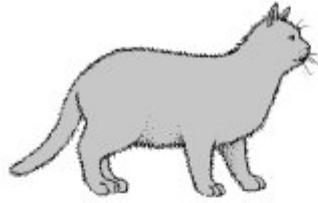# Q1.

The drawings below show eight different animals.



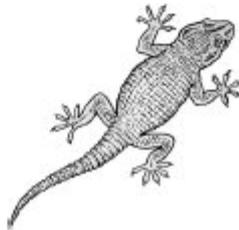sparrow

cat

dragonfly

housefly

lizard

squirrel
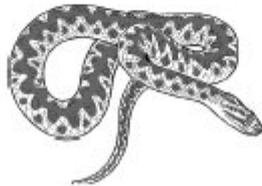
snake

hawk

*not to scale*

(a)   Put a (ring) around the **two** animals above that do **not** have a backbone.

2 marks

(b)   What are the names of **two** mammals above?

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

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

1 mark

(c)   (i)   What are the names of **two** reptiles above?

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

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

1 mark

(ii)    From the drawings, what is **one** feature that all reptiles have?

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

## Q2.

The information below comes from a newspaper report.

### River Pollution

**Scientists from the Environment Agency were called to investigate a river.**

Local fishermen reported that they had not caught trout in the river at Pine Bridge for many months. There were more algae growing in the river and it had a bad smell.

Scientists measured the oxygen levels in the water upstream and downstream from Pine Bridge. The results are shown below.
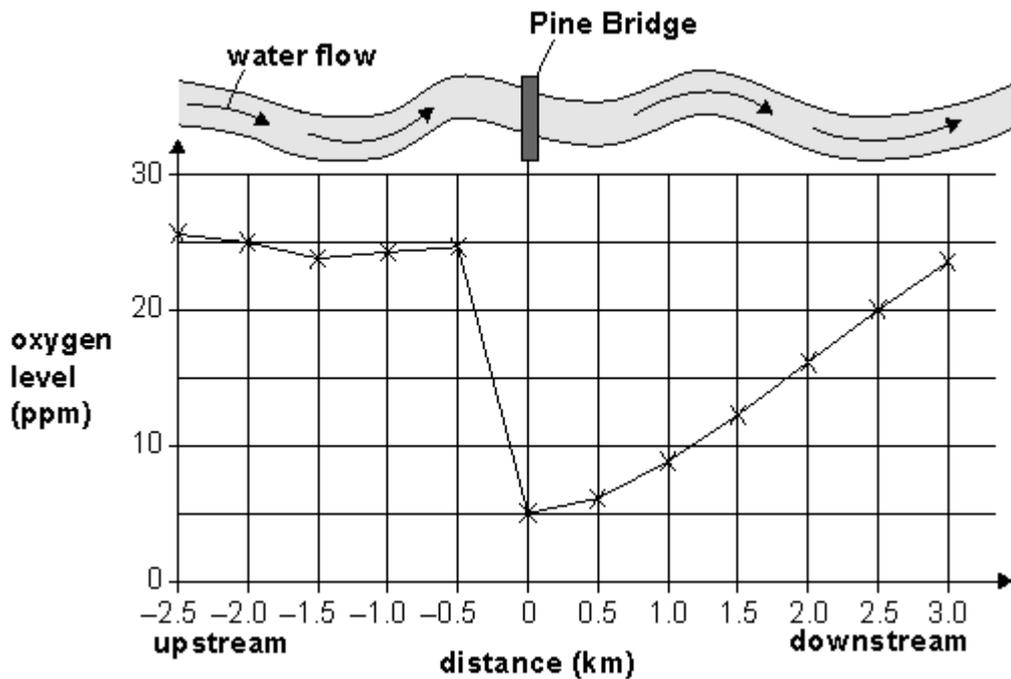


(a)    (i)    What was the oxygen level in the river at Pine Bridge?

........................................ ppm

1 mark

(ii)    Describe what happens to the oxygen level in the river as you travel **downstream** from Pine Bridge.

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

1 mark

(b)    Trout only live in water with oxygen levels higher than 20 ppm.
How far **downstream** from Pine Bridge would you be likely to find trout?
Write the unit.

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

1 mark

(c)    The scientists collected samples of the river animals found at different places.

| animals collected | distance from Pine Bridge (km) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | −2.0 | −1.5 | −1.0 | −0.5 | 0 | 0.5 | 1.0 | 1.5 | 2.0 |
| stonefly nymphs | ✓ | ✓ | ✓ | ✓ | | | | | |
| mayfly nymphs | ✓ | ✓ | ✓ | ✓ | | | | | |
| freshwater shrimps | ✓ | ✓ | ✓ | ✓ | | | | | ✓ |
| caddis fly larvae | ✓ | ✓ | ✓ | ✓ | | | | | |
| rat-tailed maggots | | | | | ✓ | ✓ | | | |
| sludge worms | | | | | ✓ | ✓ | ✓ | | |
| water lice | | | | | | | ✓ | ✓ | ✓ |
| bloodworms | | | | | | | ✓ | | |

Trout only live in water with oxygen levels higher than 20 ppm.
Give the name of one **other** animal that **only** lives in oxygen levels above 20 ppm.
Use the table and the information above to help you.

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

1 mark

(d)    Use the information above.
Name **two** animals that are **only** found when the oxygen level is below 10 ppm.

1. ....................................................    2. ....................................................

2 marks

(e)    In the river, trout are predators. Near Pine Bridge, the number of trout decreased.

Suggest **one** reason why pollution may cause the trout population to decrease.

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

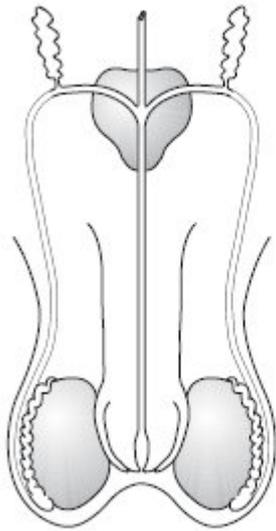........................................................................................................

1 mark
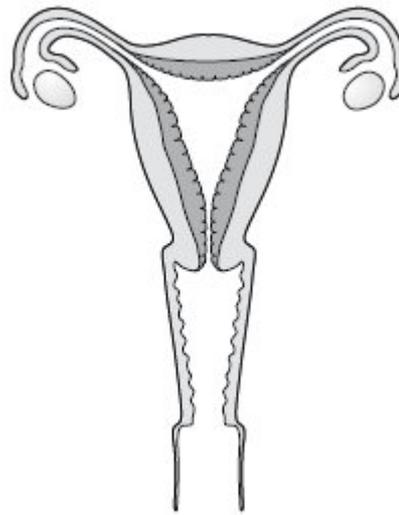maximum 7 marks

# Q3.
The diagrams below show the male and female human reproductive systems.

## male and female reproductive systems



male                                  female

*not to scale*

(a)    The table below contains descriptions of parts of the human reproductive system.
Complete the table to give the name of each part.

| name of part | description |
|---|---|
| | the tube that carries an egg to the uterus |
| | the organ that produces sperm |
| | he organ that produces the egg |

3 marks

(b)    The diagram below shows an unborn baby.



Complete the sentences below by filling in the gaps.

In humans, normal pregnancy lasts for .................. months.

When the foetus is ready to be born, muscles in the uterus wall start

to ............................................... .

2 marks

After the baby is born, the ........................................................ connecting

the foetus to the mother is cut.

1 marks

maximum 6 marks

## Q4.

Matthew measured the pH of different soils.

(a)  Tick **one** box in each row to show if each soil is acidic, neutral **or** alkaline.

| soil | pH of soil | acidic | neutral | alkaline |
|------|------------|--------|---------|----------|
| A | 4.5 | | | |
| B | 5.5 | | | |
| C | 6.3 | | | |
| D | 7.0 | | | |
| E | 7.8 | | | |

2 marks

(b)    A hydrangea is a flowering plant. Matthew notices that the colour of hydrangea flowers is different for plants grown in different places.

He records the colour of the flowers on each plant.

His results are shown in the table below.

hydrangea flower

| soil | pH of soil | colour of flowers | | | |
|------|------------|------|--------|------------|-----------|
| | | blue | violet | light pink | dark pink |
| A | 4.5 | ✔ | | | |
| B | 5.5 | | ✔ | | |
| C | 6.3 | | ✔ | | |
| D | 7.0 | | | ✔ | |
| E | 7.8 | | | | ✔ |

Look at Matthew's results.
Do his results support the statement that the colour of hydrangea flowers depends on pH?

yes ☐          no ☐

Explain your answer.

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

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

1 mark

(c)    Matthew measured the pH of the soil near hydrangea plants found in different places.

Suggest one **other** variable Matthew could **not** control in his investigation.

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

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

1 mark

(d)    Matthew wants to find out if the colour of blue hydrangea flowers depends on inherited
factors **or** environmental factors.
The flowers were growing in soil of pH 4.5.
He plants them in soil of pH 6.3.

Complete the table below to show the colours of the new flowers in soil of **pH 6.3**
       (i)      if the colour is due to inheritance
       (ii)      if the colour is due to the environment

Use the table above to complete the table below.

|  | colour |
|---|---|
| starting colour of hydrangea flowers | blue |
| colour of new flowers if only due to inheritance |  |
| colour of new flowers if only due to environment |  |

2 marks
maximum 6 marks

## Q5.
The diagram below shows part of a grassland food web.
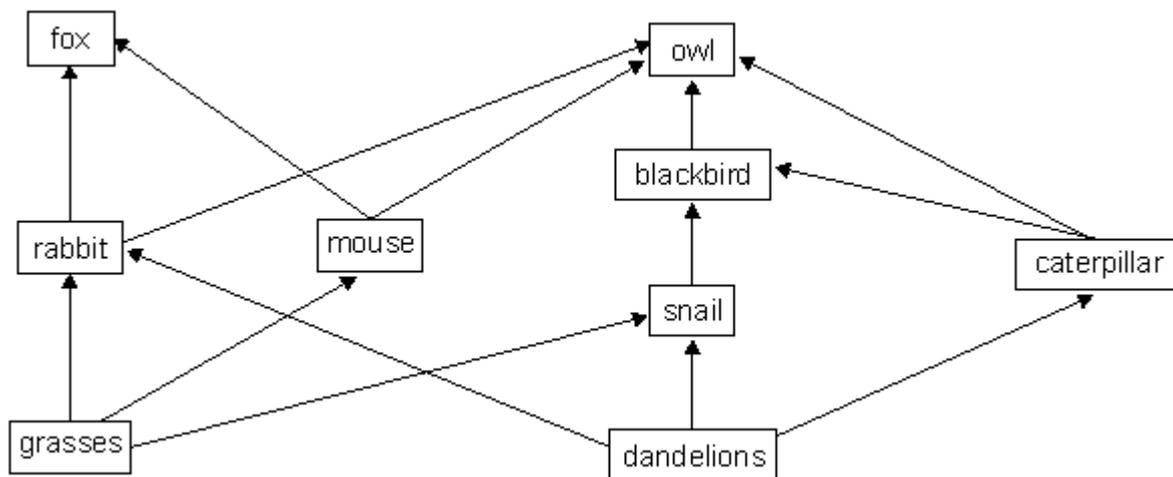
(a)     One year the snail population increased in the grassland area.

How could an increase in the number of snails cause the caterpillar population to **increase?**

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

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

1 mark

(b)     Snail poison can be used to control the number of snails. After some time, each owl contains more poison than each snail.
Explain why each owl contains more poison than each snail.

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

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

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

2 marks

(c)     A scientist wants to record the number of dandelion plants in the grassland area.

Describe how they could use a 1m² quadrat to estimate the number of dandelions growing in the grassland area.
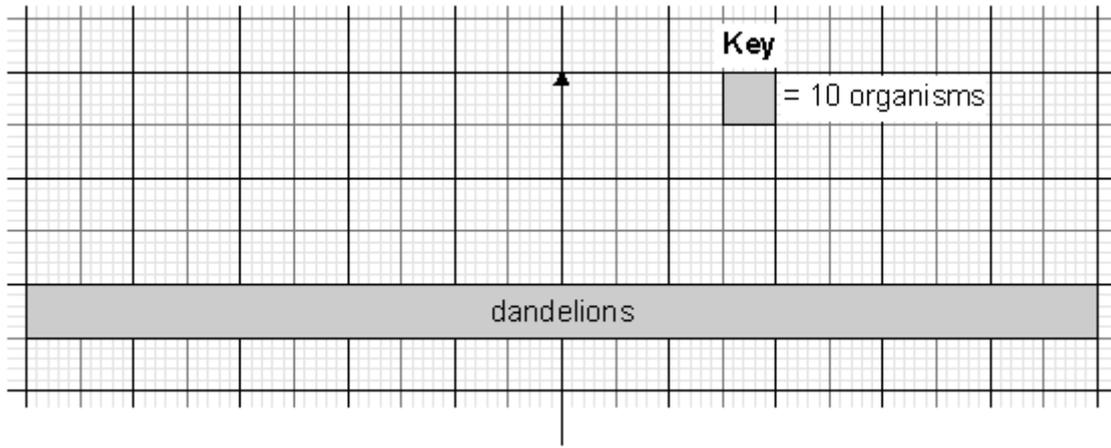
.................................................................................................................

