Debden Park High School

Yr 9 Science Spring Homework Book

Name _____

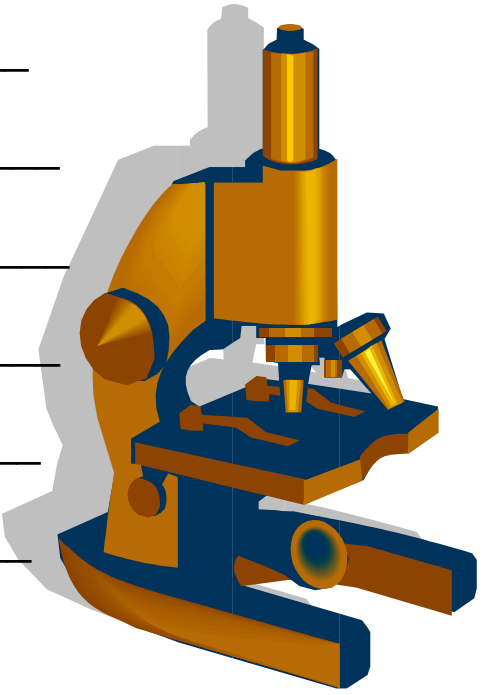
Tutor _____

Teacher _____

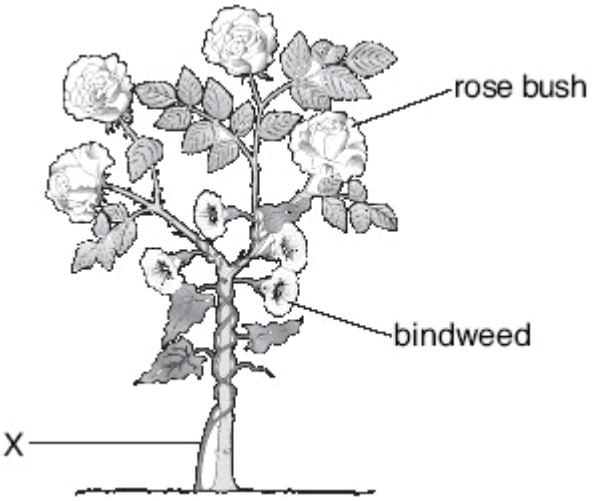
KS2 Level _____

I am currently working at Level _____

Target Level _____



1. Bindweed is a plant that grows tightly around other plants.
The drawing below shows bindweed growing around a rose bush.



(a) Complete the sentences below. Choose from the words in the list.

air **light** **support** **water** **minerals**

(i) Bindweed grows as high as possible on the rose bush so that the bindweed can get as much ..... as possible.

1 mark

(ii) Bindweed grows around the rose bush because the rose bush provides ..... for the bindweed.

1 mark

(b) A gardener cut through the stem of the bindweed at X.
Two days later the bindweed above X was dead.

Why did the bindweed die?
Tick the correct box.

no air	☐	no light	☐
no warmth	☐	no water	☐

1 mark

(c) The gardener adds fertiliser to the soil to help her rose bushes to grow well.

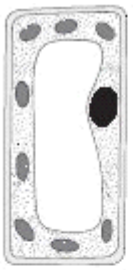
What do plants get from the fertiliser?
Tick the correct box.

acids	☐	minerals	☐
sugars	☐	vitamins	☐

1 mark

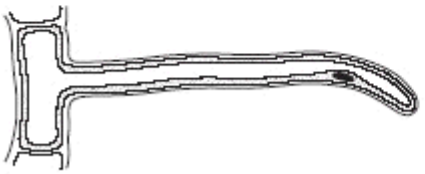
(d) Plant roots have root hairs.

Which diagram shows a root hair?
Tick the correct box.



A ☐

B ☐



C ☐

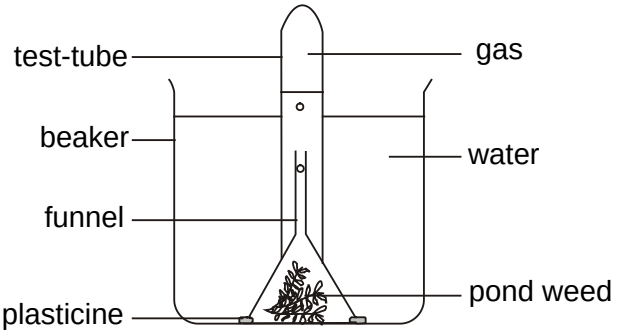
D ☐

not to scale

1 mark

maximum 5 marks

2. The drawing shows an experiment to investigate photosynthesis in weed from a pond.



Bubbles of gas produced during photosynthesis were given off from the pond weed and collected in the test tube.

(a) Name the gas given off in photosynthesis

.....

1 mark

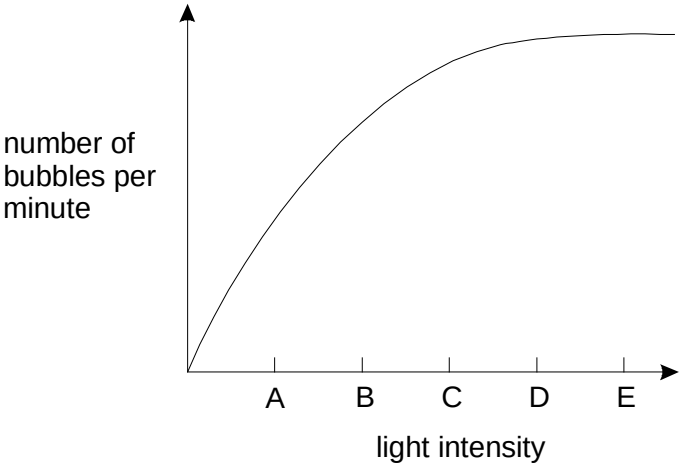
(b) What **two** substances are taken in by the plant and used for photosynthesis?

1. .....

2. .....

2 marks

Light of different intensities was shone onto the pond weed. The number of gas bubbles given off in one minute at each light intensity was counted. The results are shown in the graph.



(c) Which letter on the horizontal axis shows the light intensity at which the rate of photosynthesis first reaches its maximum?

.....

1 mark

Blue, green and red light were then shone, in turn, onto the pond weed. The number of bubbles of the gas given off in one minute was counted. The results are shown in the table.

colour of light	**number of bubbles in one minute**
blue	85
green	10
red	68

The leaves of the pond weed contain a green pigment which absorbs light for photosynthesis

(d) (i) Name this pigment.

.....

1 mark

(ii) Using the information in the table, tick a box by **one** colour of light which is strongly absorbed by the pigment.

blue ☐

green ☐

red ☐

1 mark

(e) Sugar is also produced during photosynthesis.

Give **two** ways in which the plant uses sugar.

1. .....

