NAME:	SCIENCE TEACHER:	**10C**

SCIENCE

Year 10 Examination 2009
10C – 40 marks

Make sure that you have answered all the questions in paper 10B before you start this paper

Time allowed for both examinations: 2 hours

Answer all questions in the spaces provided on the paper.
You may use a calculator.
Show all your working in calculations; marks are awarded for it.
Give units for all answers (eg kg or m) unless they are already provided.

For Teacher Use

Question	1	2	3	4	5	6	7	8	9	10	Total
Marks gained											
Marks available	3	5	4	3	3	3	5	5	3	6	40

Question 1 [3 marks]

The table gives the names, colours and solubility in water of four compounds.

name	colour	solubility
copper carbonate	green	insoluble
iron sulfate	green	soluble
sodium chloride	white	soluble
zinc carbonate	white	insoluble

The compounds were added to separate beakers of water. Enough water was present for the soluble compounds to dissolve completely. The contents of each beaker were then filtered.

a.   One of the compounds left a green solid (residue) on the filter paper.

i.   What is the name of this compound?   _____

ii.   What would be the colour of the **filtrate**? _____

b.   Describe how you would obtain pure crystals of sodium chloride from a mixture of solid sodium chloride and solid zinc carbonate. You *may* wish to include labeled diagrams.

Diagram:

Question 2 [5 marks]

A car that had been involved in a robbery was found deserted.

The car was taken to a forensic laboratory where some fingerprints and blood samples where found.

a.   Describe how you would lift the fingerprints and store them so they could be used in court as evidence.

b.   Fingerprints are classified by the basic patterns that can appear on them. Identify the three basic patterns shown in fingerprints below.
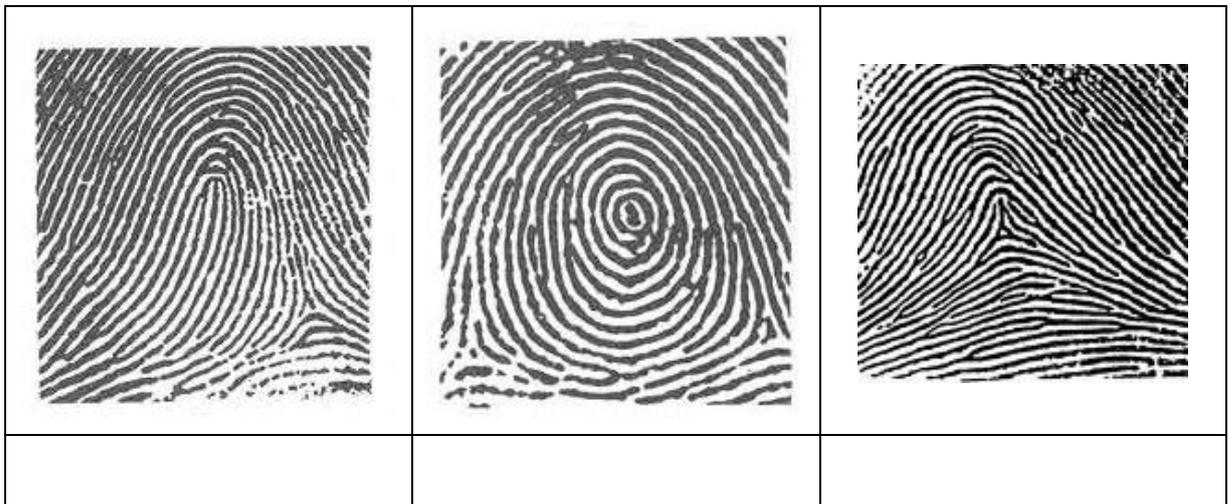
c.   Give a reason why fingerprints are a reliable means of identifying suspects.

A blood sample was found inside the car and DNA profiles were obtained from this blood and four suspects.

