| FULL NAME: | SCIENCE TEACHER: (circle code) | 9B |
|---|---|---|

# SCIENCE
# Year 9 Examination 2012
## 9B – 80 marks

**Make sure that you have answered all the questions in this paper before you start pap er 9A or 9C**

***Time allowed for both examinations: 2 hours***

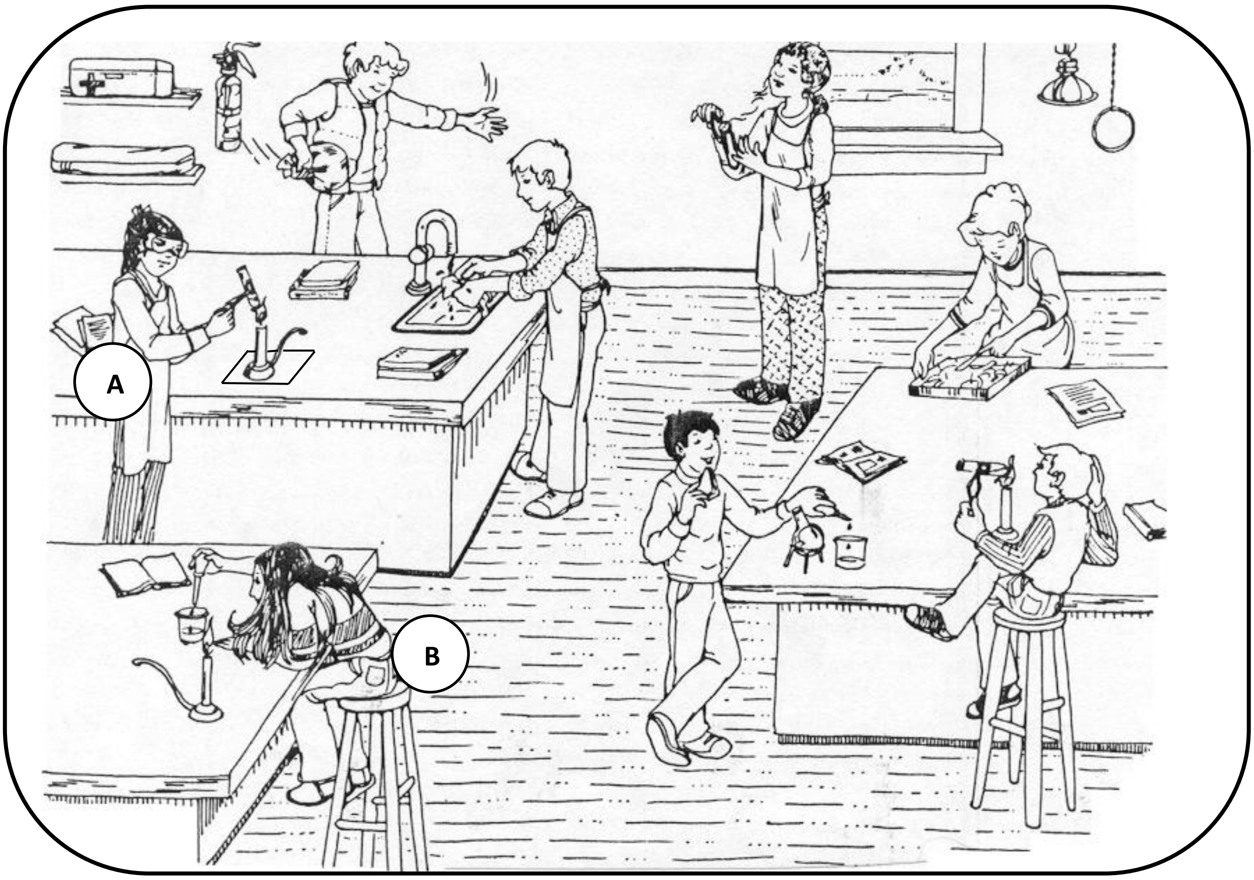
Answer all questions in the spaces provided on the paper.
Show all your working in calculations; marks are awarded for it.
Give units for all answers (e.g. kg or m) unless they are already provided.