.....

2. .....

.....

2 marks

Maximum 8 marks

3. Joe bought a potted plant. He kept it well watered but some of the leaves turned yellow.

Joe thought that the plant did **not** have enough light for photosynthesis. He moved the plant closer to the window but more leaves turned yellow.

(a) He then thought that the plant did **not** have enough minerals.

The table below gives information about minerals.

mineral	**why the mineral is needed**
magnesium	to make chlorophyll
nitrogen	to make protein
phosphorus	to grow and transfer energy
potassium	to make fruit

(i) Joe's plant did **not** have enough of one of the minerals in the table.
Use the information in the table to suggest which mineral this was.

.....

1 mark

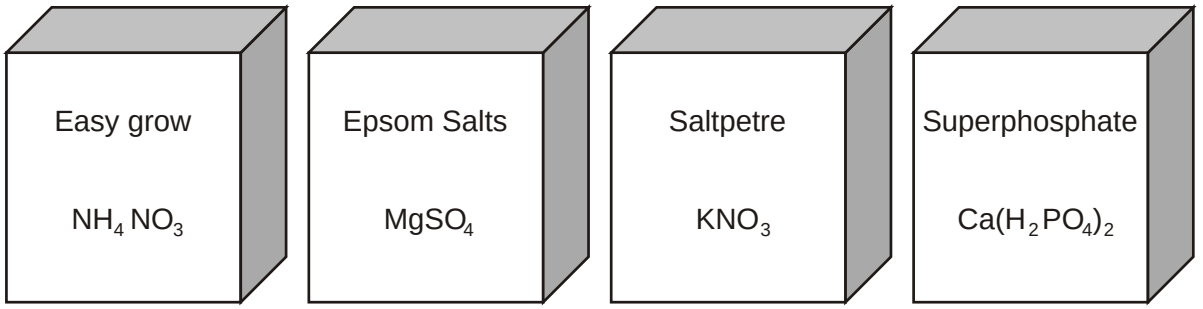
(ii) A plant growing in a pot is more likely to be affected by a shortage of minerals than a plant growing in a garden.
Give the reason for this.

.....

.....

1 mark

(b) Joe bought some fertiliser for his plant.
The names and formulae of four different fertilisers are shown below.



A **B** **C** **D**

(i) Give the letter of **one** box of fertiliser, A, B, C or D, that would provide each of the minerals in the table below.
Write the letters in the table.

mineral	**letter of fertiliser**
magnesium	
nitrogen	
phosphorus	
potassium	

3 marks

(ii) Easy Grow is ammonium nitrate, NH_4NO_3.

How many different elements are present in ammonium nitrate?

.....

1 mark

(iii) How many atoms are present in the formula of ammonium nitrate?

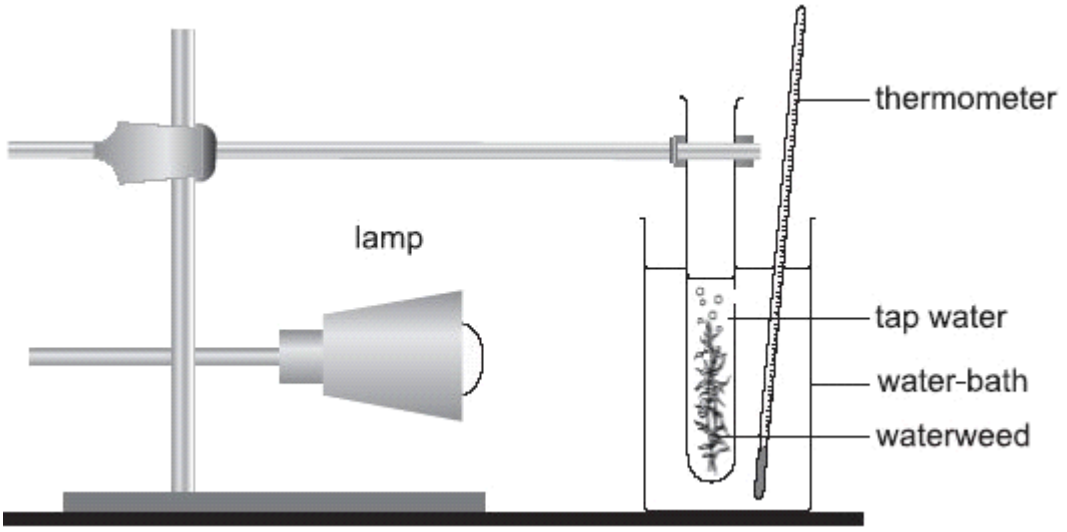
.....

1 mark

maximum 7 marks

4. Suzi investigated how temperature affects the number of bubbles produced by waterweed in one minute.

She set up the experiment as shown below.



When the temperature of the water was 10°C the waterweed did **not** produce bubbles.

(a) Suzi increased the temperature of the water in the water-bath to 20°C.
The waterweed started to produce bubbles.
She waited two minutes before starting to count the bubbles.

Explain why she waited for two minutes before she started to count the bubbles.

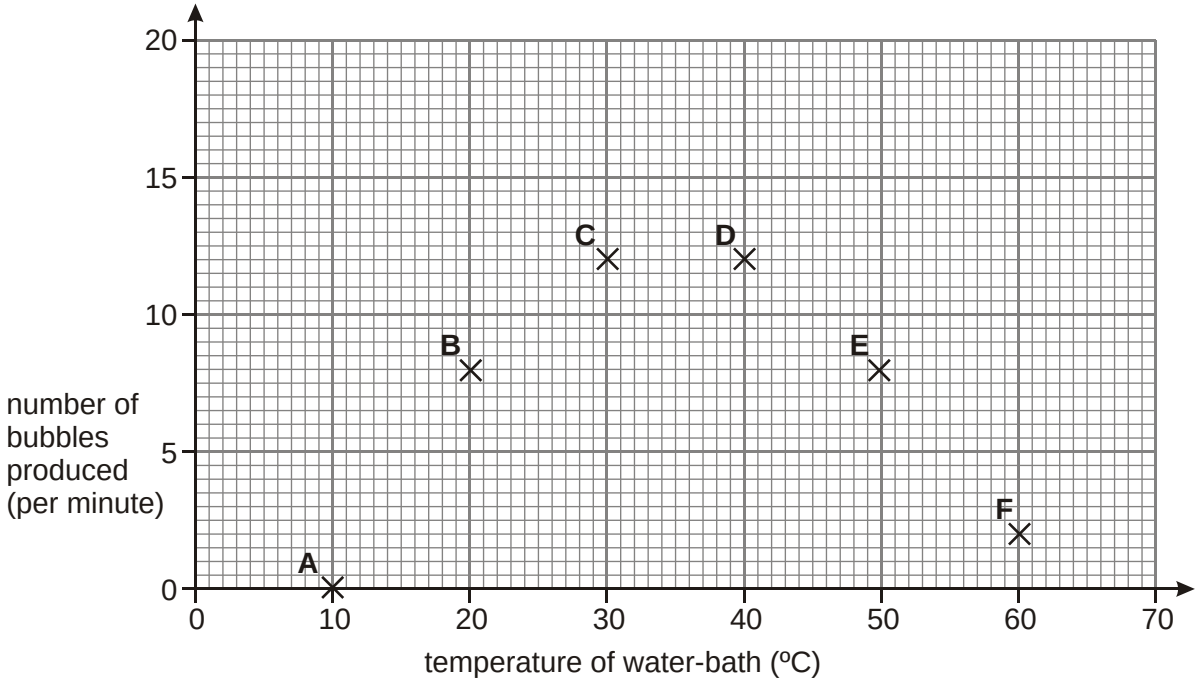
.....

