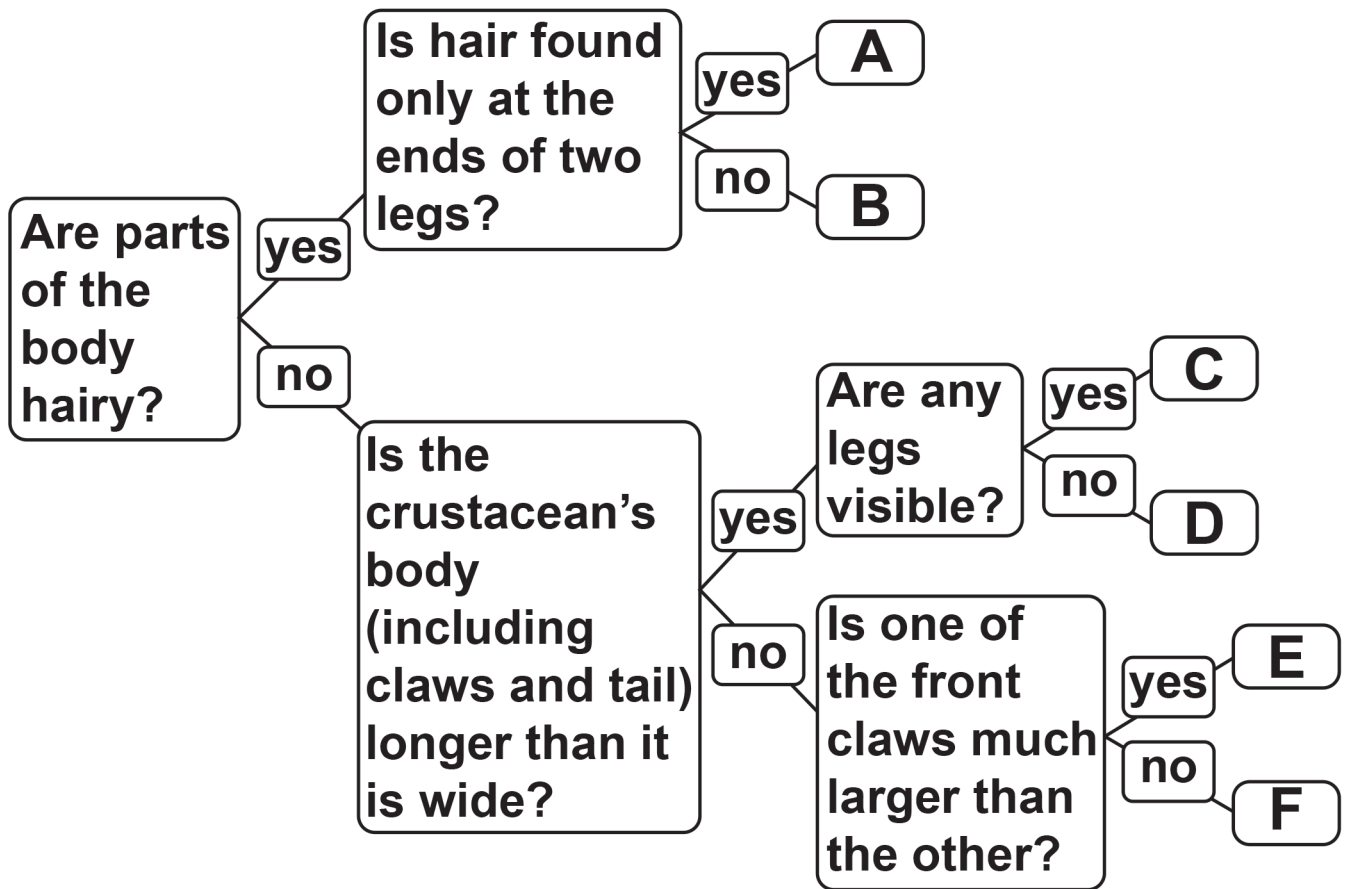


Diagram **B** shows six crustaceans.

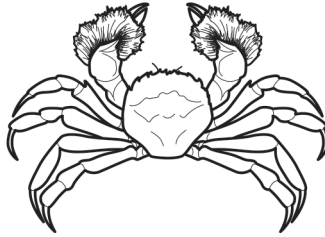
Use the key in diagram **A** to identify the six different types of crustacean.

Write the letters on the lines in diagram **B**.

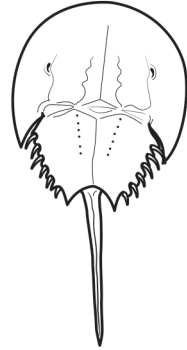
diagram B



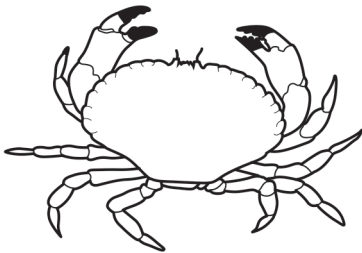
.....