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

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

2 marks

(d)     The table below shows the population numbers for one food chain from the food web.

| organism | number |
|----------|--------|
| dandelions | 200 |
| rabbits | 20 |
| foxes | 4 |

Complete the pyramid of numbers on the graph paper below to represent this food chain.
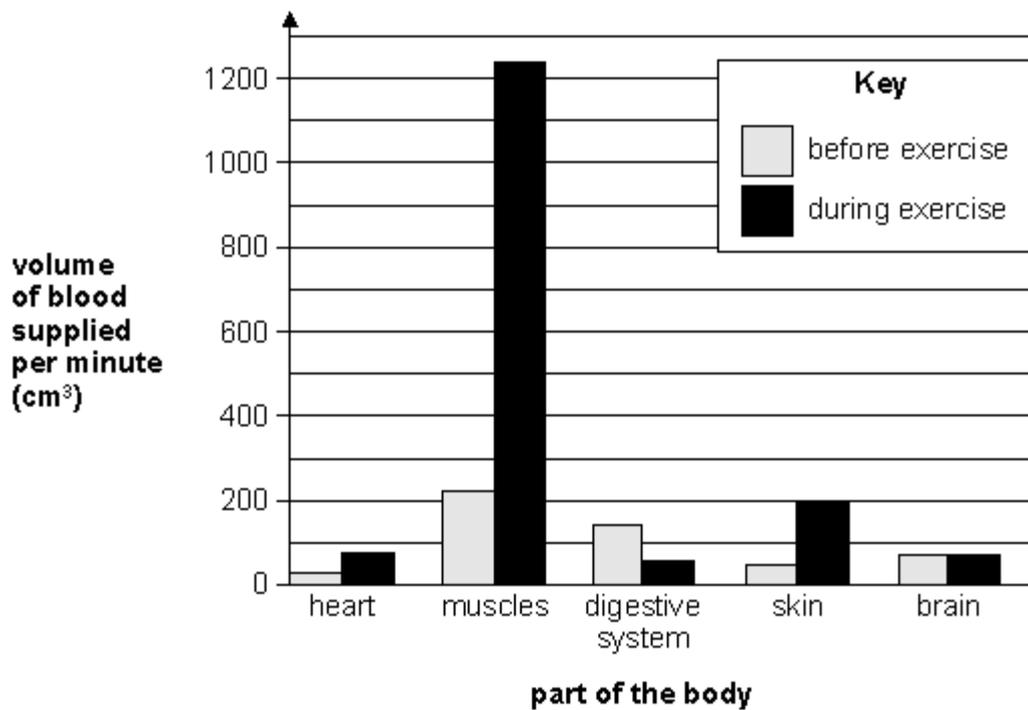Label the pyramid to show each animal.

## Q6.

When people exercise, the volume of blood per minute needed to supply different parts of the body changes.

This is shown in the bar chart below.



(a)     Explain why muscles need **more** blood during exercise. Give **three** reasons.

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

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

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

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

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

3 marks

(b)     Look at the bar chart.
        Suggest why you should not go for a long run just after eating a meal.

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

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

                                                                                                1 mark

(c)     Why is it important that the blood supply to the brain stays constant?

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

        .......................................................................................................................
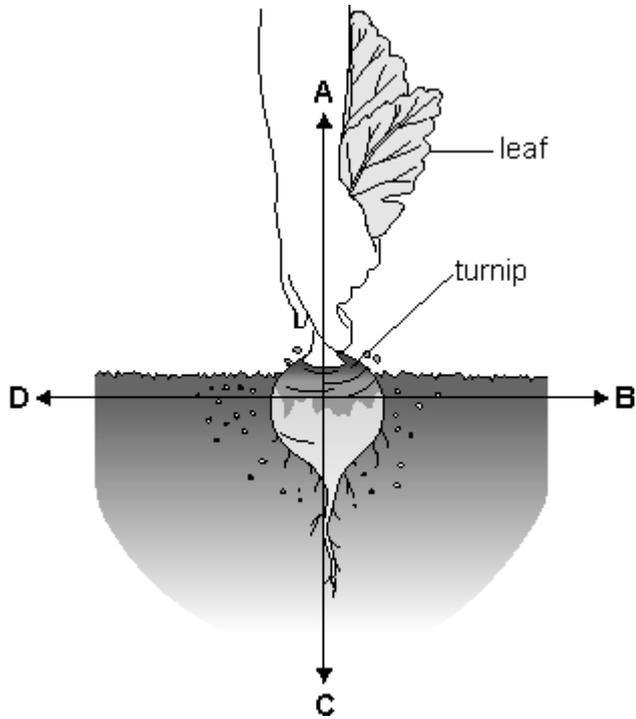
                                                                                                1 mark
                                                                                        maximum 5 marks

# Q7.

(a)     Tom watched birds feeding in his garden.
        He spotted the birds shown below.



blackbird        blue tit        bullfinch        dove        sparrow        robin

                                                                                        *not to scale*

        Tom recorded what the birds in his garden ate.
        His results are shown below.

| bird | type of food | | | |
|---|---|---|---|---|
| | fruit | nuts | worms | seeds |
| blackbird | ✓ | | ✓ | |
| blue tit | | ✓ | | ✓ |
| bullfinch | | | | ✓ |
| dove | | | | ✓ |
| sparrow | | ✓ | | ✓ |
| robin | ✓ | | ✓ | ✓ |

        Use the information in the table to answer the following questions.

(i)     Tom put some pieces of fruit in his garden.
        Which **two** birds will eat this food?

        …................................................ and ..................................................

                                                                                                1 mark

(ii)    How many types of bird eat nuts?

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

<div align="right">1 mark</div>

    (iii)      Which food from the table opposite will attract the **most types** of **bird**?

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

<div align="right">1 mark</div>

    (iv)    Which bird from the table eats the most types of **food**?

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

<div align="right">1 mark</div>

(b)    What are birds covered with to keep them warm?

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

<div align="right">1 mark</div>

(c)    Many birds reproduce in the spring.



Suggest why birds need extra food in the spring.

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

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

<div align="right">1 mark<br>maximum 6 marks</div>

## Q8.

The drawing below shows Rebekah **pulling** a turnip out of the ground.

(a)     Which arrow, **A**, **B**, **C** or **D**, shows the direction of force of Rebekah's hand on the turnip?

        ................
                                                                                    1 mark

(b)     The drawing below shows root maggots eating a turnip.
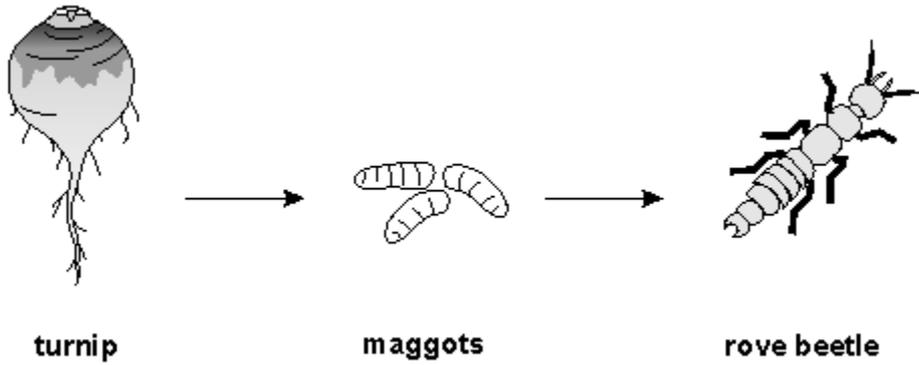        The maggots damage the roots.
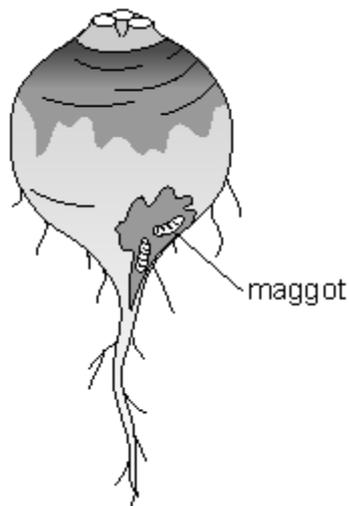


        Damaged roots do **not** grow very well.

        Complete the sentence below.

        Damaged roots **cannot** take up as much ............................................. and

        ............................................. from the soil.
                                                                                    2 marks

(c)     The drawing below shows a food chain including a rove beetle.

turnip → maggots → rove beetle

*not to scale*

Which word describes a rove beetle?
Tick the correct box.

| herbivore | ☐ | predator | ☐ |
| prey | ☐ | producer | ☐ |

1 mark

(d)     Turnip plants make food by photosynthesis.

(i)     Which part of a plant makes food?

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

1 mark

(ii)     What will the turnip plant use stored food for?

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

1 mark
maximum 6 marks

# Q9.

In 2007, a new law came in to stop people smoking in public buildings.

(a)     Smoking can be very harmful.
Which three problems can be caused by smoking?

Tick the **three** correct boxes.

| being out of breath easily | ☐ | lung cancer | ☐ |
| being overweight | ☐ | food poisoning | ☐ |
| heart disease | ☐ | | |

2 marks

(b)    Some scientists investigate 'passive smoking'. Passive smoking is when people breathe in smoke from other people's cigarettes.
They checked the health of three groups of people.

| group A | group B | group C |
|---------|---------|---------|
| **non-smokers** who spend **no** time in smoky places | **non-smokers** who spend time in smoky places | **smokers** who spend time in smoky places |
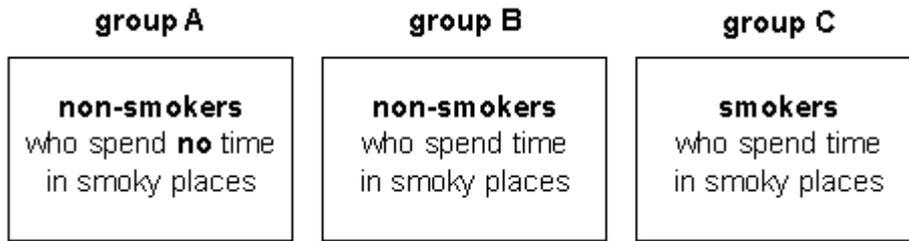
(i)    Which group of people breathe in the **least** cigarette smoke?
Tick the correct box.

group A ☐          group B ☐          group C ☐

1 mark

(ii)    Which **two** groups will help scientists find out the effects of passive smoking?
Tick the **two** correct boxes.

group A ☐          group B ☐          group C ☐

1 mark

(c)    People in **group B** are likely to have similar health problems to people in **group C.**
Explain why.

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

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

1 mark

(d)    Four scientists investigated passive smoking. The table below shows the number of people each scientist studied from each group.

| scientist | group A | group B | group C |
|-----------|---------|---------|---------|
| David | 289 | 3 | 18 |
| Olga | 8 | 6 | 11 |
| Peter | 402 | 399 | 403 |
| Mary | 15 | 210 | 511 |

Which scientist is likely to get the most reliable results?
Tick the correct box.

David ☐          Olga ☐

Peter ☐          Mary ☐

1 mark

**Q10.**

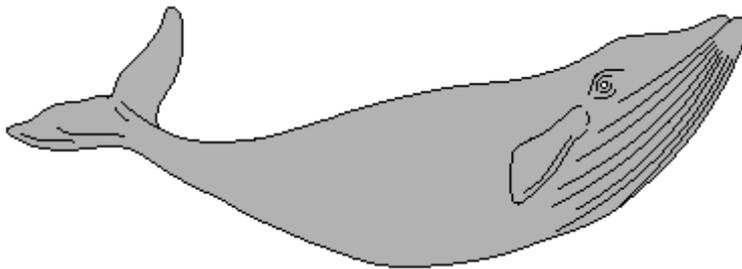(a)    The drawing below shows a fish.

Look at the drawing of a fish.

Describe **two** ways in which a fish is suited to swimming.

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

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

2 marks

(b)    The drawing below shows a blue whale.

*not to scale*

A long time ago people thought that the blue whale was a fish. Now we know that the blue whale is a mammal.

Give **one** way mammals are different from fish.

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

1 mark

(c)    A hundred years ago there were 350 000 blue whales.
Now there are only about 10 000 blue whales.
Suggest why the blue whale population has decreased.

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

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

1 mark

(d)    The blue whale is now a protected species. Scientists catch and tag the whales with a transmitter. Satellites can be used to track the tagged whales.

(i)     What information about whales can scientists be certain to get from a satellite tracking system?
Tick the correct box.

what food they eat ☐

how often they give birth ☐

where they travel ☐

the sex of the whale ☐

1 mark

(ii)    Give **one** advantage of using a satellite tracking system to track whales.