.....

1 mark

(b) Suzi counted the number of bubbles produced at six different temperatures.

Her results are shown on the graph below.



(i) Draw a smooth curve on the graph.

1 mark

(ii) Use your curve to find the temperature of water which produced the most bubbles per minute.

.....°C

1 mark

(c) Suzi predicted that the higher the temperature the more bubbles would be produced.

Which points on the graph support Suzi's prediction?

.....

1 mark

(d) Suzi's data does **not** show clearly the exact temperature at which most bubbles were produced.

How could she improve the data she collects to find this temperature?

.....

.....

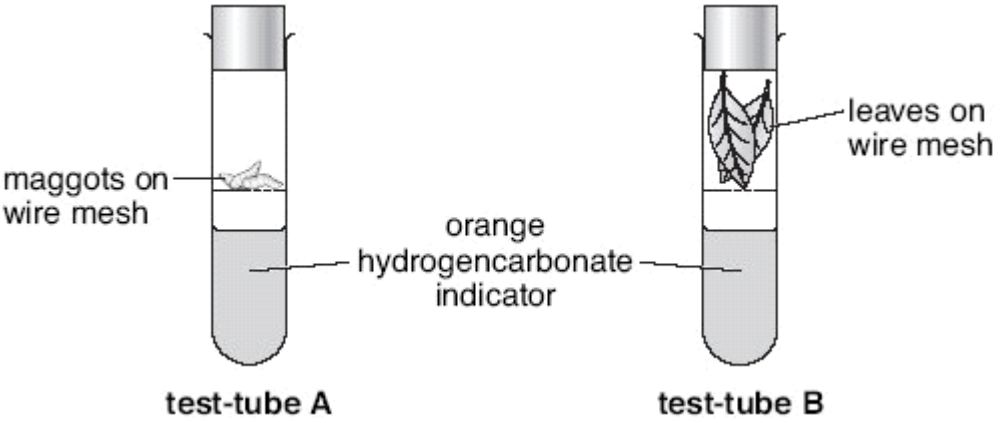
1 mark

maximum 5 marks

5. The table shows how hydrogencarbonate indicator solution changes colour when the concentration of carbon dioxide in it changes.

concentration of carbon dioxide	colour change
increases	orange to yellow
decreases	orange to purple

Sunil set up the experiment shown below and put both test-tubes on a window-sill.



Use information in the table to help you answer the questions below.

(a) The indicator in test-tube A changed from orange to yellow.

(i) What process, in the cells of the maggots, caused this colour change?

.....

1 mark

(ii) Explain what happens in this process to cause the colour change.

.....

1 mark

(b) The indicator in test-tube B changed from orange to purple.

(i) What process, in the cells of the leaves, caused this colour change?

.....

1 mark

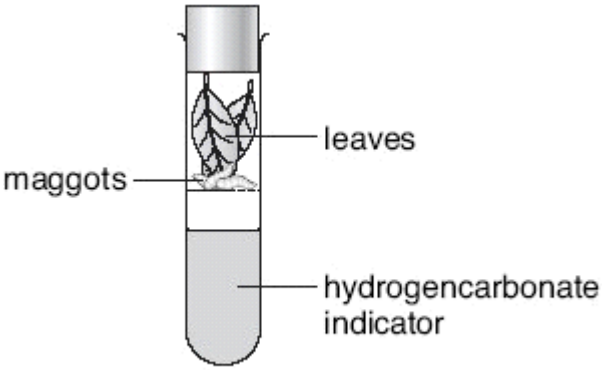
(ii) Explain what happens in this process to cause the colour change.

.....

.....

1 mark

(c) Sunil then put two fresh leaves into test-tube C containing 30 cm^3 of orange hydrogencarbonate indicator.
He added some maggots on a piece of wire mesh as shown below.
He put the test-tube on a window-sill.



test-tube C

The indicator remained orange. Explain why.

.....

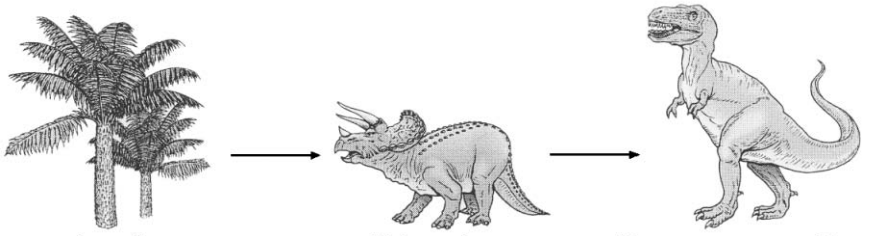
.....

.....

1 mark

maximum 5 marks

6. The drawing shows a food chain including plants called tree ferns, and two dinosaurs. They lived on Earth millions of years ago.



(a) The list below shows words which describe living things in a food chain.

herbivore **predator** **prey** **producer**

(i) Which word in the list above describes the tree fern?

.....

1 mark

(ii) From the list above, give **one** word that can describe Tyrannosaurus rex.

.....

1 mark

(iii) From the list above, give **one** word that can describe Triceratops.

.....

1 mark

(b) Some scientists think that a large rock from space hit the Earth about 65 million years ago.
A thick layer of dust stayed in the air for a long time and blocked out the sunlight.

This would cause a decrease in the number of tree ferns.
Give **one** way the decrease in tree ferns would affect the Triceratops.

.....

.....

1 mark

(c) Tyrannosaurus rex had thick scales covering its body.
Which group did it belong to?
Tick the correct box.