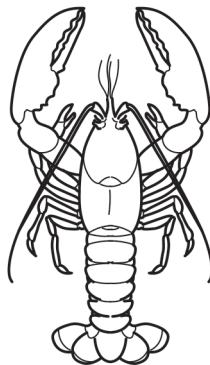
.....



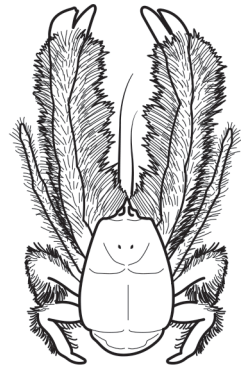
.....



.....



.....



.....

[5]

[Total: 5]

10 Keys can be used to identify a species.

The diagram shows drawings of six different birds and their names.

Ammodramus bairdii



Buceros rhinoceros



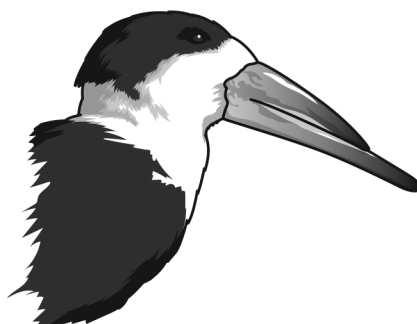
Pandion haliaetus



Haliaeetus leucocephalus



Rynchops niger



Recurvirostra avosetta



not to scale

Use the key to identify the birds in the diagram.

Complete the table by writing the letters of the birds **A** to **F** in the correct box.

| | | key | letter of bird |
|---|------------|--|----------------------|
| 1 | (a) (b) | beak is longer than the head beak is shorter than the head | go to 2 go to 3 |
| 2 | (a) (b) | beak curves upwards beak does not curve upwards | C go to 4 |
| 3 | (a) (b) | top part of the beak is hooked over the bottom part of the beak top part of the beak is not hooked over the bottom part of the beak | go to 5 E |
| 4 | (a) (b) | top part of the beak is shorter than bottom part of the beak beak has a large projection above the beak | A B |
| 5 | (a) (b) | head has a stripe head does not have a stripe | F D |

| name of bird in diagram | letter of the bird in the key |
|---------------------------------|-------------------------------|
| <i>Ammodramus bairdii</i> | |
| <i>Buceros rhinoceros</i> | |
| <i>Pandion haliaetus</i> | |
| <i>Haliaeetus leucocephalus</i> | |
| <i>Rynchops niger</i> | |
| <i>Recurvirostra avosetta</i> | |

[5]

[Total: 5]

- 11 Diagram **A** is a dichotomous key. It can be used to identify different types of tree by using their leaves.

diagram **A**

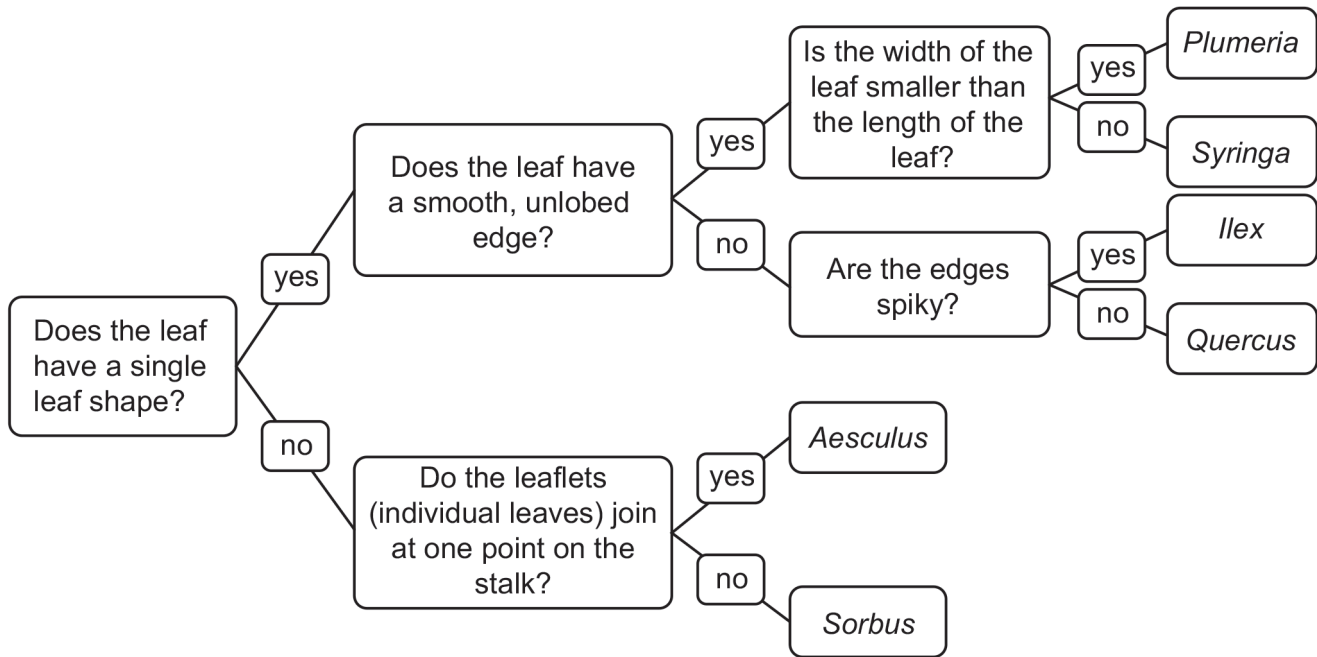
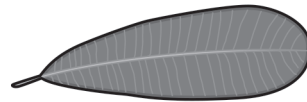
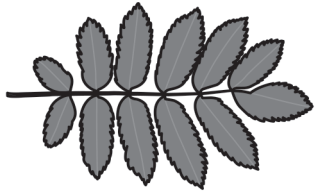
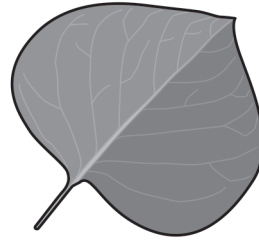
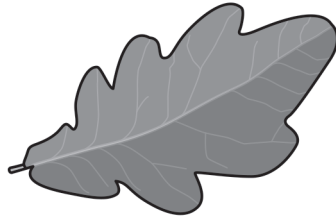
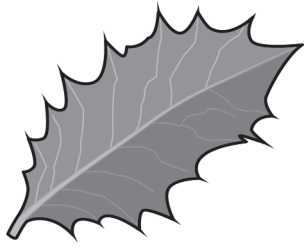