***For Teacher Use***

| *Question* | *m/c* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* | *10* | *11* | *12* | *Total* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Marks gained* | | | | | | | | | | | | | | |
| *Marks available* | *40* | *3* | *3* | *5* | *2* | *4* | *4* | *2* | *3* | *4* | *3* | *3* | *4* | *80* |

**Question One: Safety and Equipment [3 marks]**

(a) Practical activities are common in Science lessons.



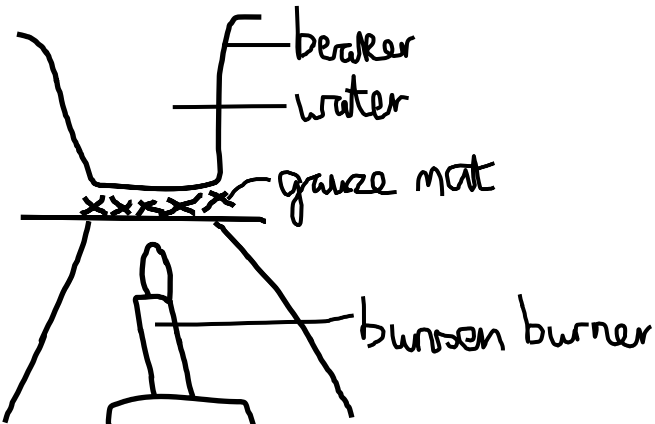

(i) Write down **two** safety rules student A is following. [½ + ½]

| | |
|---|---|
| 1 | |
| 2 | |

(ii) Write down **two** different safety rules student B is **not** following. [½ + ½]

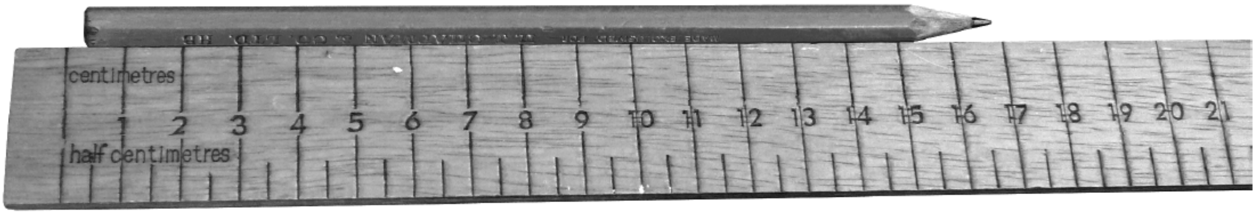
| | |
|---|---|
| 1 | |
| 2 | |

(b) Below is a scientific diagram produced by a Year 9 Science student after doing an experiment.
In the space provided, draw and label a correct **scientific diagram** for the practical. [½ + ½]

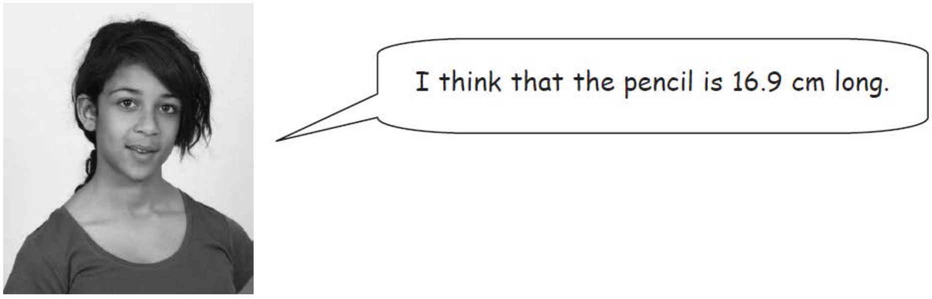


**Question Two: Measurement [3 Marks]**

(a) A student measures the length of a pencil. The photograph shows the arrangement she uses.