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

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

1 mark
maximum 6 marks

## Q11.

The diagram below shows the two different forms of the same moth.
All these moths are either speckled or black.



speckled moth                                                                black moth

(a)     The graph below shows how the percentage of **speckled** moths changed between 1950 and 2000 in one city.

black moths
speckled moths

percentage of moths (%)
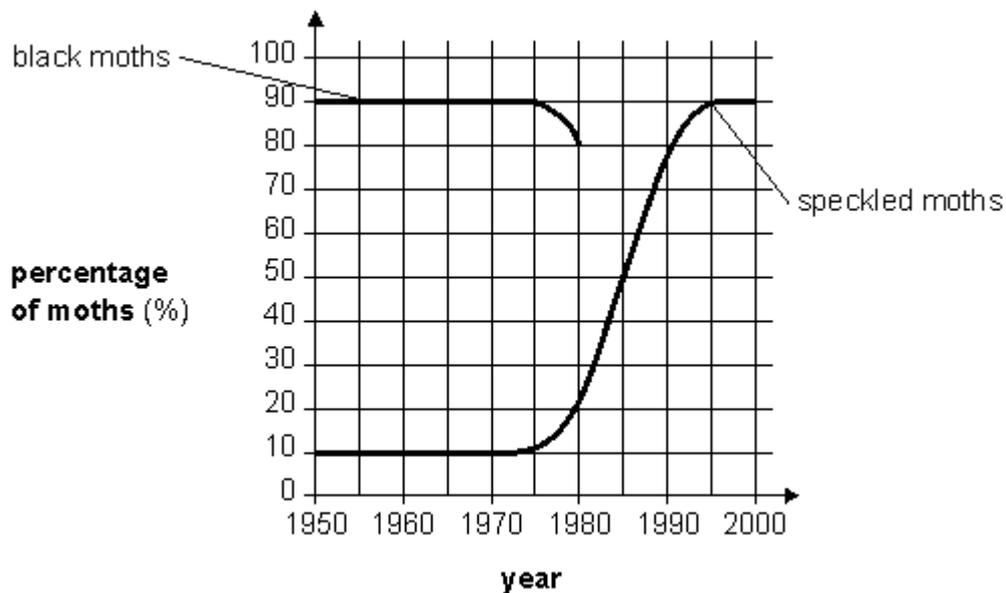
year

(i)    Complete the table below with the missing **year** and **percentage**.
       Use the graph.

| year | percentage of speckled moths (%) | percentage of black moths (%) | total percentage (%) |
|------|------|------|------|
| 1970 | 10 | 90 | 100 |
| _____ | 50 | 50 | 100 |
| 1990 | 78 | _____ | 100 |

2 marks

(ii)   The percentage of **black** moths from 1950 to 1980 is also shown on the graph.
       **Continue** the line on the graph above to show how the percentage of **black** moths
       changed between 1980 and 2000.

2 marks

(b)    The maps below show the percentage of speckled moths and black moths at different
       places in Britain in 1956 and 1996.

Key
● 100% black moths
○ 100% speckled moths
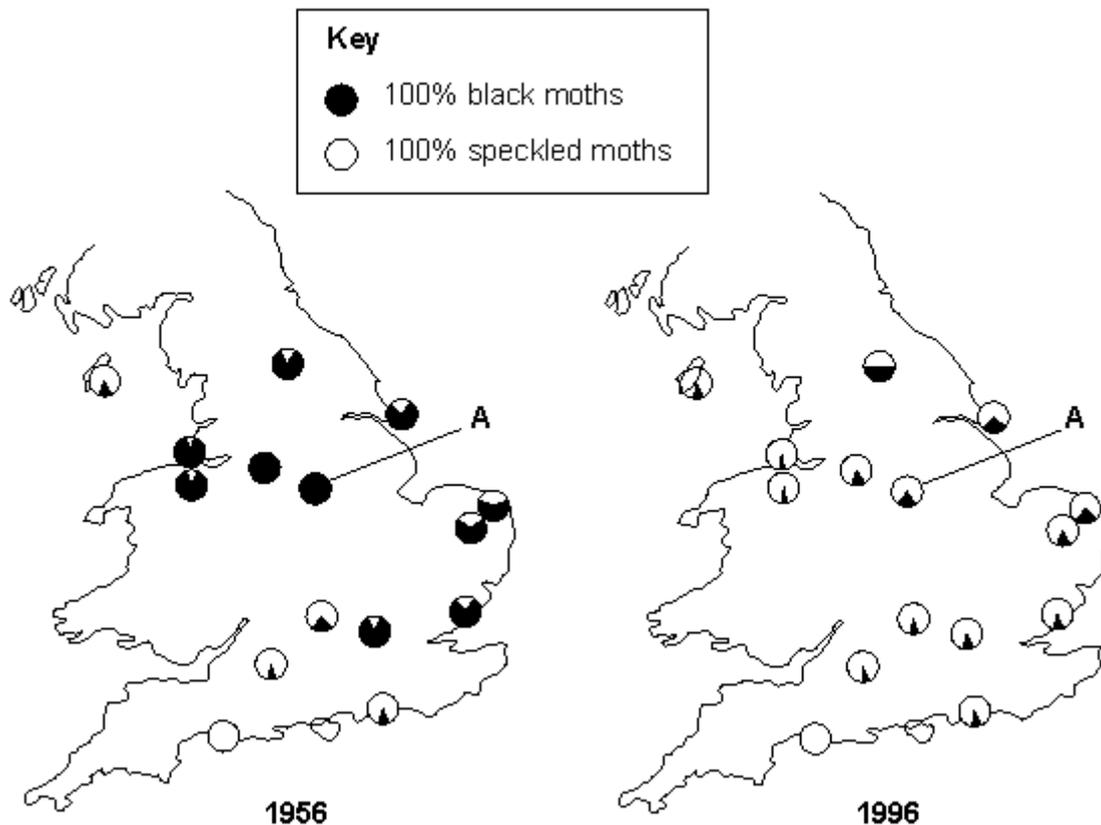
1956

1996

How did the percentage of black moths change at place **A** between 1956 and 1996?

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

1 mark

(c)  (i)  Describe **one** way in which the data shown in the graph is better than the data shown in the maps.
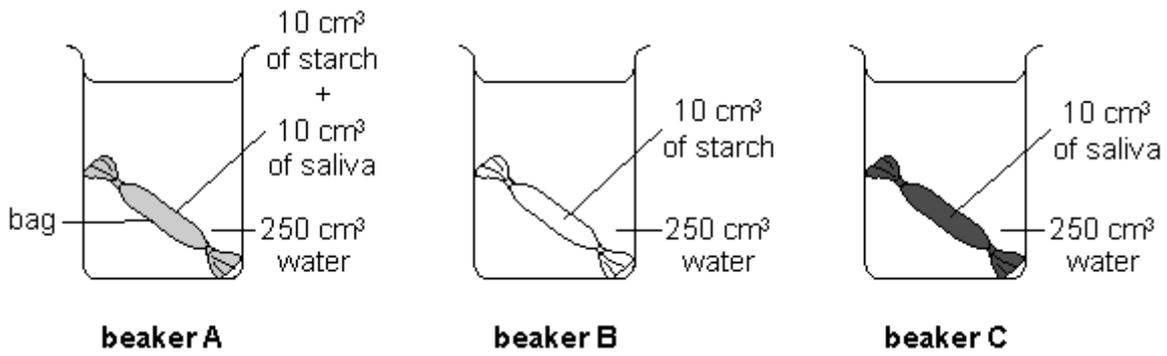
..................................................................................................................

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

1 mark

(ii)  Describe **one** way in which the data shown in the maps is better than the data shown in the graph.

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

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

1 mark
maximum 7 marks

# Q12.

Sally investigated how the human body digests and absorbs starch.

She used saliva to digest the starch.

To model digestion she used special bags made from a semi-permeable membrane. These bags have lots of very small holes.

Sally sets up the equipment as shown below. There is one special bag in each beaker.

| | 10 cm³ of starch + 10 cm³ of saliva 250 cm³ water | 10 cm³ of starch 250 cm³ water | 10 cm³ of saliva 250 cm³ water |
| --- | --- | --- | --- |
| bag | beaker A | beaker B | beaker C |

She keeps the water in the beakers at 37ºC.
After 20 minutes, Sally tested the contents of each beaker and bag for starch and sugar.
The table below shows Sally's results.

| | Was starch found in the bag? | Was sugar found in the bag? | Was starch found in the water? | Was sugar found in the water? |
| --- | --- | --- | --- | --- |
| beaker A | ✓ | ✓ | ✗ | ✓ |
| beaker B | ✓ | ✗ | ✗ | ✗ |
| beaker C | ✗ | ✗ | ✗ | ✗ |

(a)     Suggest why Sally kept the water at 37ºC.

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

1 mark

(b)     (i)     Explain why sugar was found in the bag in beaker A.

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

1 mark

        (ii)     Starch was **not** found in the **water** outside the bag in any beaker.
              Suggest why.

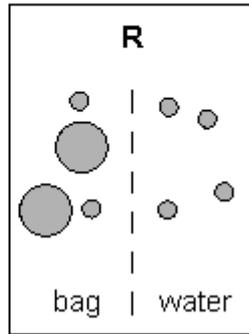        .........................................................................................................
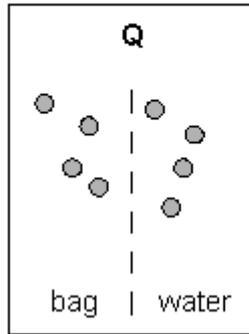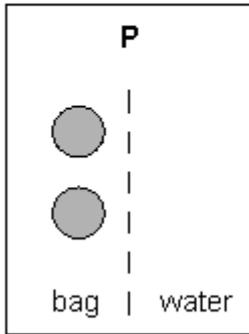
1 mark
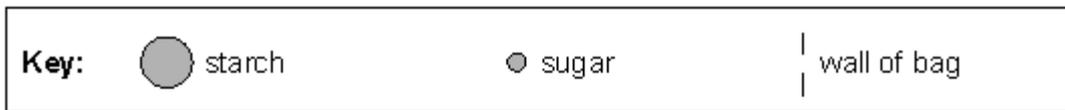
(c)     Why did Sally set up beaker C? Tick the correct box.

        for a fair test   ☐          for accuracy   ☐

        for reliability   ☐          for a control   ☐

1 mark

(d)     Sally used diagrams to show what happened in her investigation.

| Key: | ⬤ starch | ● sugar | ⎮ wall of bag |
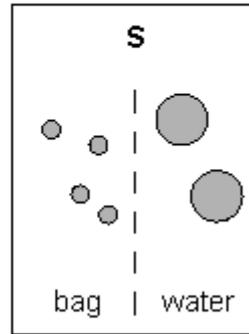


Use the diagrams above to answer the following questions.

(i)     Which diagram shows the **results** of beaker **B**? Write the letter.

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

1 mark

(ii)    Which diagram shows the **results** of beaker **A**? Write the letter.

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

1 mark

(e)     What does saliva contain that causes starch to change in beaker A?

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

1 mark

(f)      Sally chewed a piece of bread for 5 minutes without swallowing.
What would she notice about the taste of the bread after chewing for 5 minutes?
Use Sally's results to help you.

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

1 mark

maximum 8 marks

# Q13.

A garden centre has two types of the same plant for sale.

normal type       variegated type
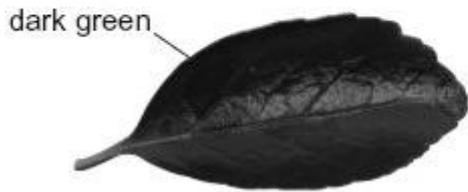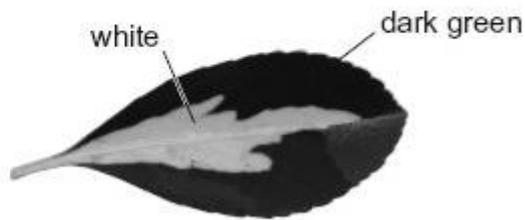
normal leaf       variegated leaf

dark green      white     dark green

Chlorophyll makes a plant leaf green.

(a)     At the end of the summer, the normal plants had grown more than those with variegated leaves. All the plants had been grown in the same conditions.

(i)      Explain why plants with normal leaves grow more than plants with variegated leaves.

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

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

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

2 marks

(ii)     Describe an investigation you could do to show how much more a normal plant grows **compared** with a variegated plant over a six-week period.

In your answer, you must clearly identify:
 •     the independent variable (IV)
 •     the dependent variable (DV)
 •     the variables to control (CV)
 •     how you will calculate the end result.