Diagram **B** shows leaves from six different trees.

Use the key in diagram **A** to identify the six different types of tree.

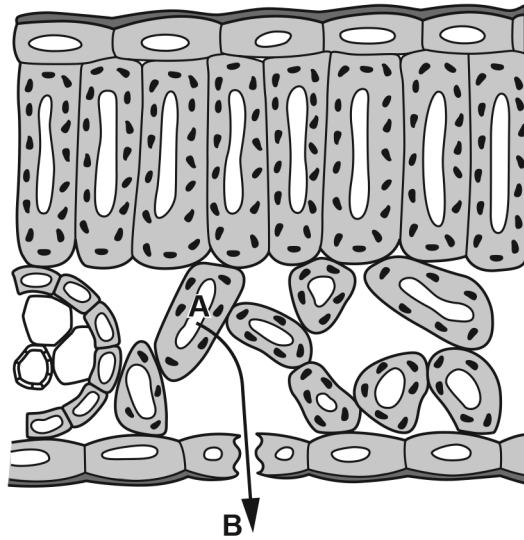
Write the name of each tree on the lines in diagram **B**.

diagram **B**



[Total: 5]

12 The diagram shows a section through a plant leaf.



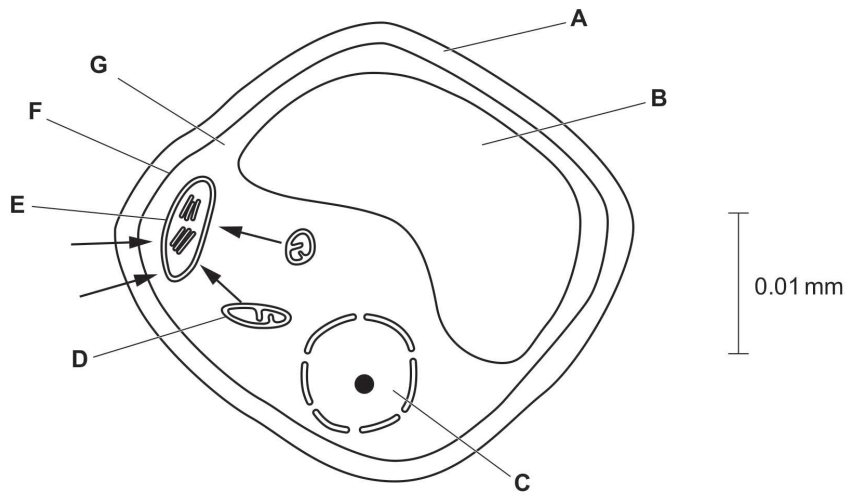
Draw a label line and a label to identify:

- a palisade mesophyll cell
- a vacuole.

[2]

[Total: 2]

- 13 The diagram shows a spongy mesophyll cell from the leaf of a plant. The arrows show the net direction of movement of carbon dioxide molecules during daylight.



The table shows:

- the functions of some of the structures in plant cells
- some of the names of the structures where these functions occur
- some of the letters that label these structure in the diagram.

Complete the table.