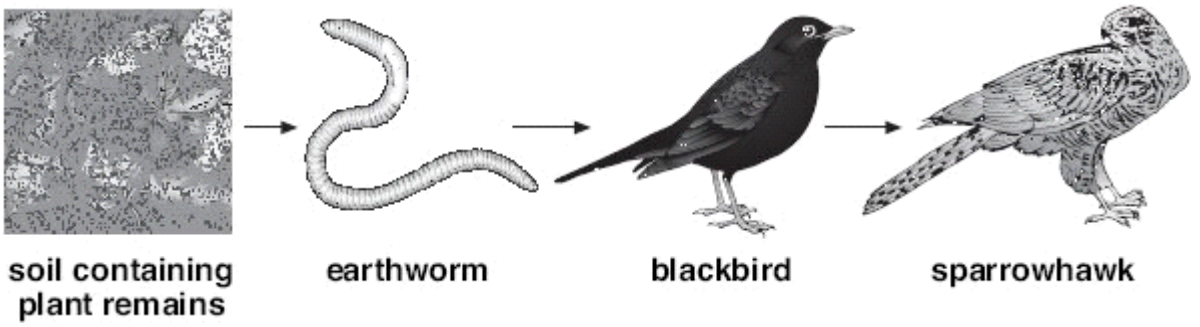
amphibians	☐	fish	☐
reptiles	☐	mammals	☐

1 mark

Maximum 5 marks

7. Copper and arsenic are present in the soil near copper mines.
When earthworms eat this soil they change from brown to bright yellow.
The copper and arsenic are **not** poisonous to earthworms.

(a) Earthworms are part of the food chain shown below.



not to scale

(i) Use the food chain to suggest how copper and arsenic get into the body of a sparrowhawk.

.....

.....

.....

1 mark

(ii) Mary suggested that blackbirds are more likely to catch bright yellow earthworms than brown earthworms.

Give **one** reason why this might be true.

.....

.....

1 mark

(b) Mary wanted to count the bright yellow earthworms and the brown earthworms in the soil at different distances from the mines.

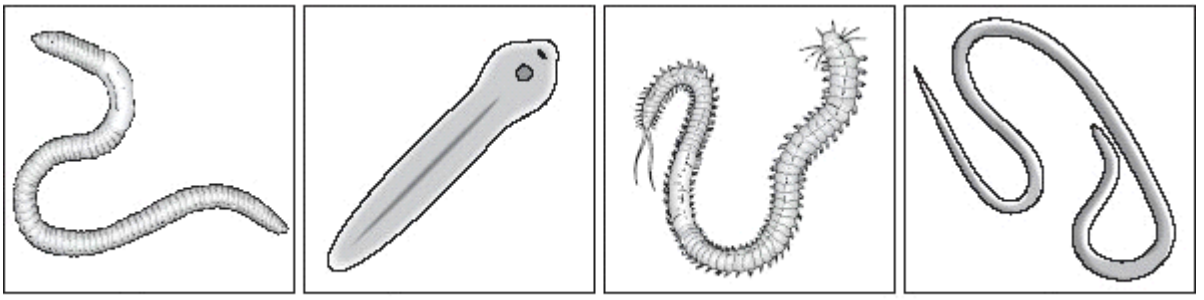
What important information about the soil could she get from her results?

.....

.....

1 mark

(c) The drawings below show an earthworm and three other worms.



not to scale

The ragworm belongs to the same group as the earthworm.

How can you tell this from the drawings?

.....

.....

1 mark

(d) The roundworm and some flatworms are parasites.

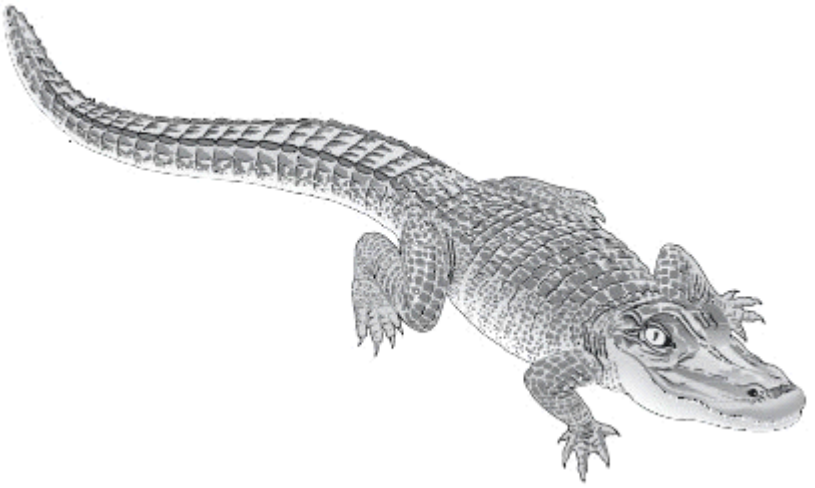
What does this mean?
Tick the correct box.

They feed only on insects.	☐	They live in a burrow.	☐
They feed on other living things and harm them.	☐	They live in the sea.	☐

1 mark

maximum 5 marks

8. The drawing below shows an alligator.



(a) Alligators are carnivores.
What does the word carnivore mean?

.....

1 mark

(b) Alligators lay eggs in nests made from plant material.
The eggs have tough shells containing calcium carbonate.

(i) How does the eggshell help the developing alligator to survive before it hatches?

.....

.....

1 mark

(ii) Rotting plant material in the nest is acidic.
When the acid comes into contact with calcium carbonate in the eggshell it makes the shell weaker.

Why does the acid weaken the eggshell?

.....

.....

1 mark

(iii) Suggest **one** reason why it is helpful to the developing alligator in the egg if the eggshell becomes weaker.

.....

.....

1 mark

(c) The table below shows the percentage of female and male alligators that hatch from the eggs when the eggs are kept at different temperatures.

temperature (°C)	**% eggs hatching as females**	**% eggs hatching as males**
26	100	0
28	100	0
30	100	0
32	86	14
34	0	100
36	0	100

(i) Use the table to suggest how a zookeeper could make sure only females hatch from the eggs.

.....

.....

1 mark

(ii) Between which **two** temperatures are 50% of the eggs likely to hatch as females?
Tick the correct box.

between 26°C and 30°C ☐

between 30°C and 32°C ☐

between 32°C and 34°C ☐

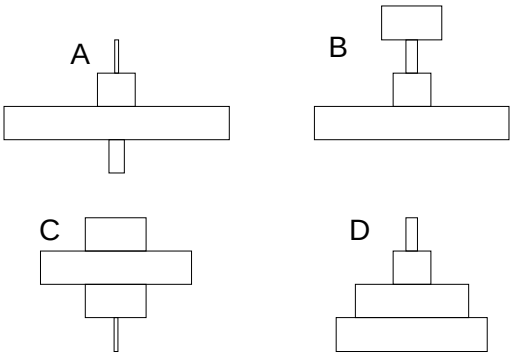
between 34°C and 36°C ☐

1 mark

maximum 6 marks

9. Pyramids of numbers represent the numbers of organisms at each stage in a food chain.

Study the four pyramids of numbers A, B, C and D shown below.