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

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

(b)     What process do plants carry out in the light and in the dark to release energy?
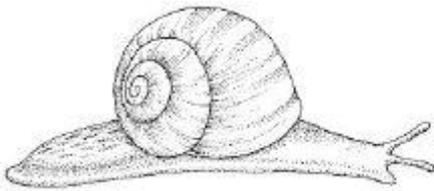Tick the correct box.

photosynthesis ☐          respiration ☐

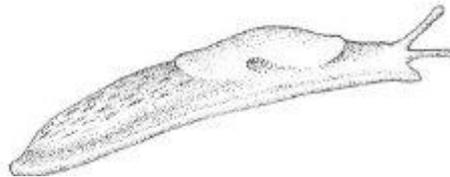absorption ☐              dispersal ☐

1 mark
maximum 7 marks

# Q14.

The drawings below show a snail and a slug.

**snail**                          **slug**



(a)     Look at the drawings above.

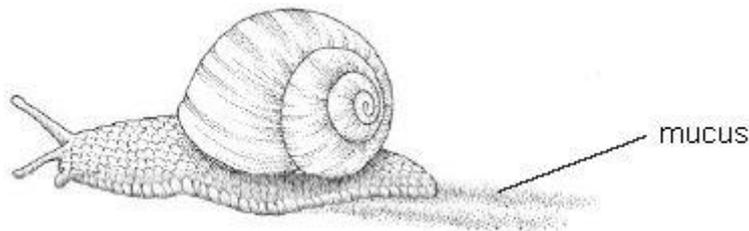(i)     Give one way the snail and slug are **different** from each other.

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

1 mark

(ii)    Give one way the snail and slug are the **same**.

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

1 mark

(b)     Snails produce mucus to help them move along the ground.


mucus

How does mucus help snails to move?
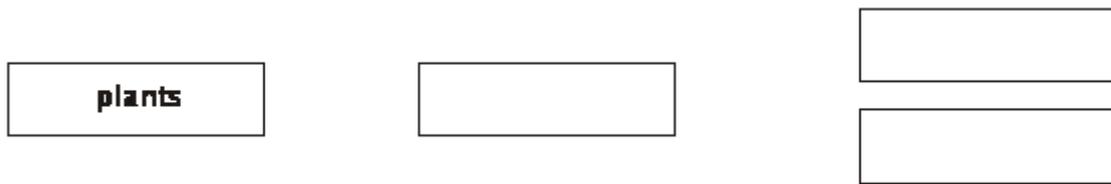Tick the correct box.

Mucus is cold. ☐                    Mucus reduces friction. ☐

Mucus increases weight. ☐          Mucus leaves a trail. ☐

1 mark

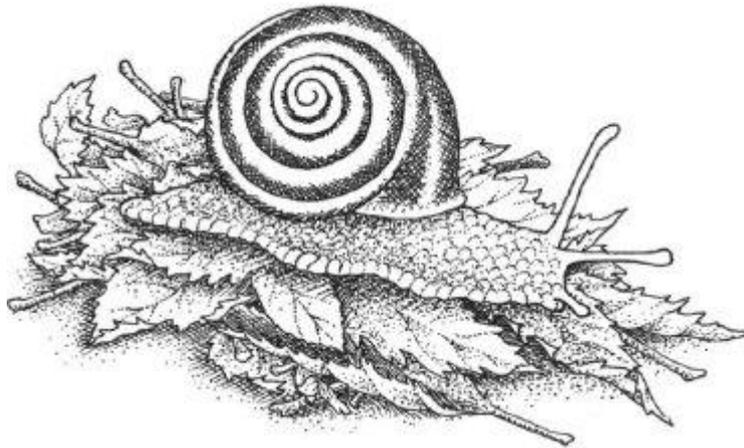(c)     Snails are herbivores. Thrushes and blackbirds eat snails.

Complete the food web below to show the relationship between plants, snails, thrushes and blackbirds.

Draw arrows on the diagram.

| plants |

2 marks

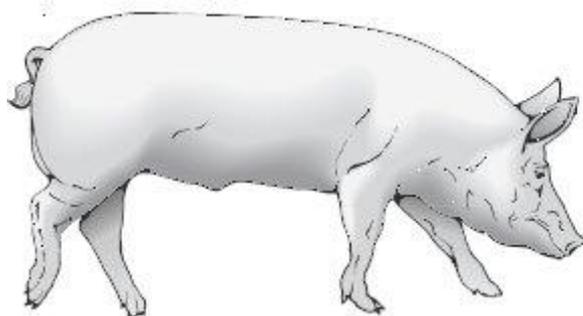(d)     Snails that live in woodland areas are usually brown or red.



Suggest how the colour of snails in woodland areas protects them from birds.

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

1 mark

maximum 6 marks

## Q15.

The drawings below show pigs from two different breeds.
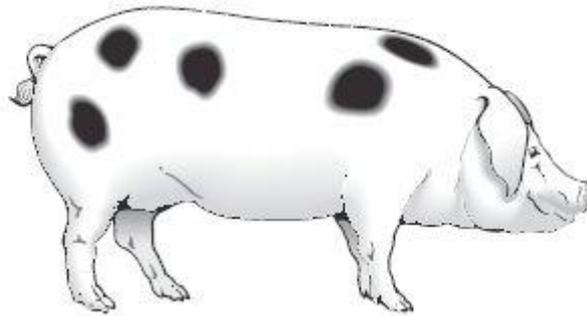


**Tamworth**                                        **Gloucester Old Spot**

(a)     (i)     From the drawings above, give **two** ways in which the pigs are different.

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

1 mark

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

1 mark

(ii)   What are these differences called?
Tick the correct box.

adaptations ☐          classification ☐
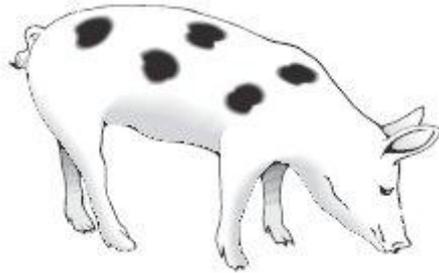
fertilisation ☐          variations ☐

1 mark

(b)   The drawing below shows a piglet bred from a Tamworth and a Gloucester Old Spot.

Give **one** way you can tell that one of its parents is a Tamworth.

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

1 mark

(c)   (i)   When pigs reproduce, which **two** types of cell pass information from the pigs to their piglets?
Tick the **two** correct boxes.

blood cell ☐          nerve cell ☐          cheek cell ☐

egg cell ☐          muscle cell ☐          sperm cell ☐

2 marks

(ii)   When pigs reproduce, two cells join together.

What is this process called?
Tick the correct box.

adaptation ☐          classification ☐

fertilisation ☐          variation ☐

1 mark
maximum 7 marks

# Q16.
Richard wanted to find out the best conditions for growing lettuce plants.

He took 4 trays and planted 8 lettuce plants in each.
The results of his investigation are shown below.

| tray | variables | | | number of plants alive after 7 days |
| | light level | air temperature (°C) | soil moisture | |
| --- | --- | --- | --- | --- |
| A | medium | 25 | moist | 8 |
| B | medium | 25 | dry | 6 |
| C | medium | 45 | moist | 2 |
| D | medium | 45 | dry | 0 |

(a)  How many days did Richard's investigation last?
Use the table to help you.

................. days

**1 mark**

(b)  Look at the table. Which variables did Richard **change** in his investigation?
Tick the correct box.

| | | |
| --- | --- | --- |
| light level and air temperature | ☐ | soil moisture and type of soil ☐ |
| air temperature and soil moisture | ☐ | type of soil and light level ☐ |

**1 mark**

(c)  Richard said:

Lettuce plants grow better at a medium light level than at other light levels

Why is Richard **not** able to make this conclusion from his investigation?

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

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

**1 mark**

(d)    The table below shows the number of lettuce plants alive at the end of day 1 and day 7 of the investigation.

For each tray, A, B, C and D, suggest the number of plants that were alive on **day 4**.
Write your answers in the table below.

|        | number of plants alive | | |
|--------|-------|-------|-------|
| tray   | day 1 | day 4 | day 7 |
| A      | 8     |       | 8     |
| B      | 8     |       | 6     |
| C      | 8     |       | 2     |
| D      | 4     |       | 0     |

**2 marks**
**maximum 5 marks**

## Q17.

The drawing below shows the remains of an animal found in a rock.

(a) Some scientists think the animal in the drawing above was a bird.

(i) Give **one** feature of the animal above that suggests it was a bird.

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

1 mark

Other scientists think the animal was a reptile.

(ii) What are reptile skins covered with?

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

1 mark

(b) The animal lived millions of years ago. Scientists used the remains to draw what they think the animal looked like when it was alive.
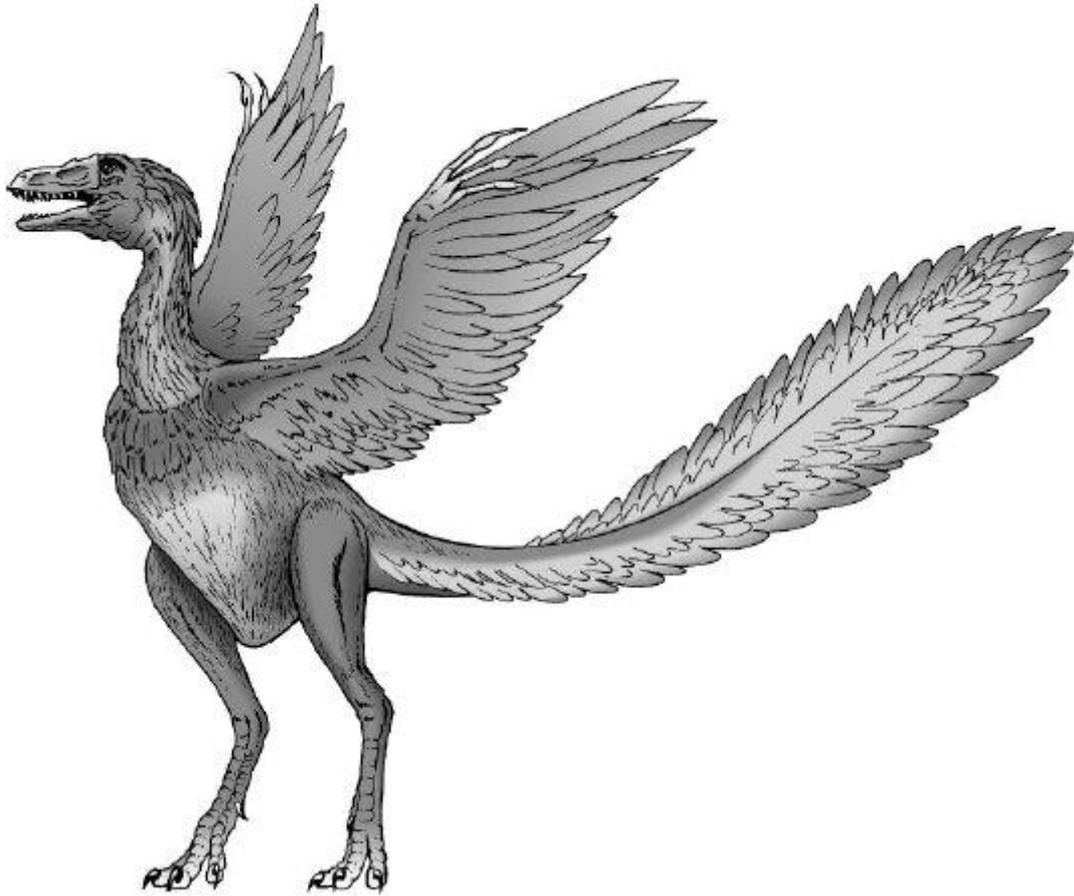
Why can scientists **not** be certain that the animal looked like the drawing above?

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

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

1 mark

(c)   Give the name for the remains of living things found in rocks.

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

1 mark

(d)   Igneous rocks can be formed from lava from volcanoes.
       The remains of living things are **not** found in rocks made from lava.
       Why does lava destroy the remains of living things?