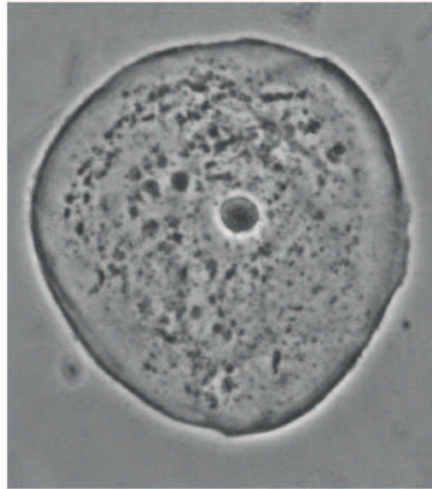
| function | structure | letter in diagram |
|------------------------------------|-------------|-------------------|
| | nucleus | |
| | chloroplast | |
| aerobic respiration | | |
| contains cell sap and stores water | | |
| | | A |

[5]

[Total: 5]

14 The photomicrograph is of an animal cell.

.....



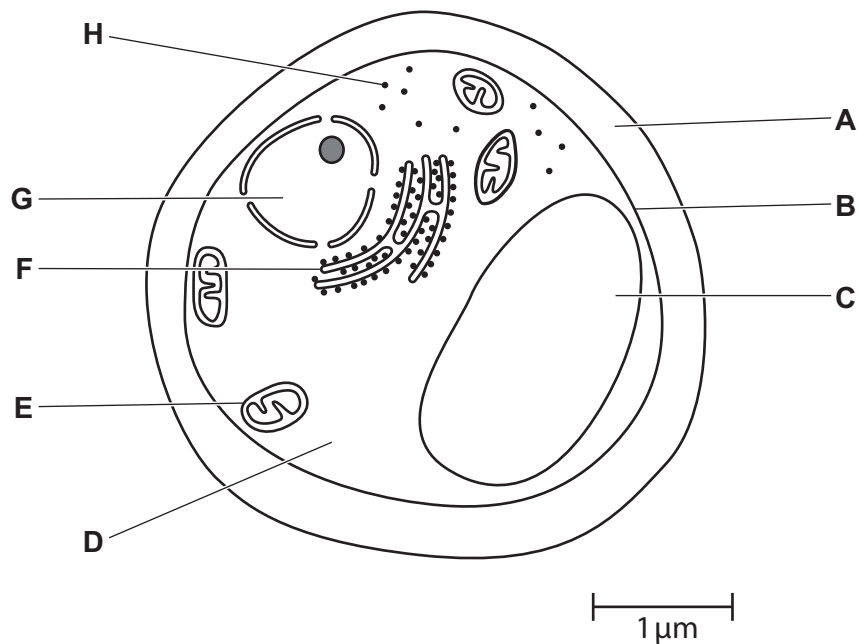
Identify the structure in the cell that contains the genetic material.

Label this structure on the photomicrograph by stating its name in the space provided **and** by drawing a label line to show its location in the cell. [2]

[Total: 2]

- 15** Baker's yeast, *Saccharomyces cerevisiae*, is a single-celled organism that is classified in the kingdom Fungi.

The diagram is a drawing of a section through a yeast cell.



The table shows some cell functions.

Complete the table by naming the cell structure responsible for each cell function and give the letter that identifies each cell structure in the diagram.

| cell function | cell structure | letter from diagram |
|---|----------------|---------------------|
| storage of genes | | |
| aerobic respiration | | |
| amino acids are assembled to make protein | | |

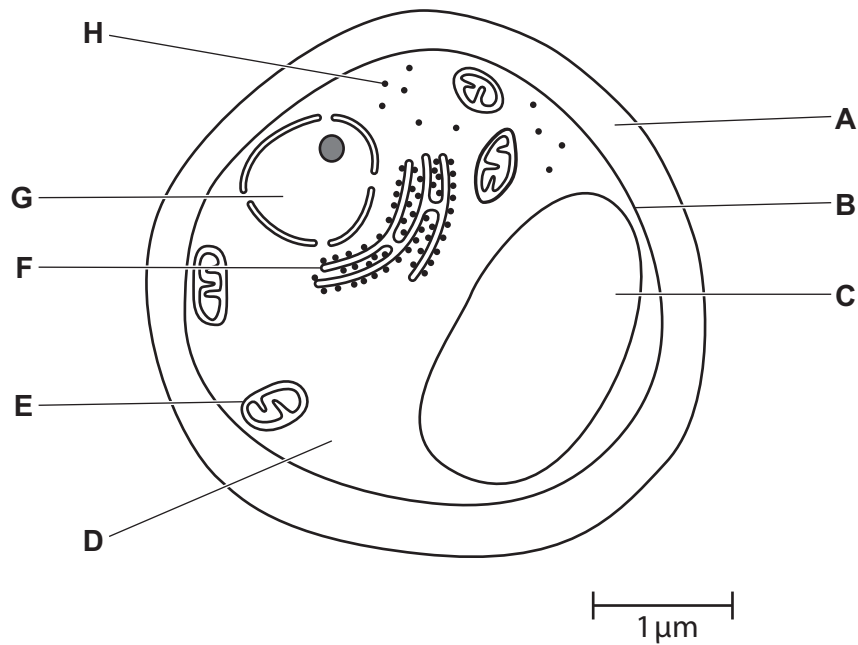
[3]

[Total: 3]

- 16 Baker's yeast, *Saccharomyces cerevisiae*, is a single-celled organism that is classified in the kingdom Fungi.