(a) For each of the food chains choose the pyramid of numbers which best represents the food chain.

(i) grass → insects → spiders → birds .....

1 mark

(ii) oak trees → aphids → blue tits → sparrow hawks .....

1 mark

(iii) grass → rabbits → foxes → fleas .....

1 mark

(b) (i) Which is the main process transferring energy to the surroundings at each stage in a food chain?

Tick the correct box.

growth ☐

nutrition ☐

reproduction ☐

respiration ☐

1 mark

(ii) Which process transfers energy from organisms at one stage in a food chain to organisms at the next?

Tick the correct box.

reproduction ☐

feeding ☐

movement ☐

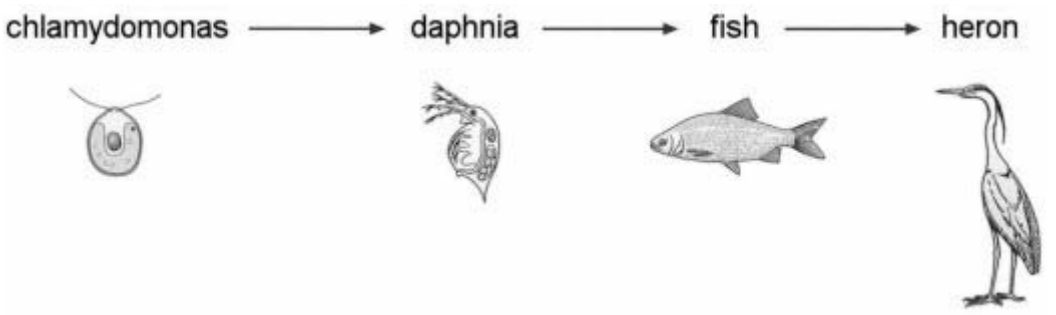
photosynthesis ☐

1 mark

Maximum 5 marks

10. Scientists measured the concentration of the insecticide, DDT, in three animals and a microscopic plant called chlamydomonas.

(a) The food chain for these four organisms is shown below.

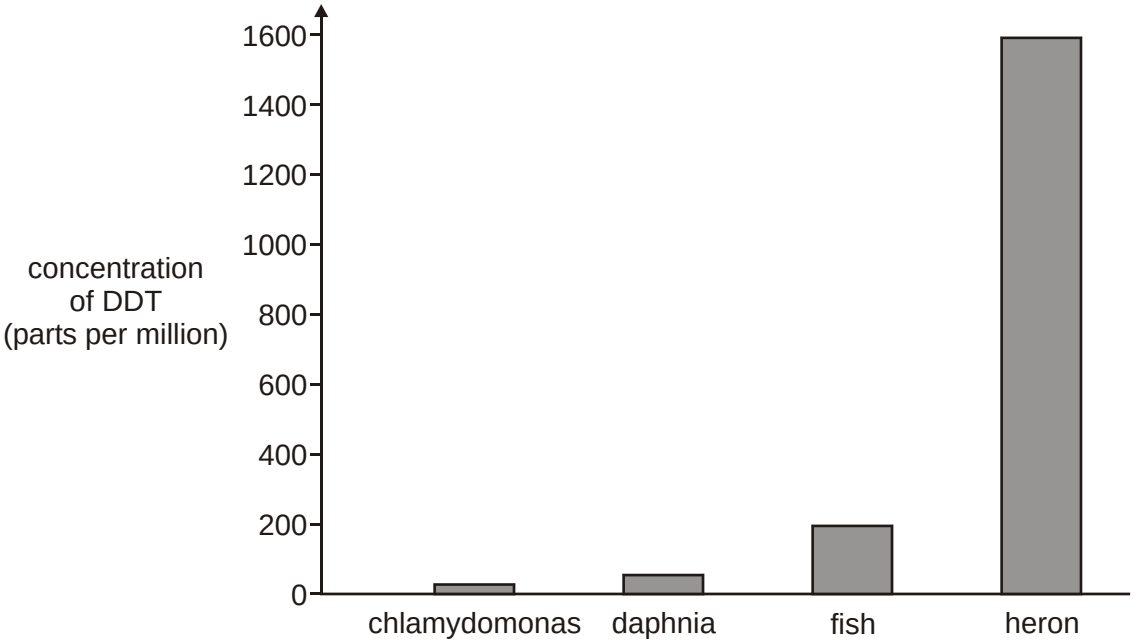


not to scale

(i) **In the space below**, draw the pyramid of numbers for this food chain. Write the name of the correct organism next to each section of the pyramid.

1 mark

(ii) The bar chart shows the concentration of DDT in the four organisms.



Give **one** reason for the difference in the concentration of DDT in these organisms.

.....

.....

1 mark

(b) In 1970 the average concentration of DDT in the tissues of sea lions in California was 760 parts per million. Nearly half the sea lion pups born in that year died because of high levels of DDT in their tissues.

How does DDT get from the body of a mother sea lion into the body of her pup:

(i) **before** the pup is born?

.....

.....

1 mark

(ii) **after** the pup is born?

.....

.....

1 mark

maximum 4 marks

11. Tom tries on four types of footwear in a sports shop.

ski boot

trainer

ice skate

walking boot

(a) (i) When Tom tries on the footwear, which one sinks into the carpet the most?

.....

1 mark

(ii) When Tom tries on the footwear, what is the same for each type of footwear? Tick the correct box.

the area of the footwear	☐
Tom's weight on the footwear	☐
the material of the footwear	☐
the weight of the footwear	☐

1 mark

(b) The drawing below shows a snowshoe.

How do snowshoes help people to walk in deep snow?

.....

.....

1 mark

(c) Choose the correct word from the list to complete the sentence below.

air resistance **friction** **gravity** **magnetism**

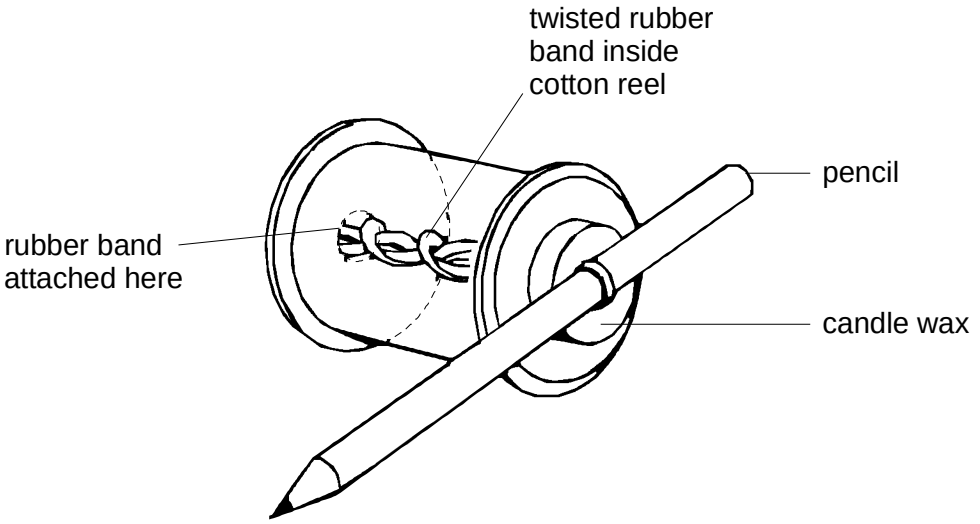
When Tom is ice skating the force of .....

between the skate and the ice is less than when he is walking on a carpet.