Blood from car   **Suspect 1**   **Suspect 2**   **Suspect 3**   **Suspect 4**

d.   Which of the 4 suspects blood matches the blood from the car? Explain how you know this.

Suspect _____

e.   Explain why a DNA profile is more useful than the ABO blood grouping in the identification of a suspect.

Question 3 [4 marks]

The pictures show some organisms from a marine ecosystem.

The pictures are not to scale.

sweep   water flea   diatom   euphausid

dinoflagellate   snapper   blenny   pilchard
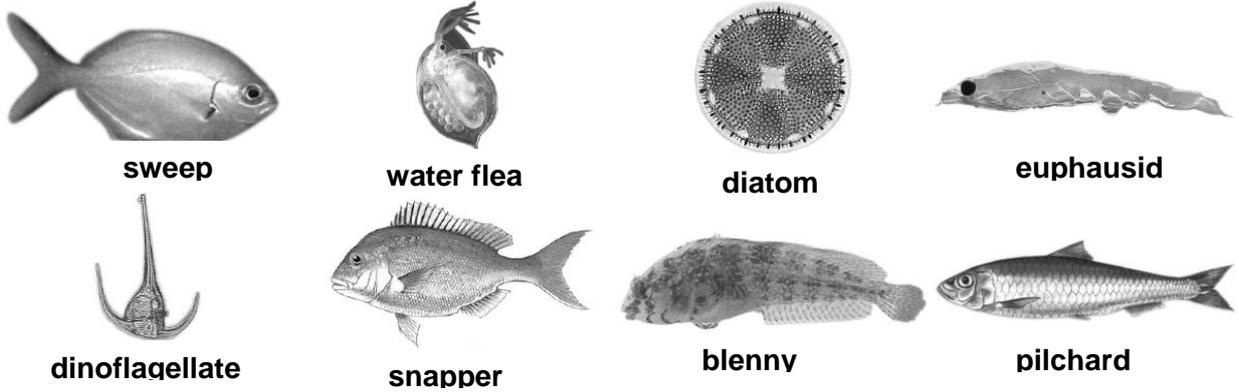
The table below shows information about the feeding relationships in the marine ecosystem.

Organism	Food eaten
euphasid	dinoflagellate, diatom
dinoflagellate	none
sweep	diatom
snapper	sweep, pilchard, blenny
pilchard	water flea, euphausid
blenny	water flea, euphausid
diatom	none
water flea	diatom, dinoflagellate

a. Use the information in the table to complete the food web below.


5
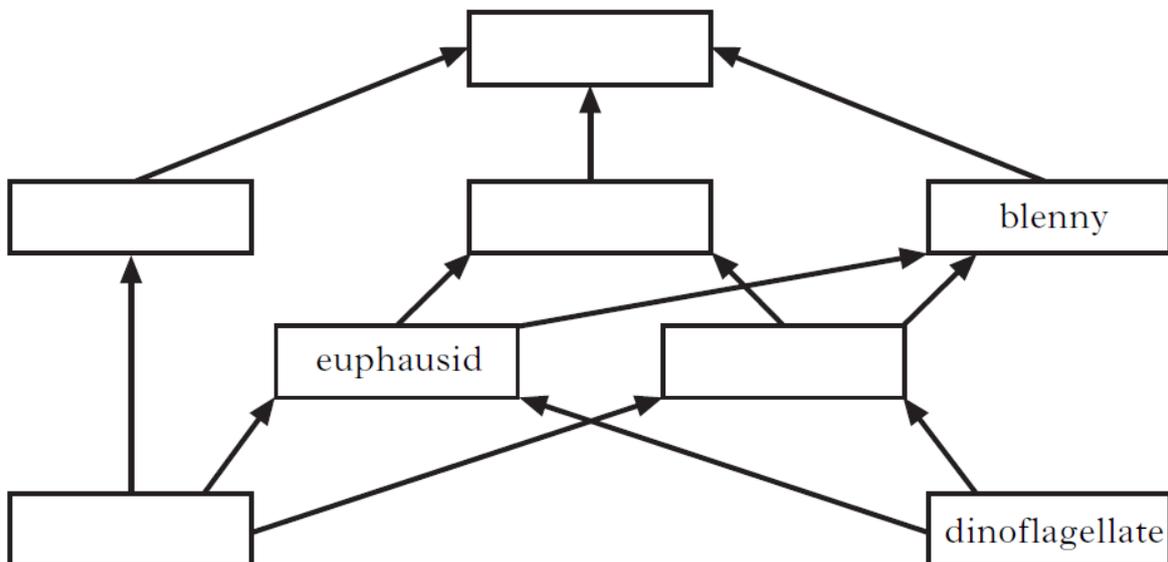
b.   What term is used to describe the snapper in this ecosystem?