The student says….




The student may not be correct.

(i) Use the photograph to estimate the length of the pencil and give its unit. [½ + ½]

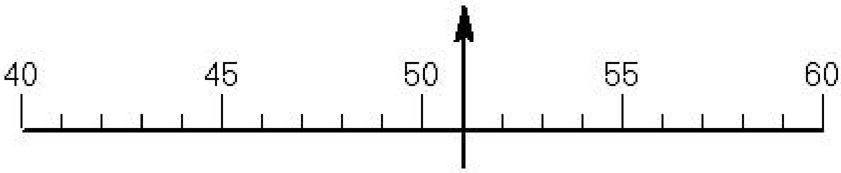
| |
|---|
| |

(ii) Suggest **two** ways that the student could improve the accuracy of this measurement, using only the equipment shown in the photograph. [½ + ½]

| |
|---|
| 1. |
| 2. |

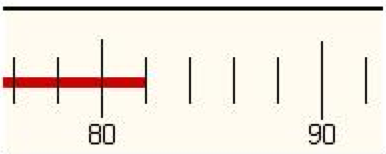
(b) Reading scales

(i) Write the value shown on the scale as a number. You do NOT need units. [½ + ½]




| |
|---|
| |

(ii) Write the value shown on this scale as a number. You do NOT need units.




| |
|---|
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**Question Three: Adaptations and Cells [5 marks]**

Rabbits have long ears and long hind legs; their large eyes are placed on either side of their heads. Their tail is short. Their feet have hairy cushions and large, straight claws. They eat plants. Rabbits live in burrows which they dig with their clawed feet. To make their tunnels, rabbits use their forepaws to loosen the earth, and then kick it back with their powerful hind feet. Rabbits use their hind feet to drum alarm signals to other rabbits when they are attacked. They make occasional low grunts and may scream when attacked.

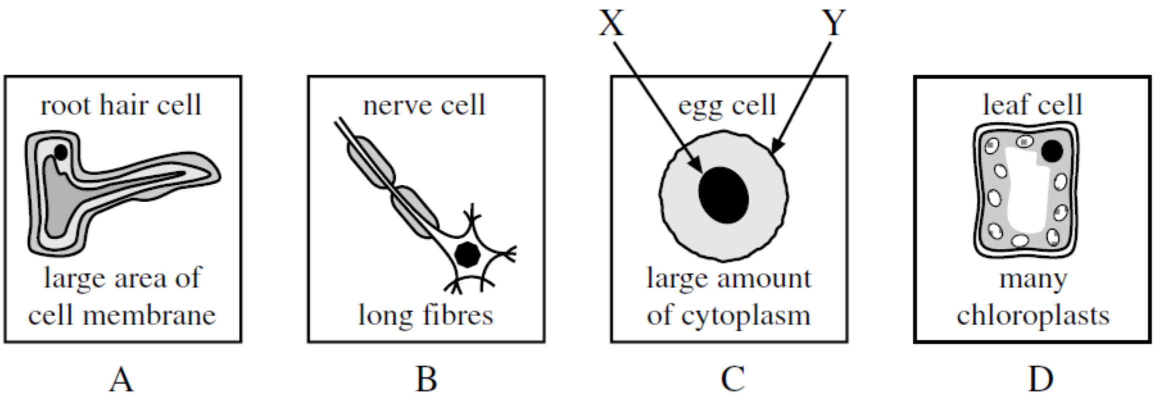
(a) Adaptations may be **behavioural, functional** or **structural**.
What type of adaptations are these? [½ + ½]

| Description of adaptation | Type of adaptation |
|---|---|
| *Their large eyes are placed on either side of their heads.* | |
| *Rabbits use their hind feet to drum alarm signals* | |

(b) Explain how **one** of these adaptations is beneficial to the rabbit. [½ + ½]

Living organisms are made up of building blocks called cells.

(c) Look at the diagrams below of different types of cells.