Diagram A is a drawing of a section through a yeast cell.

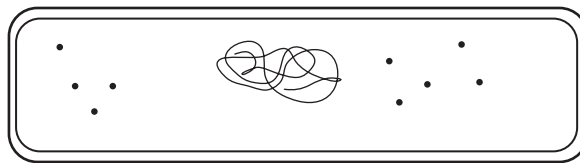
diagram A



A student made a drawing of one *Escherichia coli* bacterium.

Diagram B shows the student's drawing.

diagram B



Describe the similarities **and** differences between the structure of the yeast cell and the structure of the bacterial cell.

Use the information in diagram A and diagram B in your answer.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

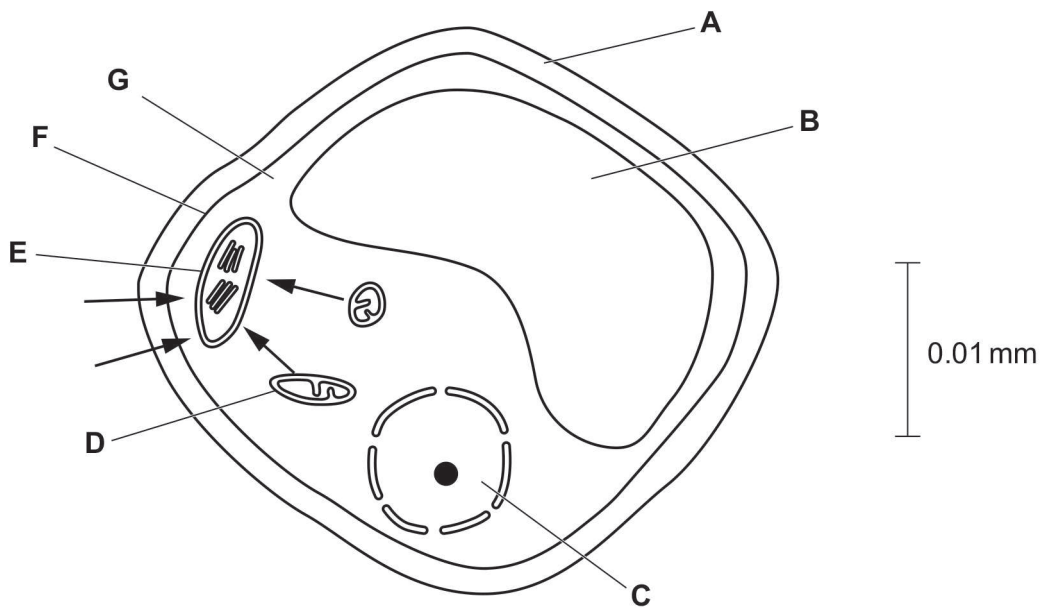
.....

.....

[6]

[Total: 6]

- 17** The diagram shows a spongy mesophyll cell from the leaf of a plant. The arrows show the net direction of movement of carbon dioxide molecules during daylight.



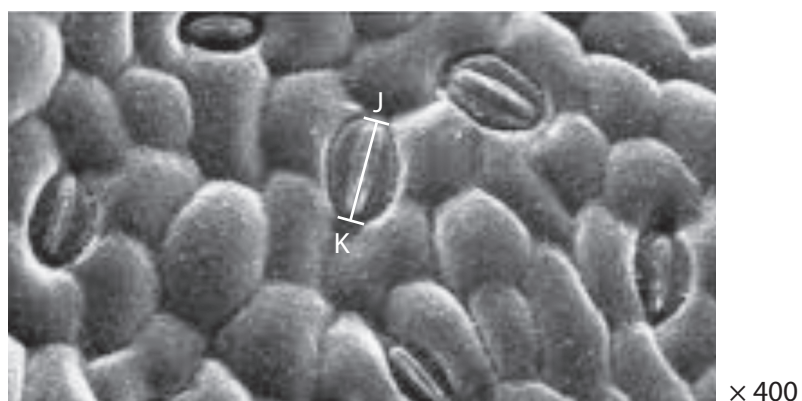
The scale bar in the diagram represents 0.01 mm.

Convert 0.01 mm to micrometres.

..... μm [1]

[Total: 1]

18 The diagram below shows the lower surface of a leaf as seen under a microscope.



- (a) (i) **JK** shows the length of the stoma in the diagram above.

Measure the length of **JK**.

length of **JK**mm [1]

- (ii) Calculate the actual length of the stoma.