1 mark

Maximum 4 marks

12. Sarah made a cotton reel vehicle like the one shown in the diagram. The pencil is wound round and round so that it winds up the rubber band.
A piece of candle wax next to the cotton reel lets the rubber band slowly unwind.



(a) As the rubber band unwinds, the candle wax slips and the cotton reel turns.
Name the force which acts between the cotton reel and the candle wax.

.....

1 mark

(b) Sarah tested the vehicle by letting it run along a horizontal table top.

(i) She noticed that the vehicle gradually slowed down.
Give the reason for this.

.....

.....

1 mark

(ii) Describe what Sarah could do to make the rubber band move this vehicle faster.

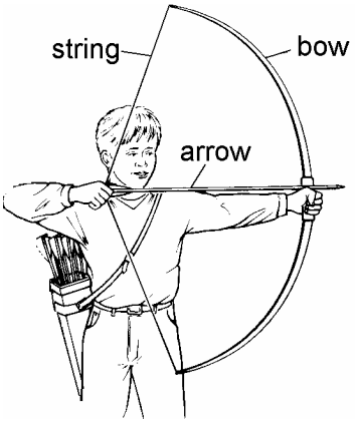
.....

.....

1 mark

Maximum 3 marks

13. The drawing shows a boy with a bow and arrow. He is holding the **arrow** and pulling it back.



(a) Two horizontal forces act on the arrow. These are the force exerted by the boy's hand and the force exerted by the string. The arrow is **not** moving.

The boy pulls the arrow with a force of 150 N. What is the size of the force exerted by the string on the arrow?

..... N

1 mark

(b) When the boy lets go of the arrow, it starts to move forward.

Explain why it starts to move.

.....

.....

1 mark

(c) The arrow flies across a field and hits a target.

Two forces act on the arrow while it is in the air. Air resistance acts in the opposite direction to the movement, and gravity acts downwards. These two forces **cannot** balance each other, even when they are the same size. Why is this?

.....

.....

1 mark

(d) The arrow has a sharp pointed end. When the arrow hits the target, the sharp point exerts a very large pressure on the target.

Why does a sharp pointed end exert a larger pressure than a blunt end?

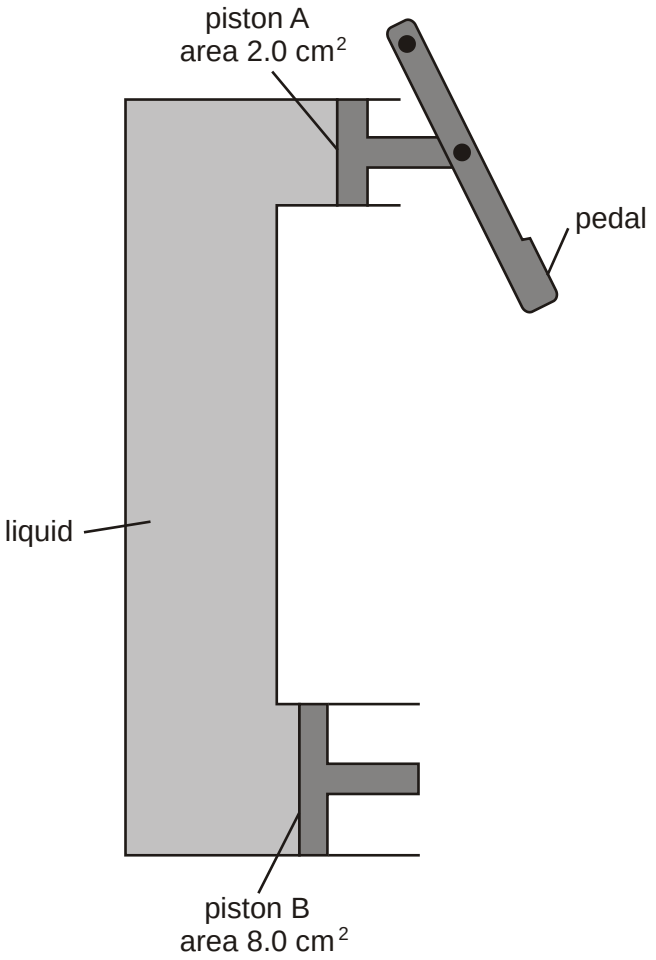
.....

.....

1 mark

Maximum 4 marks

14. The diagram below shows a container filled with a liquid.



At each end of the container there is a piston.
Piston A has a smaller area than piston B.

(a) (i) Rebekah pushes on the pedal. This produces a force of 200 N on piston A.

Calculate the pressure that piston A exerts on the liquid.
Give the unit.

.....

.....

2 marks

(ii) The liquid in the container exerts the same pressure on piston B.

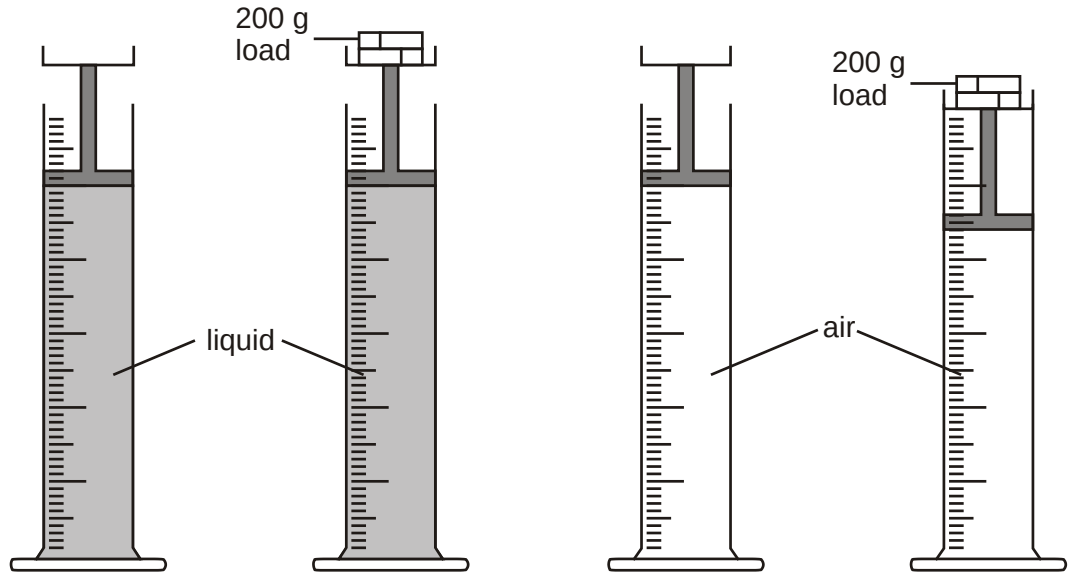
Use this pressure to calculate the force on piston B.