c.   A group (pod) of dolphins arrived in the area. Dolphins feed on snappers.

Discuss the effect of the dolphins on the size of the euphausid population.

Question 4 [3 marks]
An investigation to demonstrate the responses of woodlice to light was carried out in a choice chamber. Half of the choice chamber was covered in black paper and the other half left in light. Ten woodlice were introduced into the choice chamber. The number of woodlice in each side was counted every two minutes for ten minutes.
The graph shows the results of this investigation.

Key

X   number of woodlice in each condition
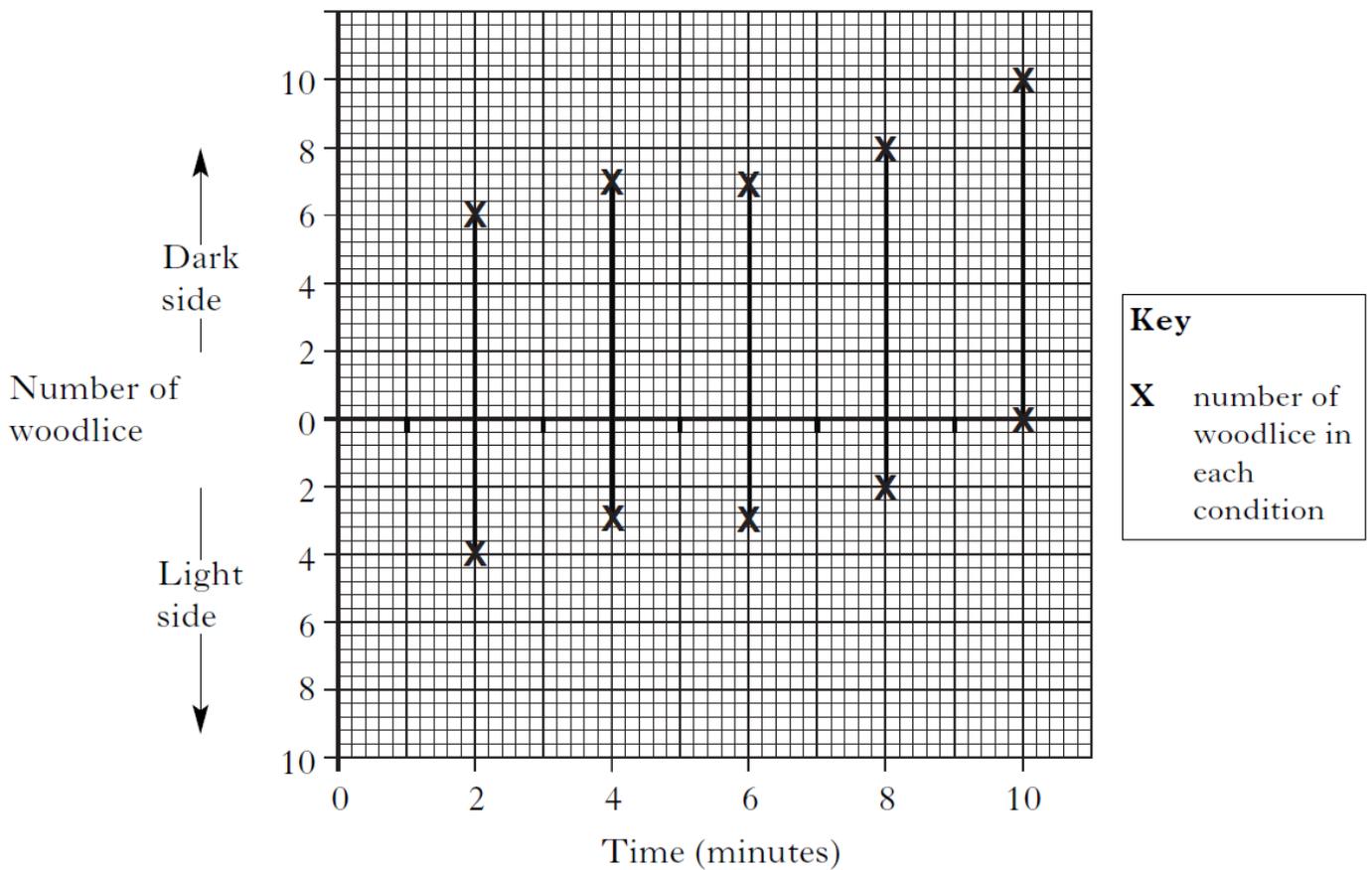
a. Name two environmental conditions that should be kept constant in this investigation.