(i) Which **two** of cells A, B, C and D would be found in a plant? [½ + ½]

(i) Name the parts of the cells shown by the arrows. [½ + ½]

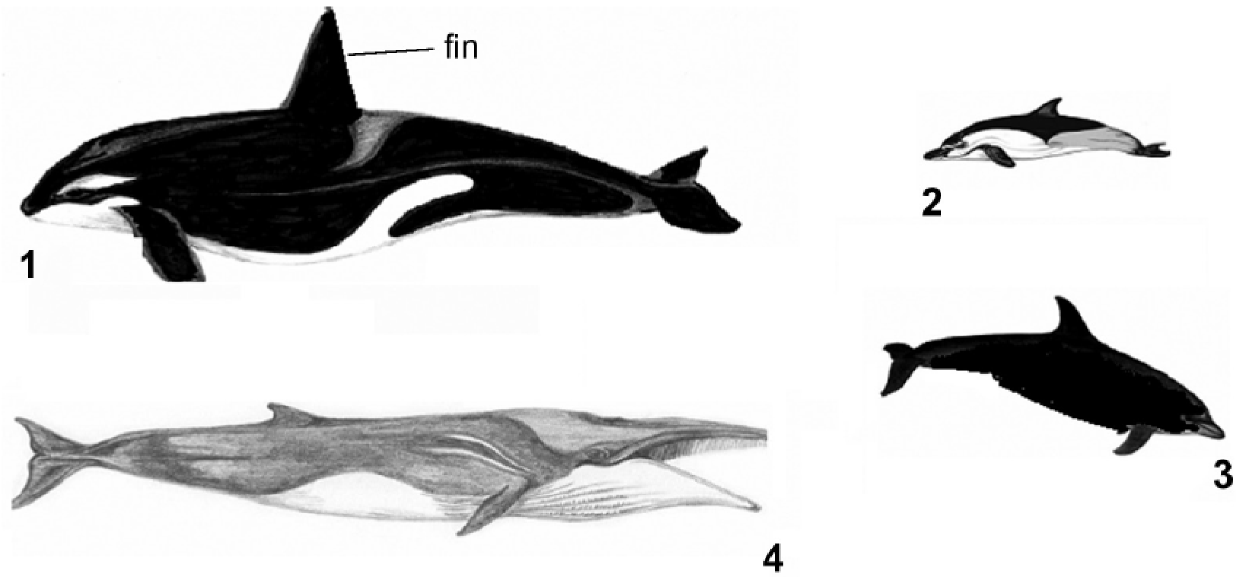
| | |
|---|---|
| X. | Y. |

(iii) Name **one** feature found in plant cells, that is NOT found in an animal cells, and describe what it does (its role). [½ + ½]

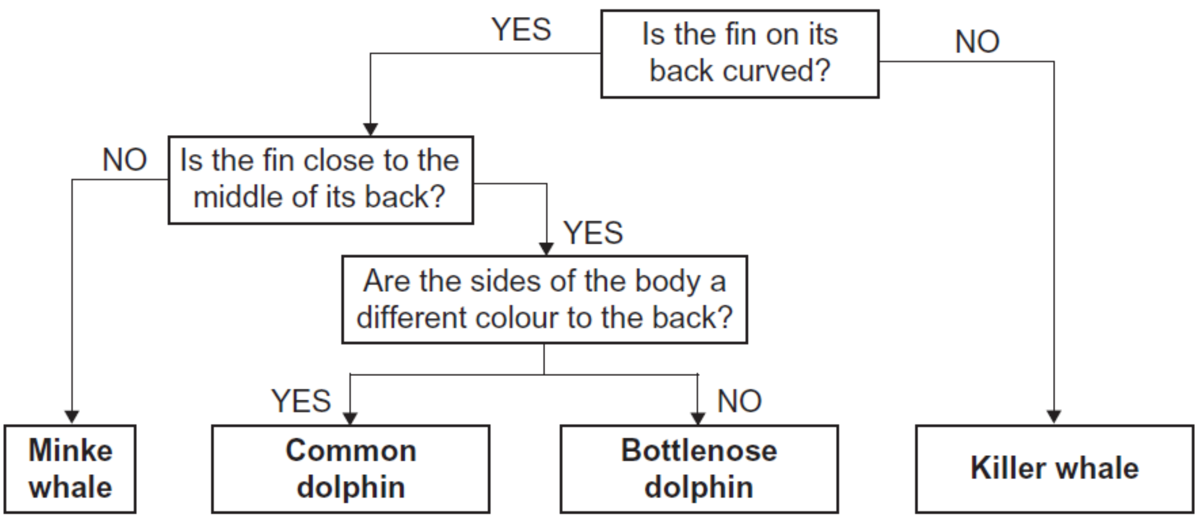
| | |
|---|---|
| Feature: | What it does: |