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

1 mark
maximum 5 marks

## Q18.

The diagram below shows an organism called Euglena.
It is made of only one cell. It lives in ponds and streams.
Euglena have features of both plants and animals.
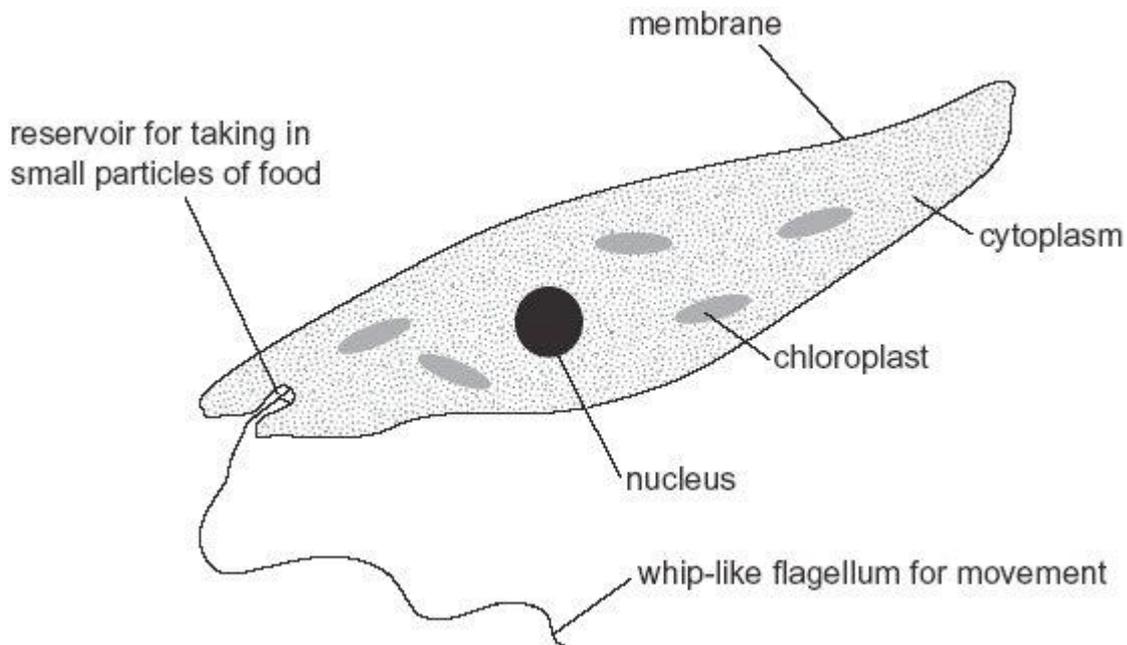
(a) Look at the diagram of Euglena.

Give **two** pieces of evidence which suggest it is an **animal** cell and **not** a plant cell.

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

1 mark

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

1 mark

(b) Plant cells can carry out photosynthesis.
How can you tell from the diagram that Euglena can carry out photosynthesis?

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

1 mark

(c) Complete the word equation for photosynthesis.

carbon dioxide + ................................. → glucose + .................................

2 marks

maximum 5 marks

## Q19.
The dentist's leaflet below shows how plaque causes tooth decay.
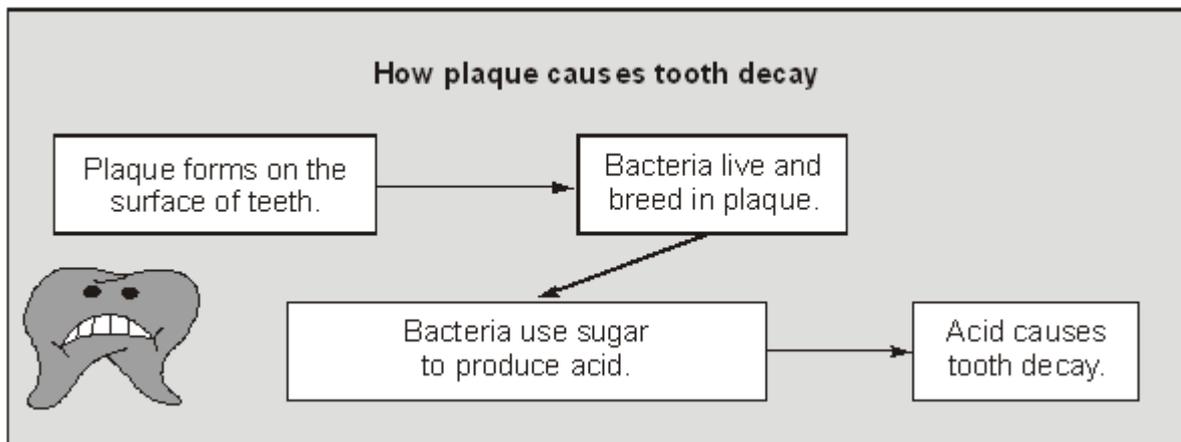


(a) (i) Explain how reducing the amount of plaque can reduce tooth decay.

Use the leaflet to help you.

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

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

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

2 marks

(ii)    Using an alkaline toothpaste also reduces tooth decay.
        Give the reason for this.

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

        .......................................................................................................
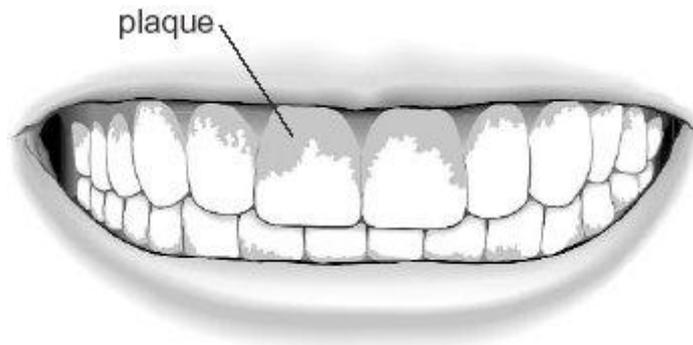
1 mark

(b)    A group of boys wanted to find out how well plaque is removed by brushing teeth.

        Every day, before they brushed their teeth, the boys chewed a tablet that stains plaque red.

        Explain why the boys looked at their teeth **before and after** brushing.
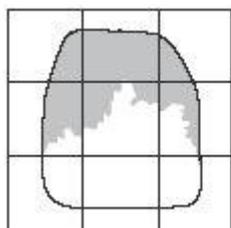
        .......................................................................................................

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

1 mark

(c)    The diagram below shows teeth with the plaque stained.



The boys used a grid drawn on clear plastic to measure the area of the plaque on their teeth.
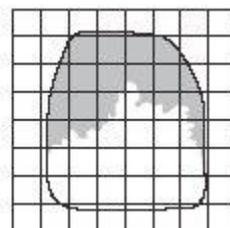


**A**                                                                 **B**

(i)    Grid B is better than grid A for measuring the area of plaque.

        Why is a grid with smaller squares better for measuring the area of plaque?

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

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

(ii)    The squares on grid B represent 1 mm².

         Use grid B to estimate the area of the tooth covered by plaque.

         .............. mm²

## Q20.

Jane stored some milk at room temperature for five days in a sealed container.
She used a pH sensor and data logger to record the pH of the milk for 5 days.

Her results are shown below.

**graph 1**
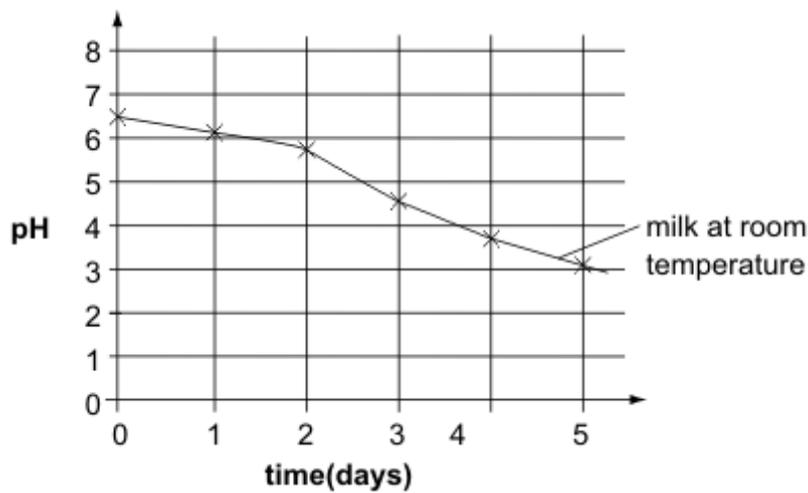


(a)    Jane predicted that the number of live bacteria in the milk would change as shown below.

**graph 2**
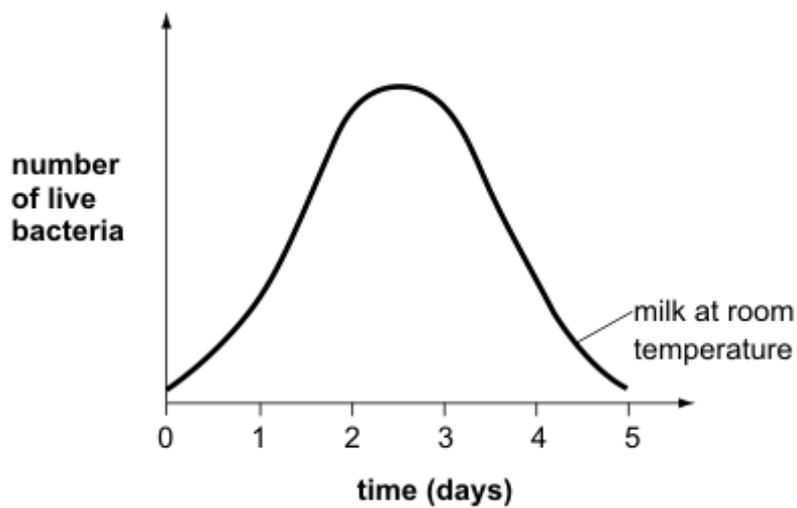


(i)    Suggest one reason why the number of live bacteria would start to decrease after 3 days.

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

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

(ii)    What evidence from **graph 1** suggests that there were still some live bacteria in the milk on day 5?

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

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

1 mark

(b)     Jane put some fresh milk in a sealed container in the fridge.
        She measured the pH of the milk every day for five days.

(i)     On **graph 3** below, draw a line to show the pH of the **refrigerated milk** for five days.

**graph 3**
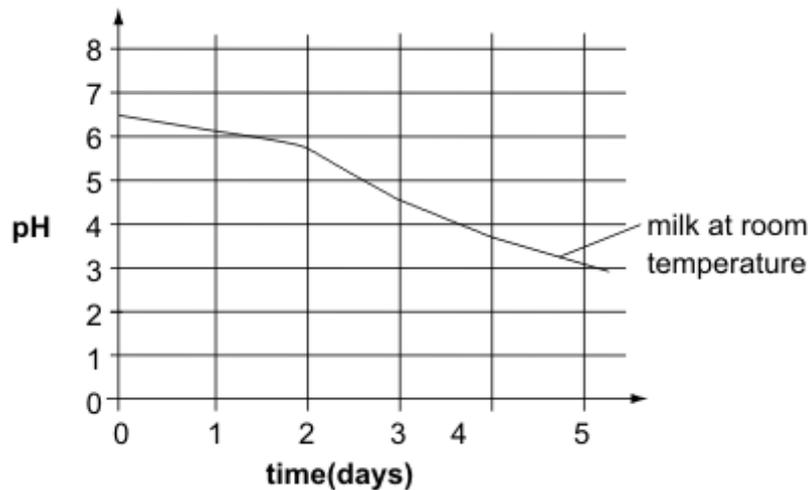


2 marks

(ii)    On **graph 4** below, draw a line to predict how the number of live bacteria in **refrigerated milk** will change over five days.

**graph 4**



1 mark
maximum 5 marks

## Q21.

(a)     Pineapple juice contains a substance that speeds up the digestion of protein.

(i)     What is the name for substances that speed up digestion?

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

1 mark

(ii)    What happens to a molecule of protein during digestion?

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

.................................................................................................
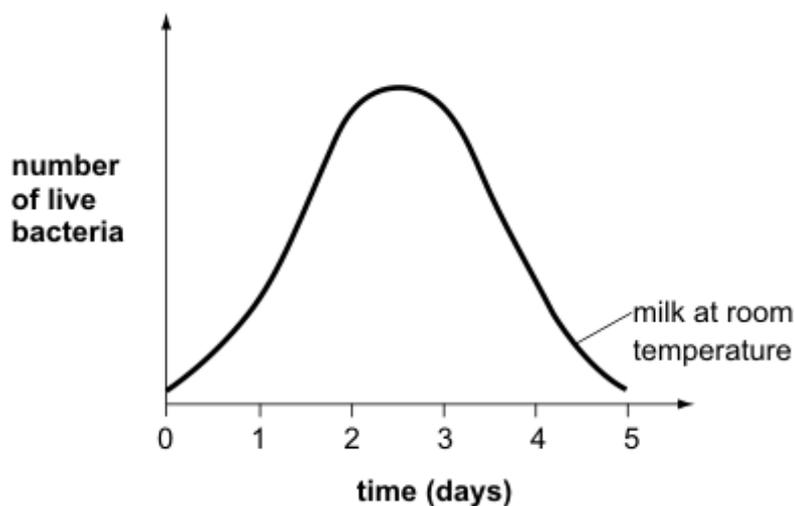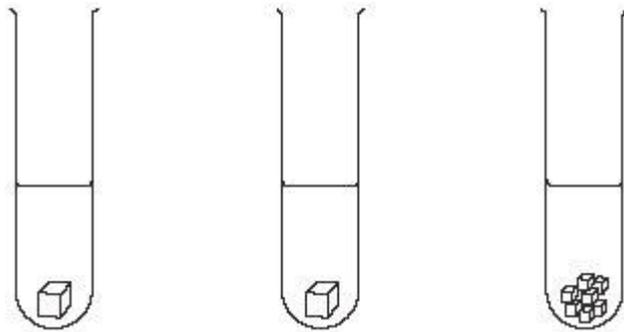
1 mark

(b)    Asim did an experiment to investigate the digestion of gelatin.
       Gelatin is the protein in jelly.
       In test tubes A and B he used one cube of jelly in each.
       In test tube C he used one cube of jelly that he had chopped up.



| **A** | **B** | **C** |
| 5 g jelly cube | 5 g jelly cube | 5 g jelly cube |
| + | + | chopped into |
| 15 cm³ | 15 cm³ fresh | pieces |
| cold water | pineapple | + |
| | juice | 15 cm³ fresh |
| | | pineapple |
| | | juice |

He recorded how long it took for the jelly to be digested in each test tube.
The table below shows his results.

| test tube | result |
| --- | --- |
| A | **not** digested after 2 hours |
| B | jelly digested in 2 hours |
| C | jelly digested in 1 hour |

(i)    What was the purpose of test tube A?