.....

..... N

1 mark

(b) Rebekah set up a different experiment as shown below.
She measured the volume of the liquid and the air in the cylinders before and after a 200 g load was added to the piston.



(i) When the loads were added to the pistons, the volume of the liquid did **not** change but the volume of the air decreased.

Explain why this happened.

.....

.....

1 mark

(ii) The diagram on the opposite page represents the way the brake system of a car works.
The brake pedal pushes piston A.
Piston B pushes the brakes on.

If air bubbles get into the liquid, the brakes do **not** work properly.
Explain why.
Use the diagrams above to help you.

.....

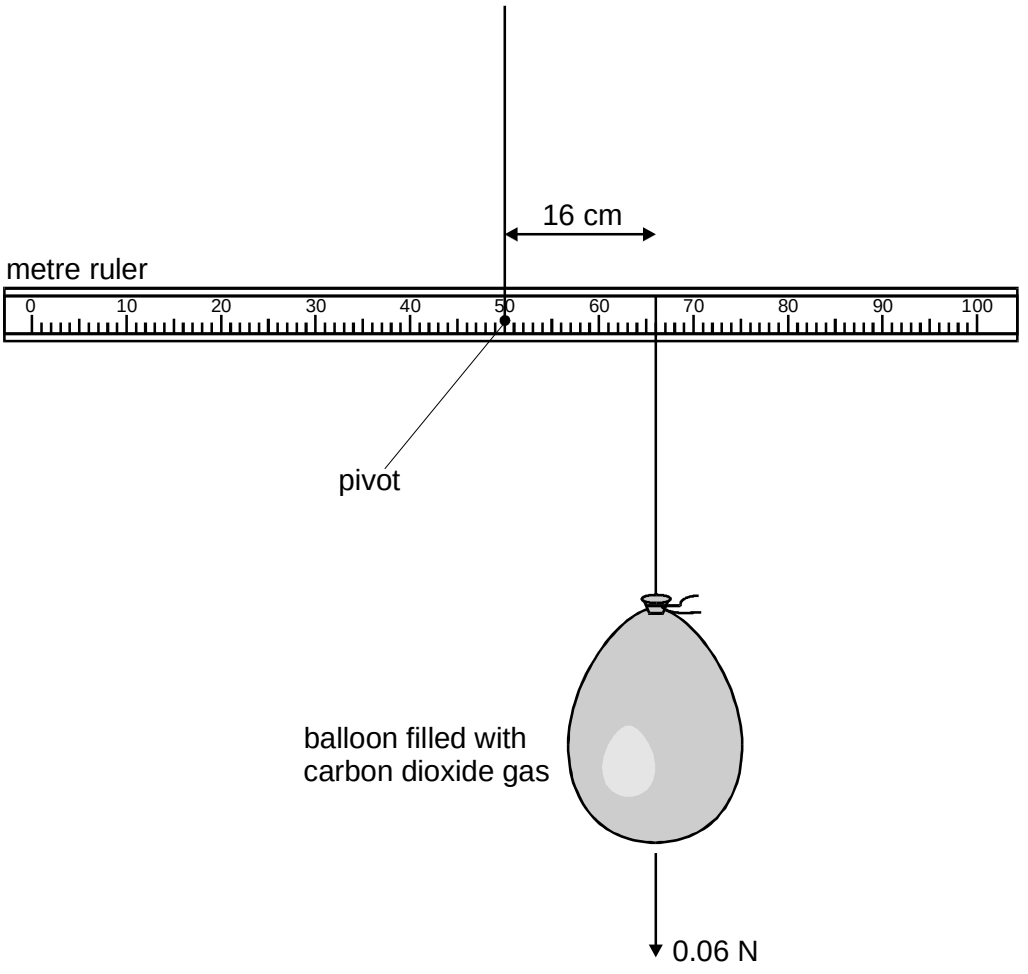
.....

1 mark

maximum 5 marks

15. Alex has a 100 cm ruler pivoted at the centre. She ties a balloon filled with carbon dioxide 16 cm from the pivot, as shown below.

The total weight of the balloon and carbon dioxide is 0.06 N.