**Question Four: Classification Key [2 marks]**

Here are some pictures of whales and dolphins.




Identify the animals 1 - 4 using the classification key below. [½ + ½ + ½ + ½]




| Number | Name |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |

**Question Five: Graph Interpretation [4 marks]**

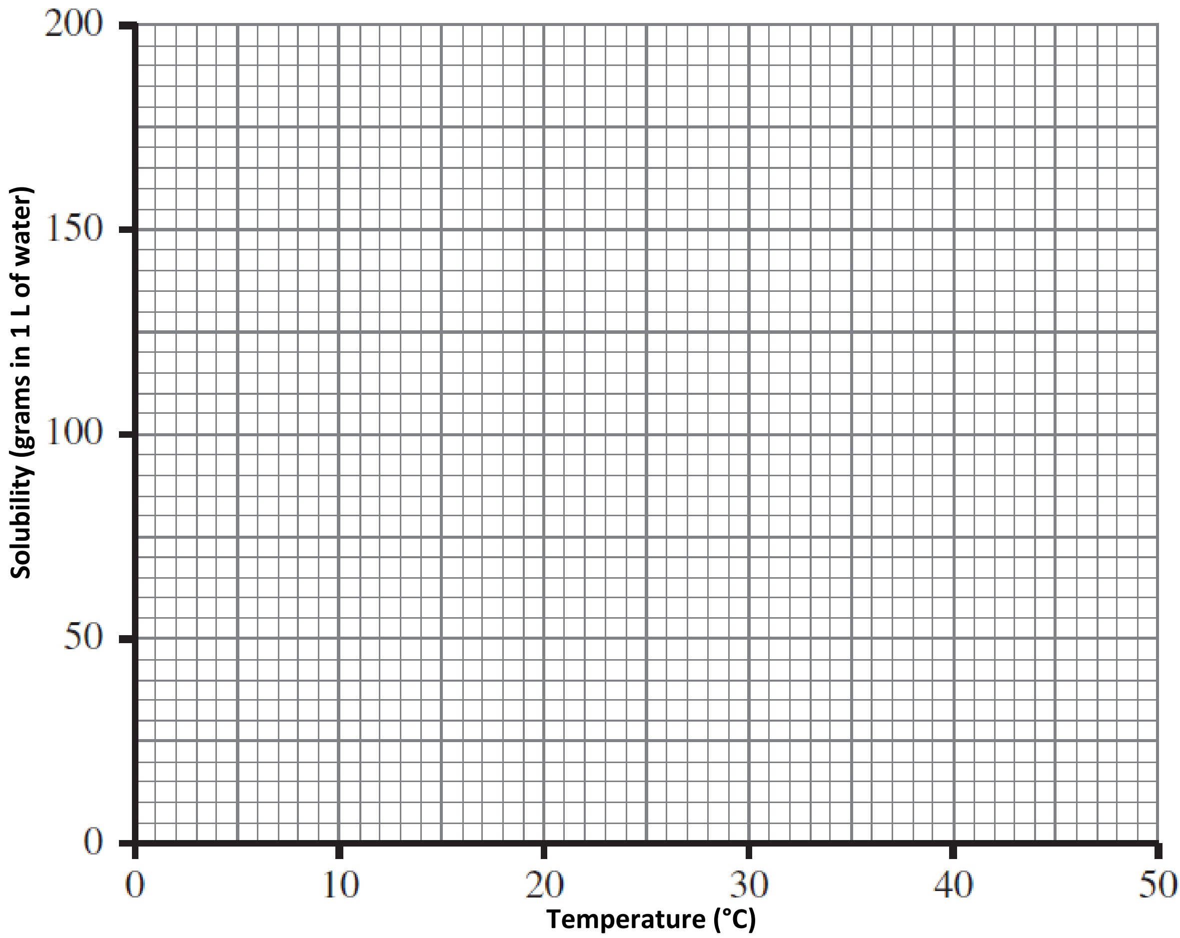
A laboratory technician was investigating how temperature affects solubility.