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

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

1 mark

(ii)   It is helpful to chew your food.
       How do the results in test tube C show this?

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

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

(c)    The substances that speed up digestion stop working when they have been boiled.

(i)    What does Asim need to put in a fourth test tube to test this in his experiment?
Label test tube D.
Test tubes A, B and C contain the same as in the first experiment.
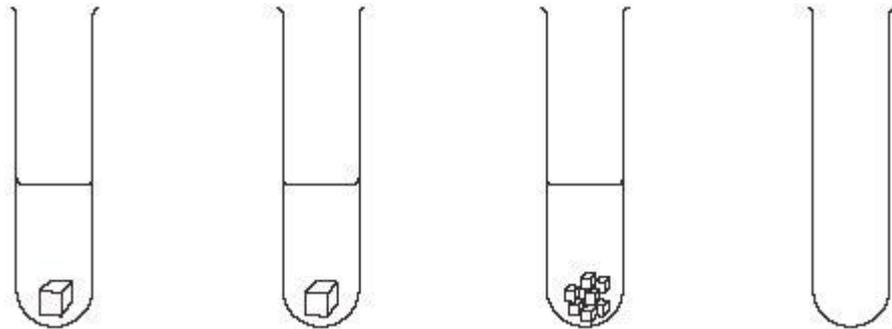
**A**                                              **B**                                    **C**
**D**
5 g jelly                      5 g jelly cube                  5 g jelly
cube        ...........................
cube                              +                            chopped into
+                           15
cm³ fresh                     pieces                    ...........................
15
cm³                  pineapple                           +                                    +
cold water                          juice                         15 cm³ fresh
pineapple                    ...........................

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

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

2 marks

(ii)    Predict what Asim would observe in test tube D after 2 hours.

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

1 mark
maximum 7 marks

# Q22.
(a)    The drawings below show an old and a modern variety of wheat plant.
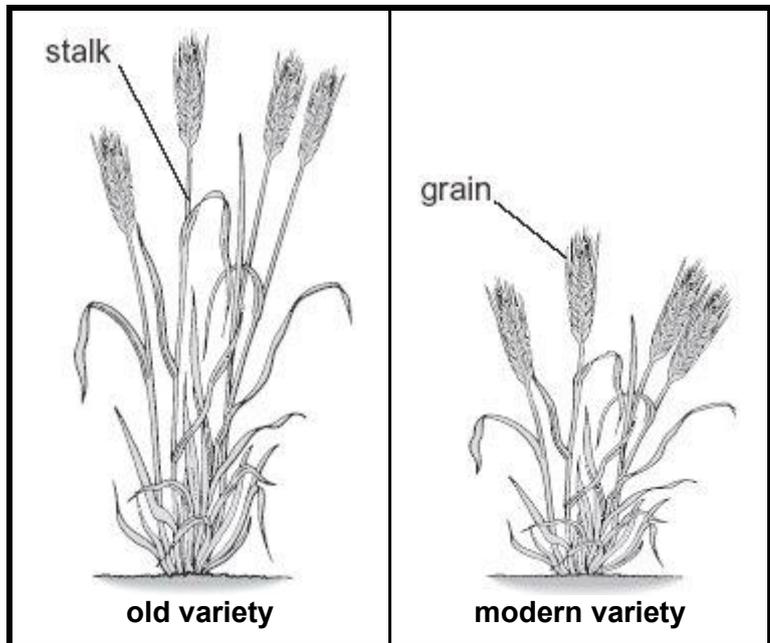
| | old variety | modern variety |
|---|---|---|
| |  |  |
| average mass of grain produced per m² (kg) | 0.5 | 0.8 |
| average length of stalk (cm) | 145 | 78 |

Glucose produced by the wheat plants is used:

- to provide energy for growth

- to make cell walls

- to make starch which is stored in the grain.

Give **one** reason why modern wheat plants with short stalks can store more starch in the grain. Use the drawings and information.

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

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

1 mark

(b) A plant breeder wants to use selective breeding to produce corn with short stalks and a high mass of grain. He could use the following varieties of corn:

| variety A | variety B | variety C |
|---|---|---|
| long stalks | short stalks | long stalks |
| high mass of grain | low mass of grain | low mass of grain |

(i) What would the plant breeder need to do to make sure he always produced corn with short stalks and a high mass of grain?
Describe the three steps the breeder would use.

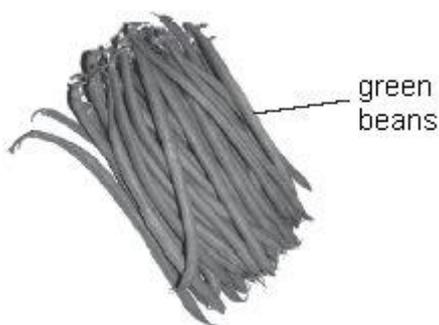.......................................................................................................................

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

3 marks

(ii)   Suggest **one** other characteristic that farmers might like corn plants to have to increase the amount of corn produced.

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

1 mark

maximum 5 marks

# Q23.

(a)   Green beans contain vitamin C.



green beans

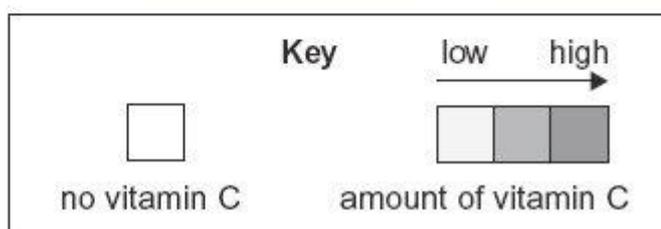Which other food is a good source of vitamin C?
Tick the correct box.

cheese          chicken          eggs          oranges

☐                ☐                ☐              ☐

1 mark

(b)   The amount of vitamin C changes in the beans and in the water as the beans are cooked.
The shading shows how it changes.



| at the start | after 5 minutes | after 10 minutes |

chopped bean

water

Key          low    high

☐

no vitamin C          amount of vitamin C
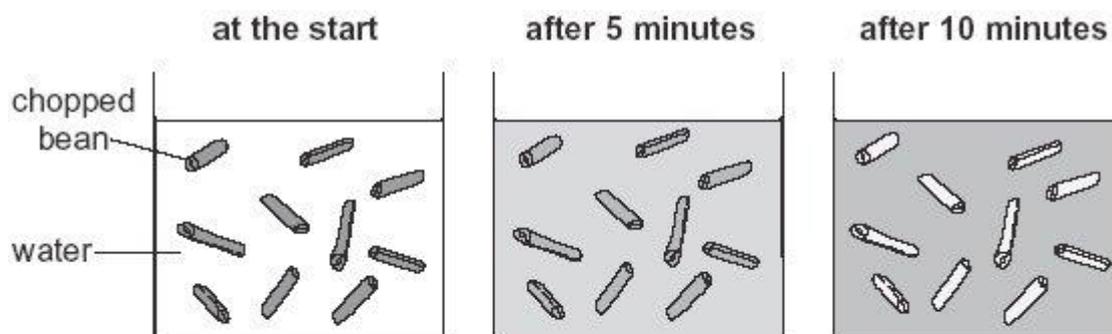
Use the diagram. How does the **amount of vitamin C** in the beans and in the water change as the beans are cooked? Tick one box in each row.

| amount of vitamin C | increases | decreases | stays the same |
|---|---|---|---|
| in the beans | | | |
| in the water | | | |

1 mark

(c)    Cheese is a source of calcium.

Why do we need calcium?

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

1 mark

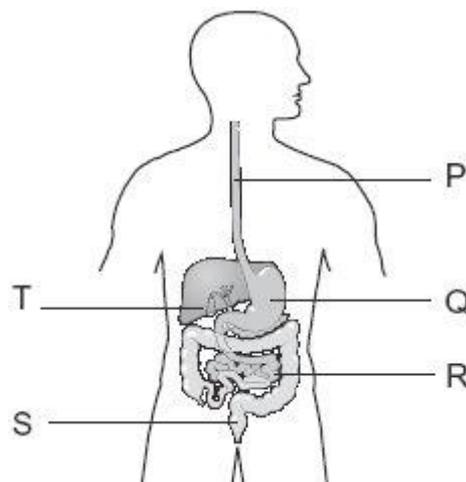(d)    Draw a line from each nutrient to a good source of that nutrient in our diet.

nutrient                                        source of nutrient

| starch |

| fat |

| protein |

| sugar |

| lean chicken meat |

| jam |

| pasta |

| margarine |

2 marks

(e)    The diagram shows part of the human digestive system.



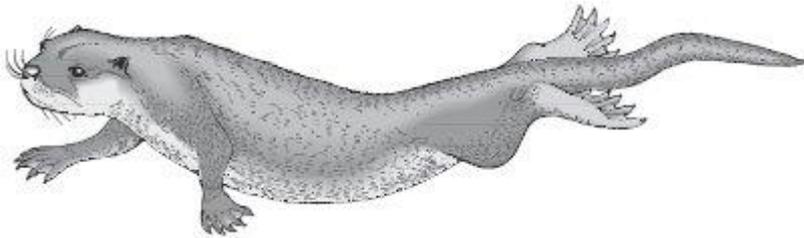(i)    Write the letter which labels the small intestine.

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

(ii)    Write the letter which labels the stomach.

........

## Q24.

The picture below shows a mammal called an otter.



(a)    Give **one** feature that **only** mammals have.

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

1 mark

(b)    Otters live by rivers.

Give **one** way the otter is suited for swimming.
Use the picture above to help you.

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

1 mark

(c)    Otter cubs are born in a burrow under the ground.



(i)    How does this help the otter cubs survive?

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

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

1 mark

(ii)    Why must the burrow be above the level of the water in the river?

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

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

1 mark

(d)    Otters catch fish and birds for food.

Which word below describes an otter?
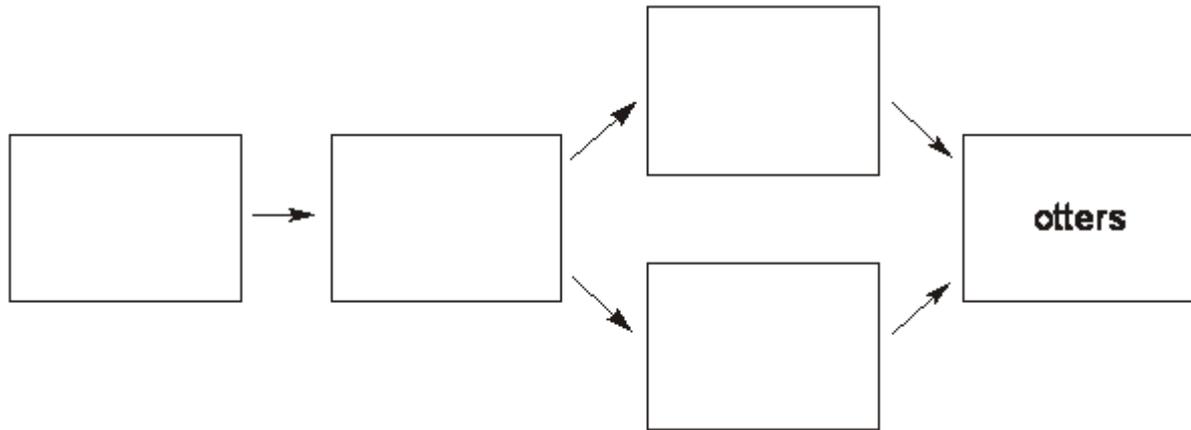Tick the correct box.

herbivore ☐          predator ☐

prey ☐          producer ☐

1 mark

(e)    The information below describes what some animals eat.

•    Insects eat plants.

•    Birds and fish eat insects.

•    Otters eat fish and birds.

Complete the food web using this information.
One box has been done for you.



2 marks

(f)    In the 1960s, the number of otters in England decreased.
To increase otter numbers, scientists released otters in pairs (one male and one female).

Why were the otters released in pairs?

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

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

1 mark
maximum 8 marks

## Q25.

Nancy is a dancer.

(a) When Nancy dances her arms and legs are moved by pairs of antagonistic muscles.

How do antagonistic muscle pairs work?
Tick the correct box.