•
•

b. What conclusion can be made from the results of this investigation?

c. Explain the advantage(s) of this behaviour to the woodlice.

| |
|---|
| |
| |
| |
| |

Question 5 [3 marks]

Some information about four **indicators**, their **colour changes** and the **pH range** over which they change is given below.

Alizarin is an indicator with a colour change from pink to violet over the pH range 11.0 to 13.0. Over the pH range 3.0 to 5.0, congo-red indicator changes colour from blue to red. Both thymol-blue indicator and methyl-red indicator change from red to yellow. The pH range for thymol-blue indicator is 1.2 to 2.8 and for methyl-red indicator it is 4.2 to 6.3.

Present this information as a table with **three** suitable headings.

Question 6 [3 marks]

An insulated wire wrapped around a core and carrying an electric current makes an electromagnet.
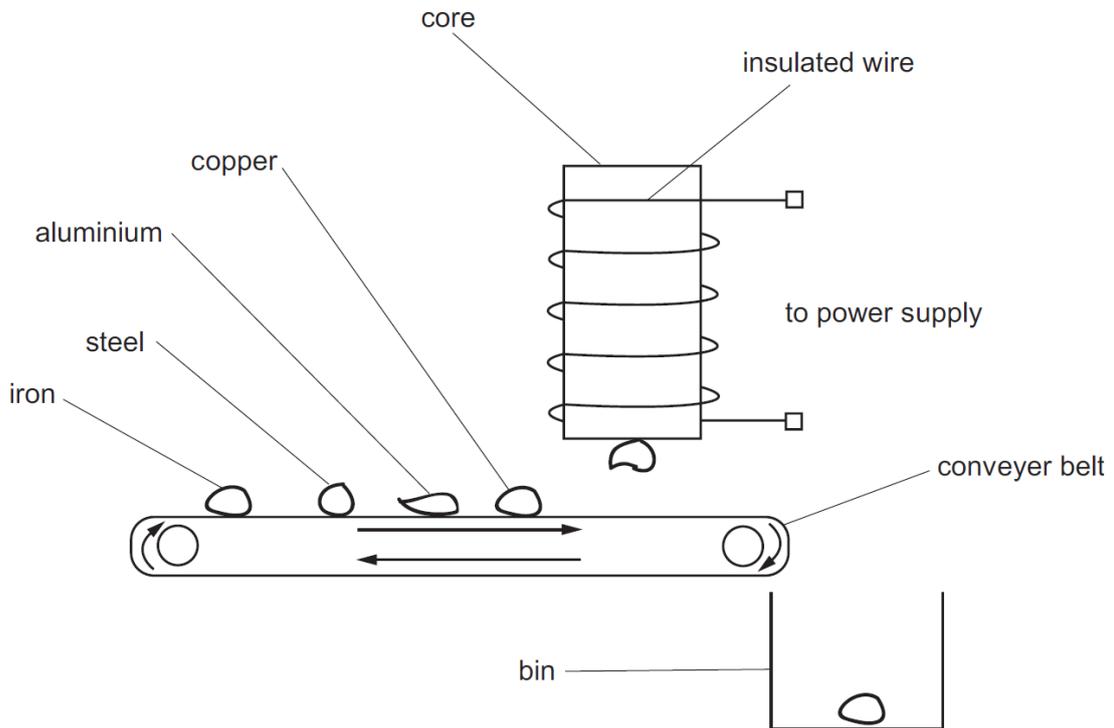
It could be used to sort scrap metal on a conveyer belt.
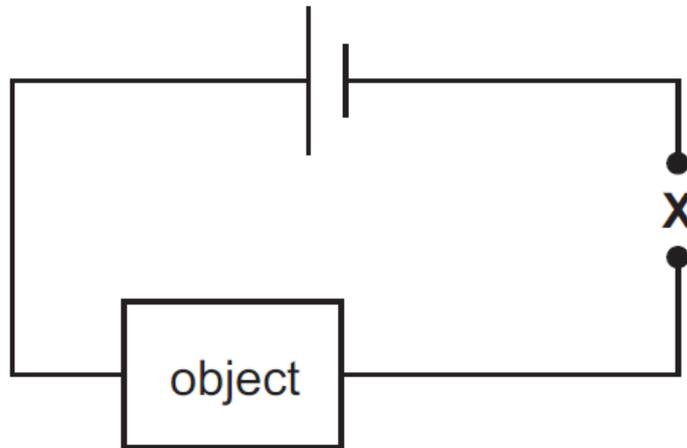