She measures the solubility of the fertiliser in water at six different temperatures. She measures the mass of the fertiliser that dissolves in 1 litre of water.

Her results are recorded below.

| | | | | | | |
|---|---|---|---|---|---|---|
| Temperature (°C) | 0 | 10 | 20 | 30 | 40 | 50 |
| Solubility (grams in 1 L of water) | 35 | 55 | 70 | 110 | 145 | 195 |

(a) Plot the results as a line graph; Join the points with a smooth curve. [½ + ½ + ½]




(b) Use your graph to estimate the solubility of the fertiliser at 15 °C. ________ g in 1 L of water. [½]

(c) From her results, what effect does increasing temperature have on the solubility of the fertiliser? [1]

(d) How could the technician make the fertiliser dissolve faster in the water? [½ + ½]

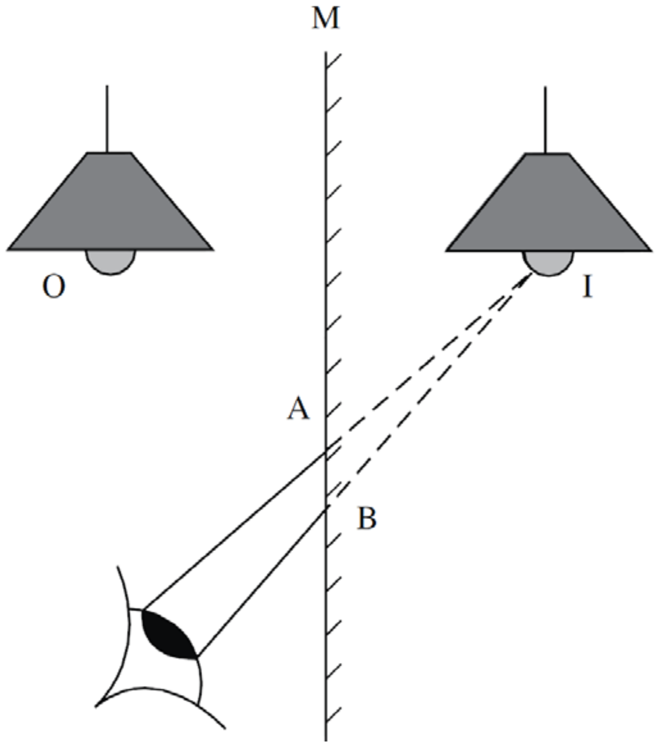
Method:

How/why does this work?

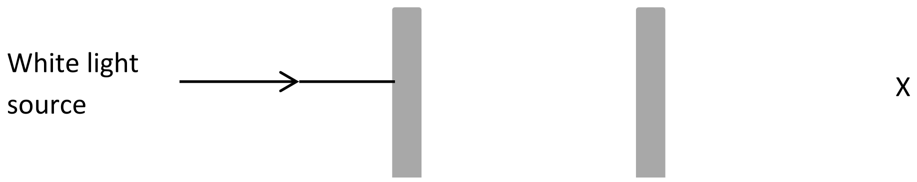
**Question Six: Light [4 marks]**

(a) Complete the diagram to show how the student sees the image (I) in the mirror. [½ + ½ + ½]
You should include:

- normals at points A and B
- two incident rays from the object O to the mirror M
- arrows to show the direction of the incident rays.