Both muscles contract at the same time. ☐

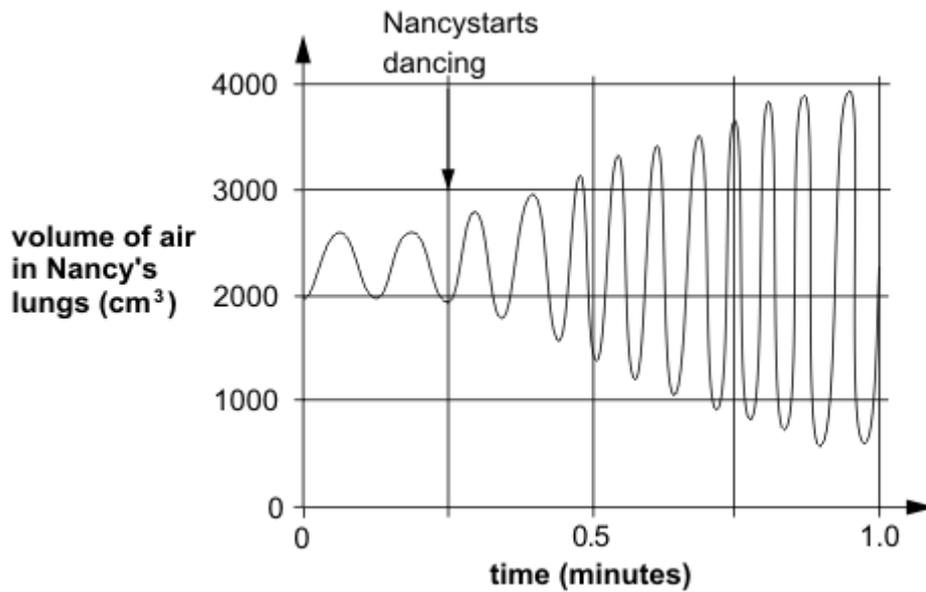One muscle is big and the other is small. ☐

As one muscle contracts, the other relaxes. ☐

One muscle is strong and the other is weak. ☐

Both muscles relax at the same time. ☐

1 mark

(b) As Nancy dances her breathing changes because she needs more oxygen.
The graph below shows how the volume of air in her lungs changes when she dances.

From the graph, give **two** ways her breathing changes when she dances.

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

1 mark

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

1 mark

(c) Nancy's muscle cells produce carbon dioxide as she dances.

Which of the following shows how the carbon dioxide is removed from Nancy's body? Tick the correct box.

muscle cells ⟶ bloodstream ⟶ windpipe ⟶ lungs ⟶ nose ☐

muscle cells ⟶ windpipe ⟶ lungs ⟶ bloodstream ⟶ nose ☐

muscle cells ⟶ bloodstream ⟶ lungs ⟶ windpipe ⟶ nose ☐

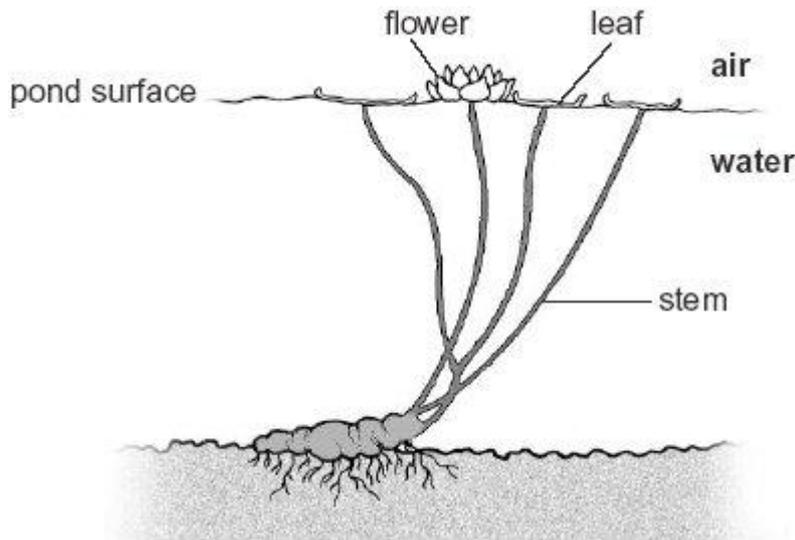muscle cells ⟶ windpipe ⟶ bloodstream ⟶ lungs ⟶ nose ☐

1 mark
maximum 4 marks

## Q26.

The photograph below shows some water lilies in early summer.

This diagram shows a water lily plant.



(a) Water lilies do **not** grow well in moving water.

Suggest a reason for this.

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

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

1 mark

(b) During the winter, many water lily plants do **not** grow new leaves.

Suggest **one** reason why the plants do **not** grow new leaves in the winter.

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

1 mark

(c) (i) Give **one** way water lily plants are adapted to live in water.

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

1 mark

(ii) Explain how this adaptation helps the water lily to grow in water.

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

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

1 mark

(d) In the summer, water lilies produce large yellow flowers.

The flowers float on the surface of the pond.



Suggest **one** way these colourful floating flowers help the water lily to reproduce.

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

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

1 mark

(e) When water lilies cover the pond surface with leaves, the pond does not get as hot during the day.

Explain why the pond does **not** get as hot.

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

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

1 mark

maximum 6 marks

## Q27.

Sara investigated making bread.
She described what she did below.



I mixed flour, water, sugar and yeast to make bread dough.

I put 50 cm³ of dough into a measuring cylinder.

I put the measuring cylinder into a water bath at 30°C.

I measured the volume of the dough after 30 minutes.

at the start          after 30 minutes

water
dough

Sara repeated the experiment with the water bath at different temperatures.
Her results are shown below.

| temperature of water bath (°C) | volume of dough (cm³) | |
| --- | --- | --- |
| | at the start | after 30 minutes |
| 30 | 50 | 66 |
| 45 | 50 | 73 |
| 60 | 50 | 77 |
| 75 | 50 | 71 |
| 90 | 50 | 60 |

(a)  Use the table of results.
What question did Sara investigate?

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

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

1 mark

(b)  At each temperature Sara used dough from the same mixture.

(i)  Give **one** other way Sara made her experiment fair.

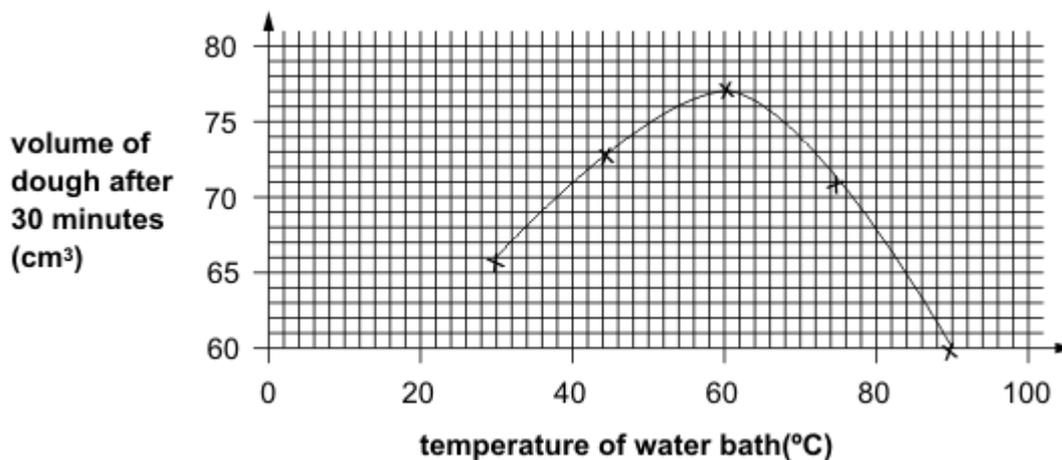..................................................................................................................

1 mark

(ii)  Why would using dough from a different mixture make Sara's experiment **unfair**?

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

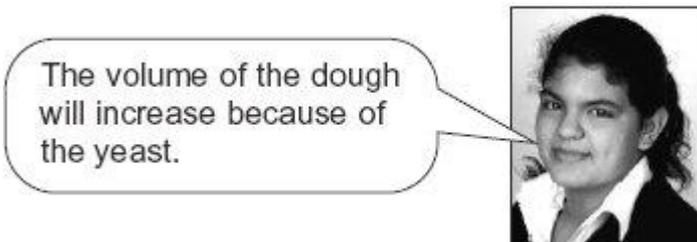..................................................................................................................

1 mark

(c)  Sara plotted her results on the graph below.



Describe the relationship between the variables on the graph from 30°C to 90°C.

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

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

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

(d) Sara made a prediction.



The volume of the dough will increase because of the yeast.

What could she do to test her prediction?

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

......................................................................................................................
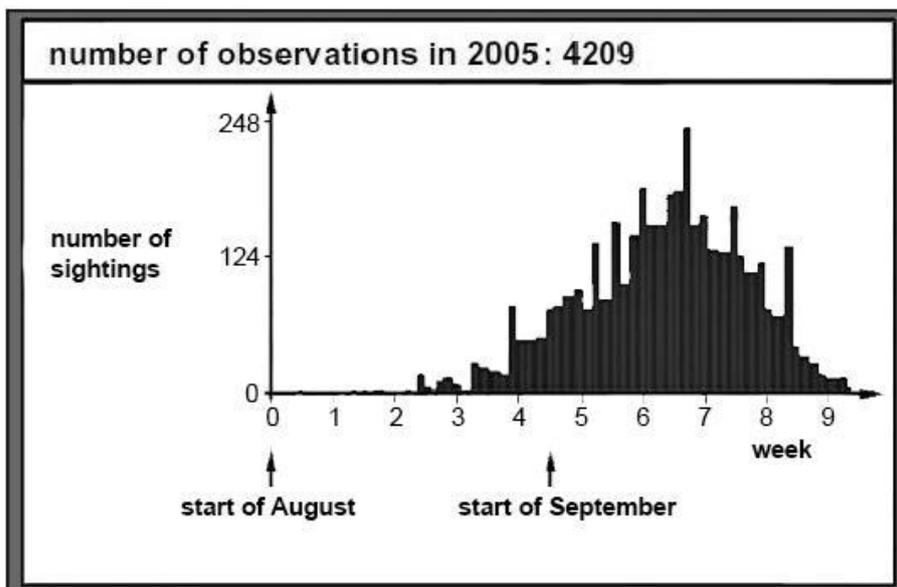
1 mark
maximum 6 marks

## Q28.

Every autumn the BBC asks people all over the UK to record when and where they see the first ripe conkers.
The results are shown on a website.
Conkers only ripen in the autumn.



conker



number of observations in 2005: 4209

number of sightings

248

124

0

0  1  2  3  4  5  6  7  8  9
week

start of August      start of September

(a) Some pupils discussed these results and made some conclusions.

Tick a box in each row to say whether the conclusion is **true** or **false** or whether you **cannot tell** based on the results.

|  | true | false | cannot tell |
| --- | --- | --- | --- |

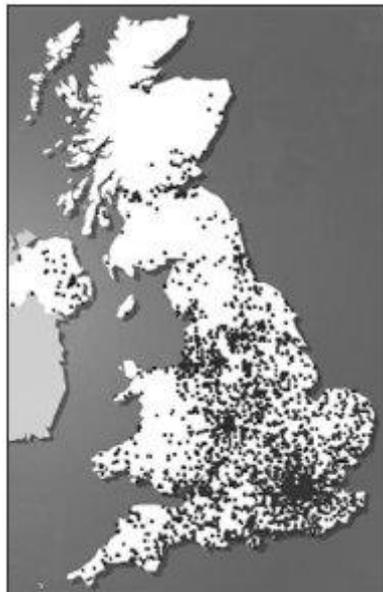There are more conkers in 2005 than there have been in other years.

☐ ☐ ☐

There are only 248 conker trees in the UK.

☐ ☐ ☐

The most common time for the first ripe conkers was in September.

☐ ☐ ☐

The number of sightings decreased between August and September.

☐ ☐ ☐

**2 marks**

(b)    The map shows where members of the public saw ripe conkers in the UK.



(i)    Suggest **one** reason why it is a good idea to collect data by asking the public to observe when conkers ripen.

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

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

**1 mark**

(ii)   Suggest **one** reason why it is **not** a good idea to collect data by asking the public to observe when conkers ripen.

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

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

**1 mark**

(c)     The data was collected in one year.

What data would the BBC need to collect to find out if the time of year in which conkers ripen is changing?

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

**1 mark**

(d)     Conkers ripen earlier in the south of the country than in the north.

Suggest why conkers ripen earlier in the south.

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

**1 mark**

**maximum 6 marks**

**Q29.**

During pregnancy a woman's body increases in mass.
The table shows the average increase in mass in some parts of the body during pregnancy.

| part | increase in mass during pregnancy (kg) |
|---|---|
| foetus | 3.6 |
| uterus | 0.9 |
| placenta | 0.7 |
| red blood cells | 0.2 |
| amniotic fluid | 0.9 |
| breast tissue | 0.4 |
| fat | 3.9 |

(a)     Explain why the mass of the placenta increases as the foetus develops.