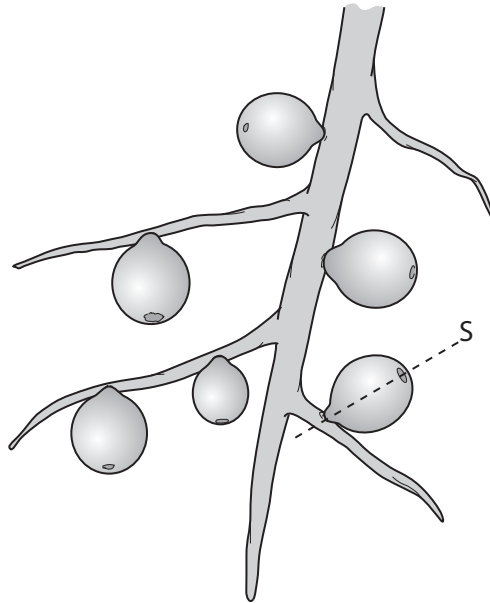
Show your working.

actual length of stomamm [2]

[Total: 3]

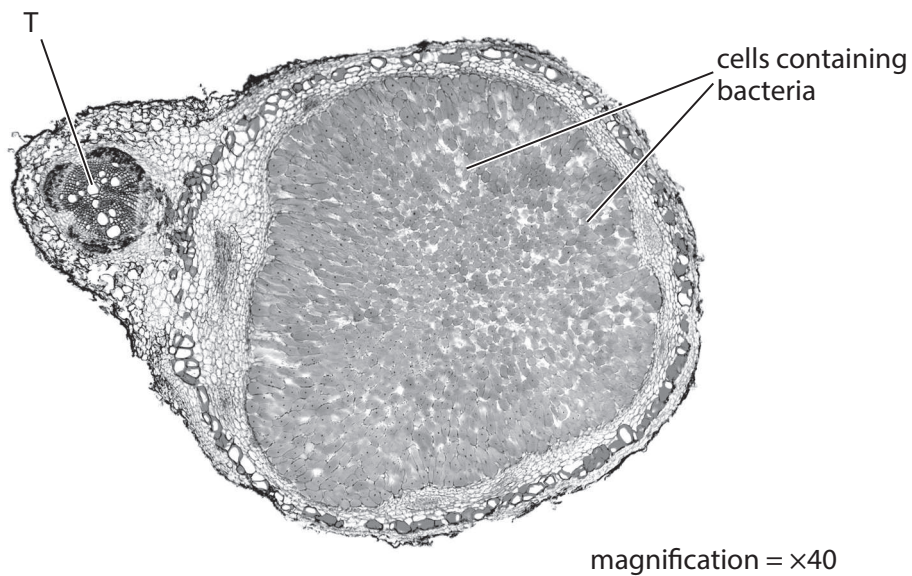
- 19 The pea plant, *Pisum sativum*, is a legume which is grown both as a human food and as a livestock feed.

The diagram below shows some of the root nodules on a pea plant.



The diagram below shows a cross-section through the root nodule at **S**.

T indicates the transport tissue in the root.



magnification = $\times 40$

- (a) The maximum diameter of the root nodule is 73 mm.

Calculate the actual diameter of the root nodule.

actual diameter [1]

(b) Describe the role of the bacteria in the root nodule of *P. sativum*.

.....
.....
.....
.....
..... [2]

(c) The bacteria require carbohydrates that are supplied by the pea plant.

Describe how the carbohydrates are produced and transported by the plant to the bacteria.

(i) produced

.....
.....
.....
..... [2]

(ii) transported

.....
.....
.....
..... [2]

[Total: 7]

20 The table shows some of the features of diffusion, osmosis and active transport.

Place ticks (✓) in the boxes to show the correct features of each process.