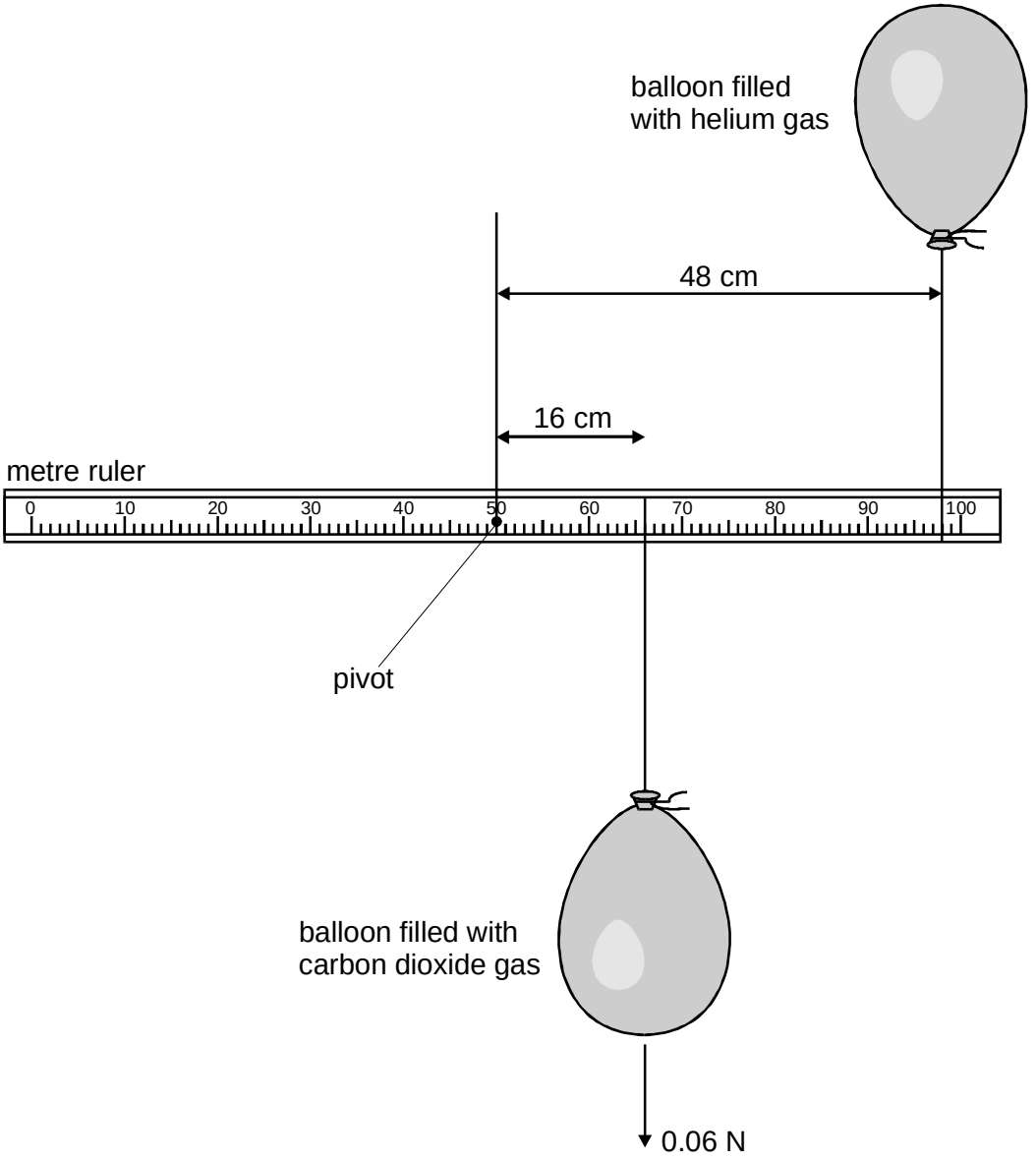
(a) The ruler becomes unbalanced.
Calculate the turning moment the balloon produces about the pivot on the ruler.
Give the unit.

.....

.....

2 marks

(b) Alex ties another similar balloon, filled with helium, 48 cm from the pivot.
The helium balloon exerts an upward force on the ruler.
The ruler is balanced as shown below.



(i) When the ruler is balanced, what turning moment must the helium balloon produce about the pivot?

.....

1 mark

(ii) Calculate the upward force exerted by the helium balloon on the ruler.

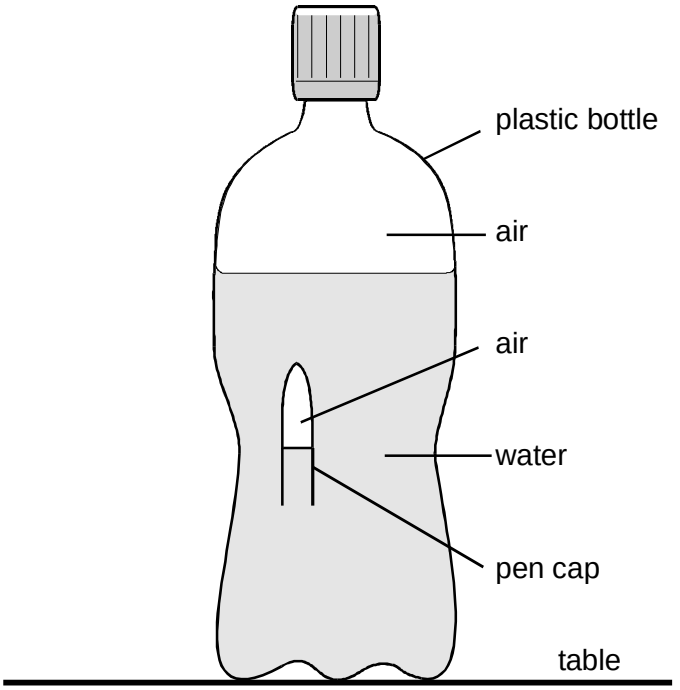
.....

..... N

1 mark

Maximum 4 marks

16. A pen cap floats in a plastic lemonade bottle three-quarters full of water.
If you squeeze the bottle the pen cap sinks to the bottom.
If you then let go of the bottle, the pen cap floats to the surface.



(a) When the bottle is squeezed what, if anything, happens to:

(i) the distance between the air molecules inside the bottle?

.....

1 mark

(ii) the distance between the water molecules inside the bottle?

.....

1 mark

(iii) the pressure of the air trapped inside the pen cap?

.....

1 mark

(iv) the volume of the air trapped inside the pen cap?

.....

1 mark

(b) Explain why the pen cap sinks when you squeeze the bottle.

.....

.....

.....

.....

2 marks

Maximum 6 marks

17. The action of the weather and plants on rocks or building materials is called **weathering**. The material is damaged but nothing gets taken away.

When material is broken down and removed from the area the process is called **erosion**.

(a) For the examples described in the table, tick **one** box in each row to show if the example is **weathering, erosion** or **neither**.

example	weathering	erosion	neither
The stones in an old wall have been pushed apart by the roots of weeds.			
An old granite gravestone is still smooth and shiny.			
A clay flower pot in the garden has crumbled and broken into pieces during the winter.			
Some soil has been washed from a flower bed by rain.			

4 marks

(b) How does water cause weathering of a brick?

.....

.....

1 mark

Maximum 5 marks

18. The chemical name for pure limestone is calcium carbonate. When calcium carbonate is heated to a temperature above 825°C it produces calcium oxide and carbon dioxide.

(a) Complete the symbol equation for this reaction.

$CaCO_3 \rightarrow$ ..... + ...

2 marks

(b) The photograph shows a limestone statue that has been changed by acid rain.

Some gases which pollute the air dissolve in rainwater to form acids.

(i) Give the name of a gas which dissolves in rainwater, leading to the formation of sulphuric acid.

.....

1 mark

(ii) Complete the word equation for the reaction between calcium carbonate and sulphuric acid.

calcium carbonate + sulphuric acid → ..... + ...+ water

2 marks

maximum 5 marks

19. Sandstone can be 'weathered' by doing the following each day for one week.

1. Soak the sandstone in water.
2. Place it in a freezer overnight.
3. Take it out of the freezer each morning.

(a) Explain how this freezing and thawing 'weathers' the sandstone.

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2 marks

(b) Weathering of rock may be caused by **physical** processes or **chemical** processes.

(i) The process in part (a) is a physical process which weathers rock. Describe **another** physical process which occurs naturally and explain how it weathers rock.

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2 marks

(ii) Name a chemical process which occurs outdoors and explain how it weathers rocks and buildings.

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2 marks

Maximum 6 marks