a.   Name a suitable material for the core of the electromagnet. _____

b.   Which of the metals shown would fall into the bin?

c.   When the electric current is switched off the metal sticking to the electromagnet drops off. Explain why this happens.

Question 7 [5 marks]

A boy wants to test various objects to see if they conduct electricity. He sets up the circuit shown below.

a. Name a component which the boy can connect at X to show whether a current passes through the circuit.

b. What word is used to describe an object which does not conduct electricity?

c. The boy uses this circuit to test various objects. **Tick** the box beside each object which conducts electricity.

☐ brass rod   ☐ plastic ruler
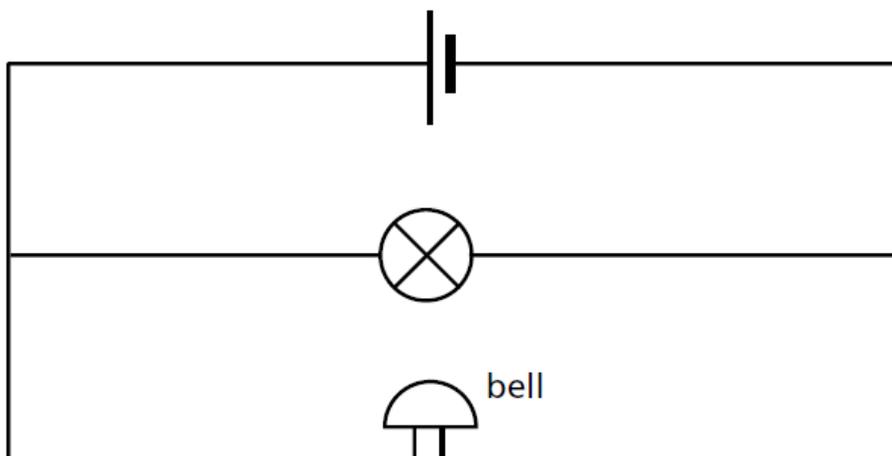
☐ graphite centre from a pencil   ☐ wooden casing from a pencil

☐ piece of rubber tubing

d. Look at the circuit diagram below. Add:

i.   a switch **(label it A)** that will turn the light on and off without affecting the bell

ii. a second switch **(label it B)** that will turn off the light and the bell.