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2 marks

(b)     Pregnant women need to make sure they have plenty of iron in their diet.
Use information in the table to explain why they need extra iron.

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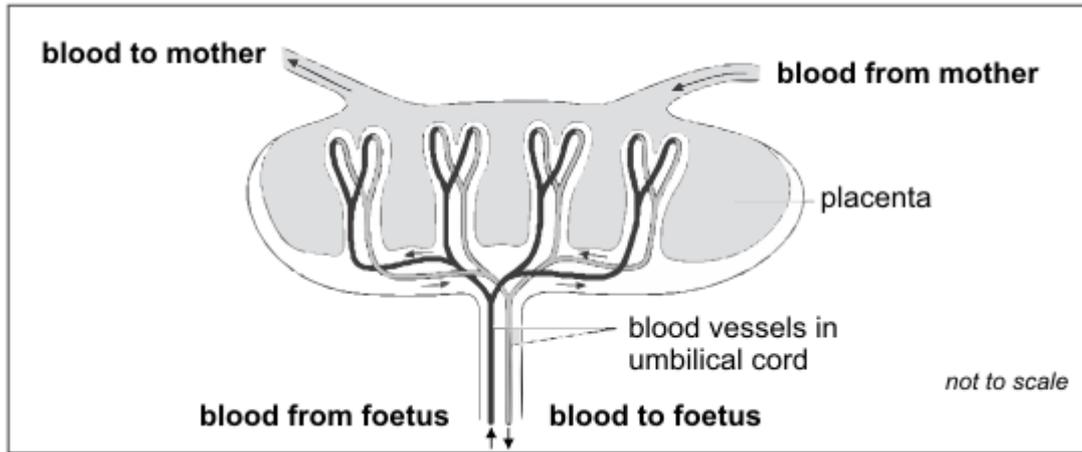
1 mark

(c)    The foetus is **not** part of a woman's body before she becomes pregnant.

Which **two** other parts from the table are **not** present in her body before she becomes pregnant?

..................................................... and ........................................................

1 mark

(d)    (i)    The diagram shows the blood supply in the placenta and umbilical cord.



*not to scale*

When the mother breathes, oxygen and other gases pass to the foetus.

Complete the flow diagram below to show how oxygen passes from the mother to the foetus. Use **all** the words from the list below.

| lungs    umbilical cord    blood of foetus    windpipe    placenta |
| --- |
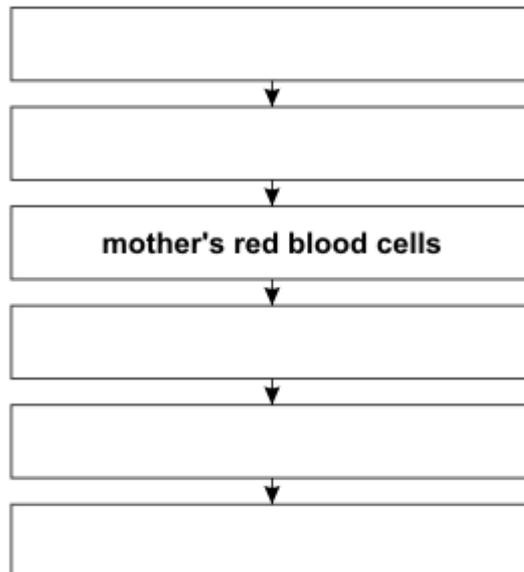


2 marks

(ii)    When a pregnant woman breathes in cigarette smoke, carbon monoxide gas combines with some of her red blood cells.
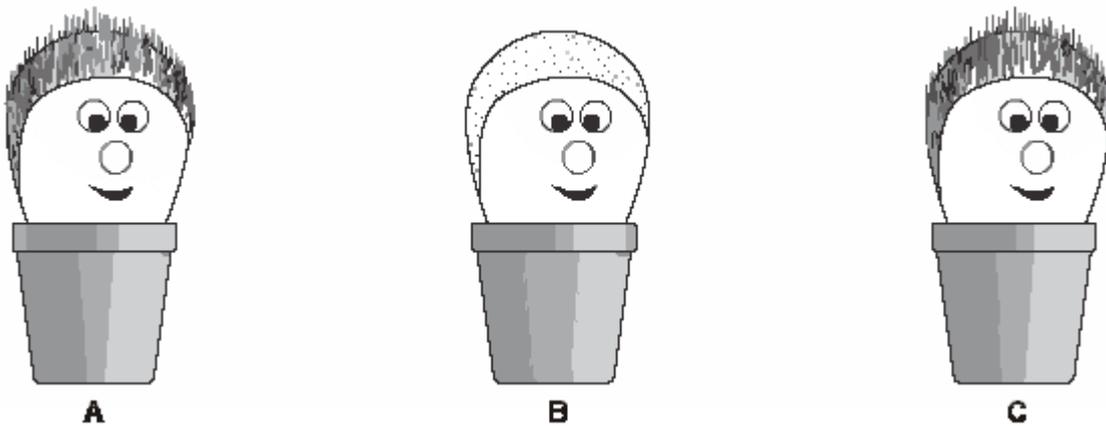
How could this harm the foetus?

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## Q30.

Nadine mixed grass seeds with sand.
She put the mixture into three mesh bags to make three model heads.
She soaked two of the bags in water.

(a)    The drawings below show the model heads after one week.



A                              B                              C

(i)    Which **two** model heads did Nadine soak in water?
Give the letters.

.................... and ....................

How can you tell this from the drawings?

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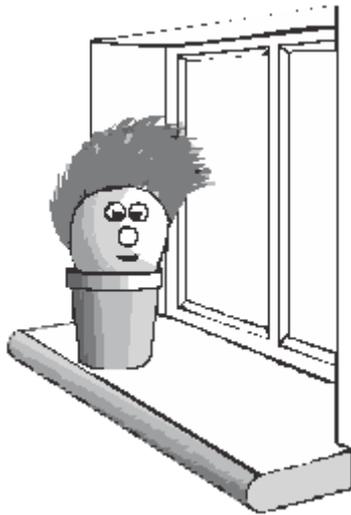
1 mark

(ii)   Nadine watered both of these models for two weeks.
She watered one more often than the other.

How would the model that was watered more often look different from the
other one?

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1 mark

(b)    Nadine put one of the watered models near a window.

Why did the grass grow towards the window?

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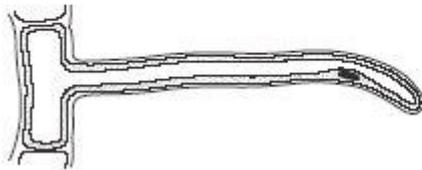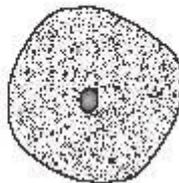
1 mark

(c) (i) Grass plants have root hairs. Which diagram shows a root hair cell?
Tick the correct box.



A ☐        B ☐        C ☐        D ☐

1 mark

(ii) Fill the gaps in the sentence below.

Root hairs take in ................................... and

1 mark

................................... from the soil.
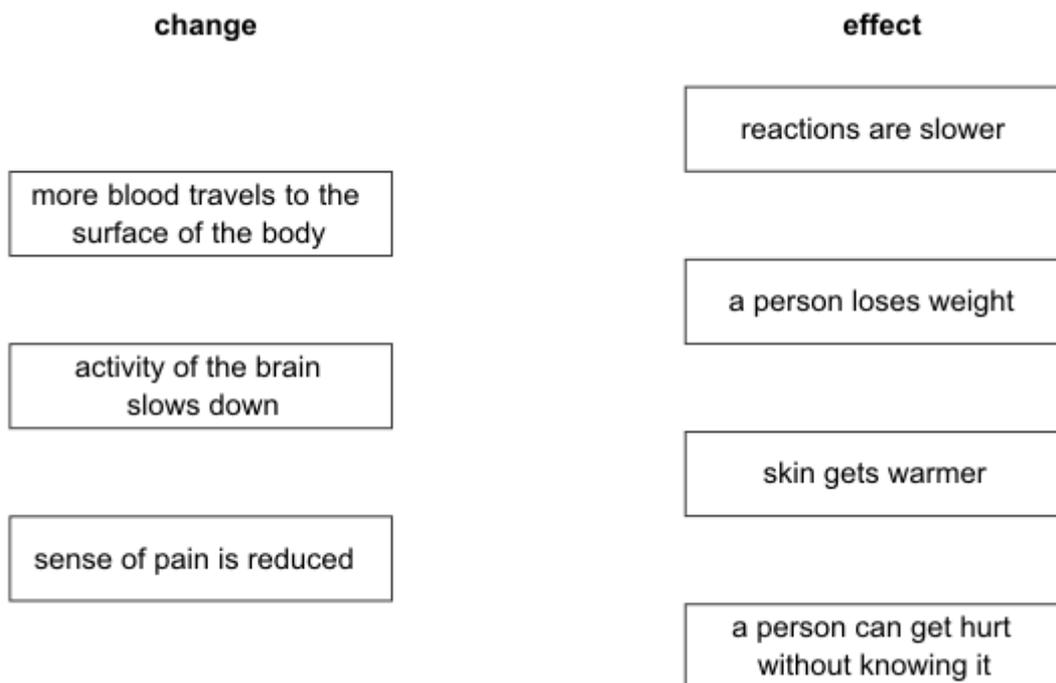
1 mark
maximum 6 marks

# Q31.
(a)    Drinking alcohol can cause changes in the body.

(i) Draw a line from each **change** to the **effect** on the body.
Draw only **three** lines.

|  change | effect |
|---|---|

**change**

more blood travels to the
surface of the body

activity of the brain
slows down

sense of pain is reduced

**effect**

reactions are slower

a person loses weight

skin gets warmer

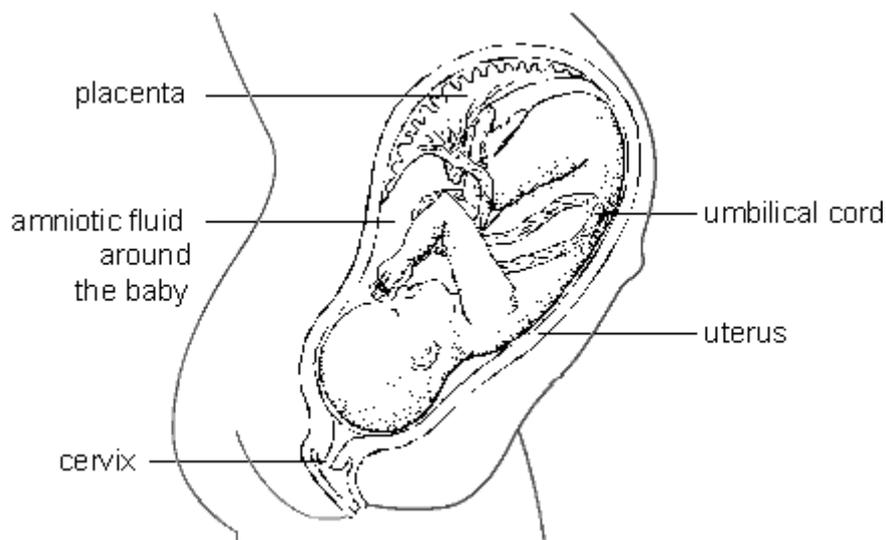a person can get hurt
without knowing it

2 marks

(ii)   People who drink alcohol and then drive a car are likely to have accidents.

From the information above, which **effect** of drinking alcohol causes accidents?

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

1 mark

(b)   The drawing below shows a baby in its mother's uterus.



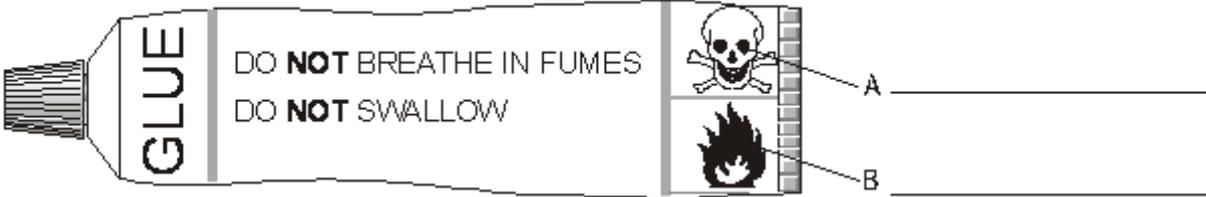(i)   Through which labelled part can alcohol pass from mother to baby?

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

1 mark

(ii)   Which labelled part protects the baby from damage?

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

1 mark

(c)   (i)   What do the hazard warning symbols, **A** and **B**, on this tube of glue mean?
Choose from the box below and write your answers on the lines.

| corrosive | explosive | flammable | toxic | radioactive |

GLUE

DO **NOT** BREATHE IN FUMES
DO **NOT** SWALLOW

A ..............................................

B ..............................................

2 marks

(ii)   The glue contains a solvent.
       Why is it dangerous to breathe in the fumes from the glue?

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

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

1 mark
maximum 8 marks