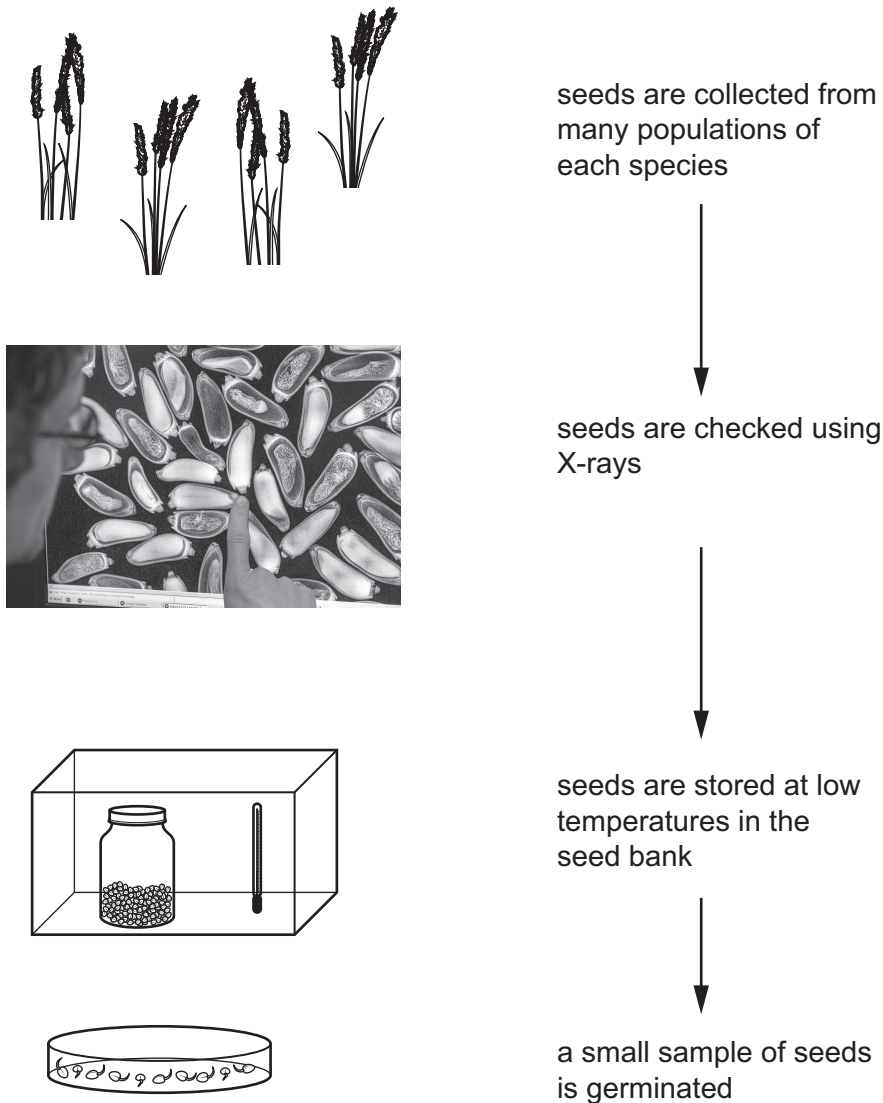
| | requires energy from respiration | takes place against a concentration gradient | always involves the movement of water | substances can cross the cell membrane |
|------------------|-------------------------------------|---|---|--|
| diffusion | | | | |
| osmosis | | | | |
| active transport | | | | |

[4]

[Total: 4]

21 Seed banks are used to conserve endangered plant species.

The diagram shows some of the steps involved in managing a seed bank.



Seeds stored at low temperatures have very low respiration rates.

Explain why.

.....

.....

.....

.....

.....

[2]

[Total: 2]

22 A plant was **not** watered for one week.

Look at a series of photographs of the plant during the week.



Explain how the lack of water has affected the support of the leaves of the plant shown in the photographs.

Use the term *turgor pressure* in your answer.

.....

.....

.....

.....

.....

.....

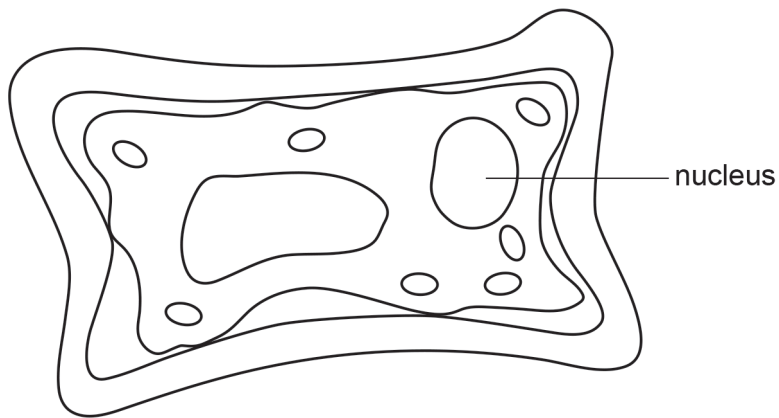
.....

[3]

[Total: 3]

- 23** A leaf cell was put into a solution. The water potential of the solution was lower than the water potential of the contents of the cell.

The diagram is a sketch of the cell after three hours in the solution.



The leaf cell was transferred into pure water.

Sketch the expected appearance of the cell after it had been in the pure water for three hours.

Draw **one** arrow on your sketch to show the direction of water movement.

[3]

[Total: 3]

- 24** Plant roots absorb mineral ions by active transport.

Define the term active transport.

.....

.....

.....

.....

[3]

[Total: 3]

- 25** Sexual reproduction requires energy.

State **three** uses of energy in organisms **other than in reproduction**.

1

2

3

[3]

[Total: 3]

- 26** Transmission of impulses relies on the flow of ions through the cell membranes of neurones down their concentration gradients. Active transport is responsible for maintaining the concentration gradients of ions across the membranes of neurones.

Explain how ions are moved across membranes by active transport.

.....

.....

.....

.....

.....

.....

.....

[3]

| feature | human | mouse |
|--|-------|-------|
| body mass / kg | 60.0 | 0.025 |
| kidney mass / g | 320.0 | 0.310 |
| water intake / dm ³ per day | 1.5 | 0.005 |
| water reabsorption / dm ³ per day | 179.0 | 0.168 |
| salt filtration rate / g per day | 580.0 | 0.556 |
| salt reabsorption / g per day | 575.0 | 0.551 |

Describe how salts are reabsorbed **against** a concentration gradient.