Question 8 [5 marks]

A pupil did an experiment about Hooke's Law. She attached different weights to the bottom of a hanging spring and measured how much longer it got.

Weight force (Newtons)	Length of spring (cm)	Extension (cm)
0	10.0	0.0
1	10.5	0.5
2	11.0	
3	11.5	
4	12.0	
5	12.5	
6	13.0	
7	14.0	
8	15.5	

a.   Complete the table above by filling in the extension column.

b.   Draw a line graph showing the relationship between the **weight force** applied and the **extension** (that you calculated).
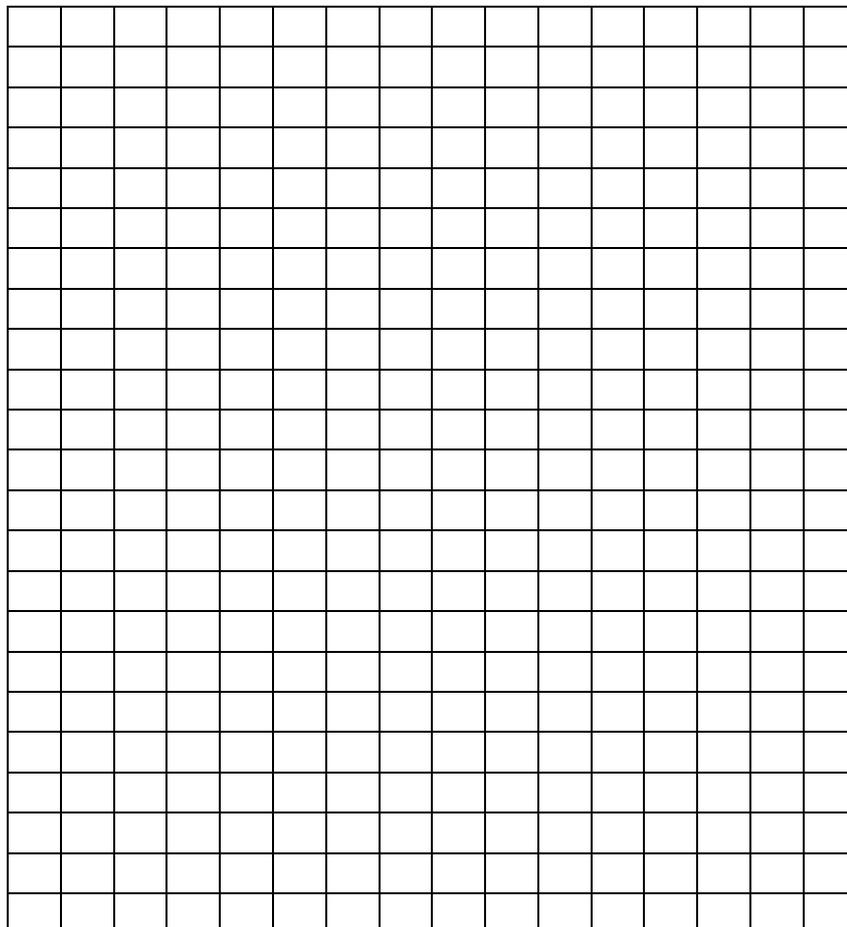
c.   Describe the relationship (pattern) between the weight force applied and extension.

Question 9 [3 marks]

Most plants will grow in most soils, but they grow best in soil with the right balance of nutrients for their particular needs. One important factor influencing soil nutrients is soil pH.
Study this table showing the preferred pH range for different plants.

Plant	Preferred pH range	Plant	Preferred pH range	Plant	Preferred pH range	Plant	Preferred pH range
Beans	6.0–7.5	Carnation	6.0–7.5	Daffodil	6.0–6.5	Sunflower	6.0–7.5
Beetroot	6.0–7.5	Honeysuckle	6.0–7.5	Mint	7.0–8.0	Marigold	5.5–7.0
Cabbage	6.0–7.5	Iris	5.0–6.5	Onion	6.0–7.0	Primrose	5.5–6.5
Cucumber	5.5–7.0	Lavender	6.5–7.5	Bluebell	6.0–7.5	Rhododendron	4.5–6.0
Lettuce	6.0–7.0	Rose	5.5–7.0	Dahlia	6.0–7.5	Tulip	6.0–7.0

a. The garden behind Janine's new flat had lots of marigolds growing in it. Is the soil likely to suit potatoes and carrots? Why/why not?

b. One corner of Adrienne's garden has a thriving crop of mint which has spread from the neighbour's garden. She wants to plant a rhododendron bush there. Is it likely to grow well? Why/why not?

c. Carolyn's garden has a mixture of plants in it, even though the pH ranges shown on the table suggest they will not grow well together. Comment on this.

Question 10 [6 marks]

Read the passage and then answer the questions. You are NOT expected to have studied the Phosphorous Cycle.

The Phosphorus Cycle

Phosphorus is an element which is essential to both plants and animals. It is needed to form molecules of DNA, make cell membranes and release energy in cells. Animals also need phosphorus, along with calcium and vitamin D, to build up strong teeth and bones.

Like the elements carbon and nitrogen, phosphorous is recycled in the environment. Phosphorus is found in rocks. Erosion by rainfall and running water removes phosphorus from rocks. Plants absorb this phosphorus from water in the soil. When animals eat the plants, the phosphorus passes into their bodies. Decomposition of animal waste and dead organisms returns the phosphorus to the soil. The phosphorus can be absorbed again by other plants. However, most of the phosphorus is carried by rivers into the sea; it sinks to the seabed and is lost from the cycle until it forms rocks again.

Too much phosphorus can be an environmental pollutant. Phosphorus fertilisers are washed into rivers and lakes. As a result, the number of water plants increases sharply, and when they die this causes the oxygen level to fall and animals in the water cannot survive.

In humans, too much phosphorus can cause damage to the brain, bones, teeth and kidneys. In the past, some people working in factories who were exposed to high levels of phosphorus developed a disease called "Phossy Jaw". The jaw bone absorbed so much phosphorus that it became swollen and crumbled away. Nowadays, the amount of phosphorus used in manufacturing processes is carefully controlled.

a.   Name the **three** substances animals need to build up strong teeth and bones.

b.   Name **two** elements which, like phosphorus, are recycled in the environment.

c.   Explain why animals cannot survive in lakes which are polluted by too much phosphorus.

d.   Describe what happened to factory workers suffering from "Phossy Jaw".

| |
| |
| |

e.   Use the information to complete the diagram of the phosphorus cycle.

```
        ┌─────────────────┐              ┌─────────────────┐
        │  Phosphorus in  │ ◄─────────── │  Phosphorus in  │
        │     rocks       │              │   _____    │
        └─────────────────┘              └─────────────────┘
  erosion  ╲                                      ▲
            ╲                                      │
             ▼                                     │
   ┌─────────────────┐   decomposition   ┌─────────────────┐
   │  Phosphorus in  │ ◄──────────────── │  Phosphorus in  │
   │    water in     │                   │ animal waste and│
   │  _____   │                   │   _____    │
   └─────────────────┘                   └─────────────────┘
            ╲                                     ▲
  absorption ╲                                    │
             ▼                                     │
   ┌─────────────────┐    eaten    ┌─────────────────┐
   │  Phosphorus in  │ ──────────► │  Phosphorus in  │
   │   _____    │             │     animals     │
   └─────────────────┘             └─────────────────┘
```