[illegible]

28 State the name of **two** large carbohydrate molecules found in plants that can be made from glucose.

1

2 [2]

[Total: 2]

- 29** The shape of a protein is very important for its function.

Explain the importance of shape for the function of an enzyme.

.....

.....

.....

.....

.....

.....

.....

.....

[3]

[Total: 3]

- 30** Red blood cells contain the protein haemoglobin.

State the names of the **four** chemical elements that are found in all proteins.

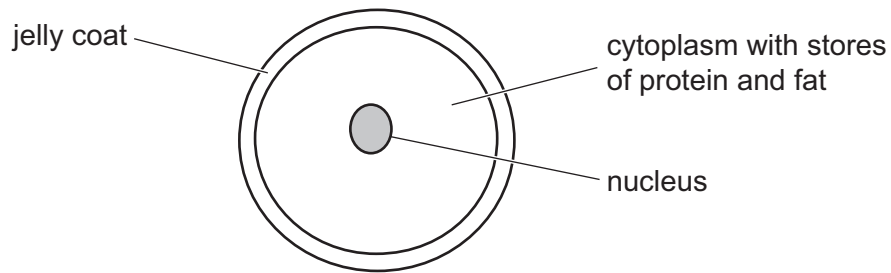
.....

.....

[2]

[Total: 2]

- 31 The diagram shows a section through an egg cell at the time of ovulation.



Explain why the egg cell contains stores of protein and fat.

.....

.....

.....

.....

.....

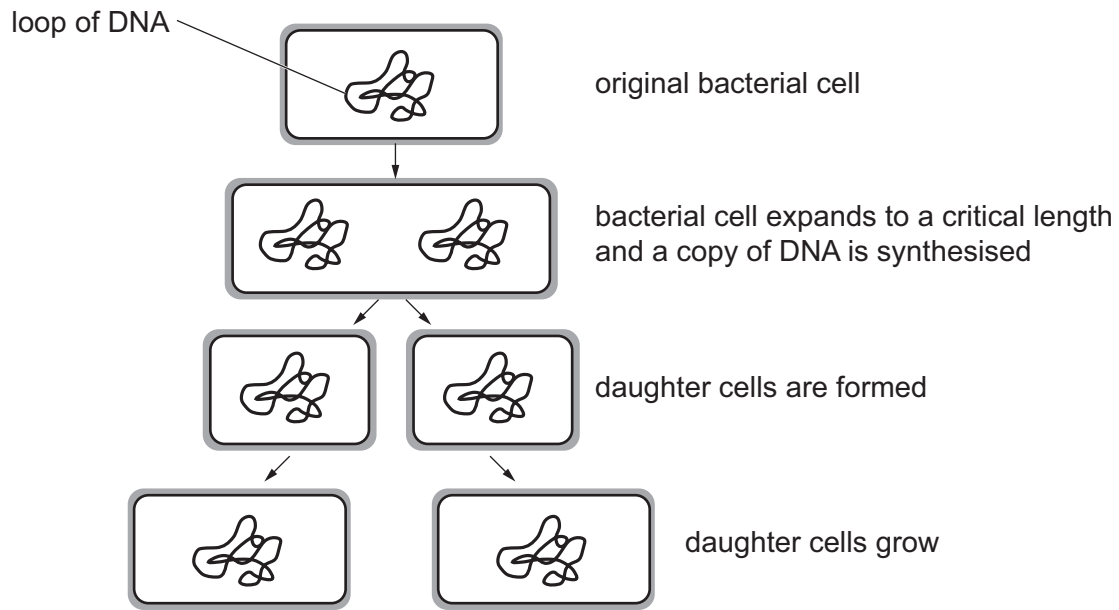
.....

.....

[3]

[Total: 3]

- 32 The diagram shows some of the stages in the reproduction of the bacterium *Escherichia coli*.



Complete the sentences about the cells in the diagram.

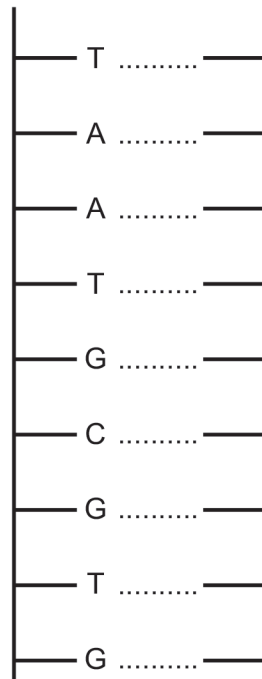
The DNA is in the form of a double The DNA is copied so that the number of loops of DNA after cell division is in each daughter cell. The daughter cells are genetically to the original cell.

[3]

[Total: 3]

- 33 The diagram shows part of a DNA molecule from a chromosome of a cat.

Complete the diagram by writing the letters for the base sequence of the other strand of the DNA molecule.



[1]

[Total: 1]