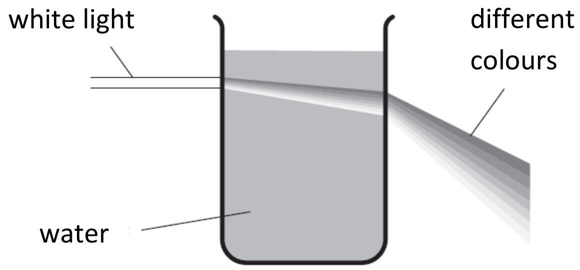



(b) A white light source, a red filter and a blue filter are arranged as shown below. Discuss what would be seen at point X **and** explain your reasons for your answer. [½ + ½ +½]

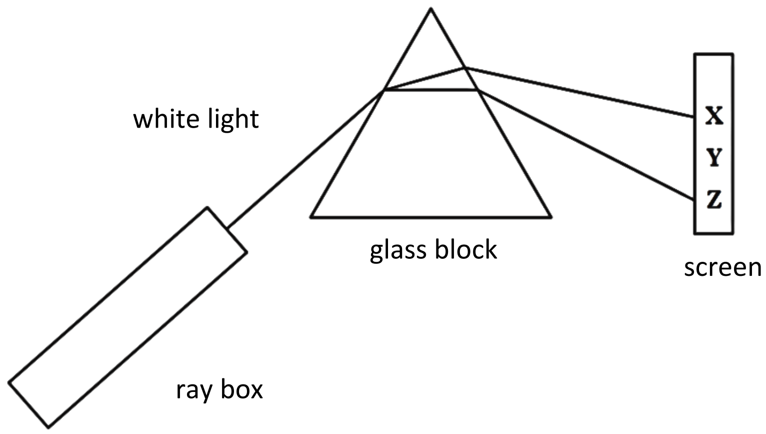



| At X: |
| --- |
| Explanation: |
| |
| |
| |
| |
| |

(c) A student notices that when white light passes through a glass of water it is split into different colours.




The student decides to reproduce this effect in a laboratory using the following equipment.




(i) State the name of the glass block that the student uses to split the light into different colours. [½]

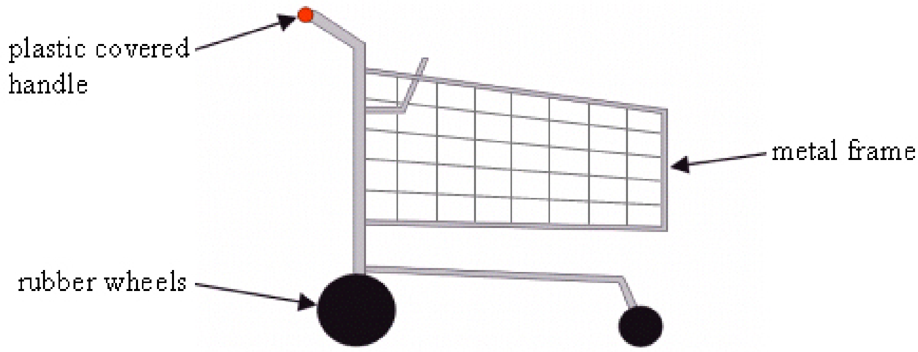
| |
|---|
| |

(ii) Which of the colours violet, red or green would be seen at positions X, Y and Z on the screen? [½]

| | | |
|---|---|---|
| X - | Y - | Z - |

**Question Seven: Properties and Uses [2 marks]**

Here is a labelled picture of a supermarket trolley, showing the materials it is made of.




(a) Discuss why the trolley frame is made from metal. [1]

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

(b) Explain why rubber a suitable material for the wheels. [1]

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

**Question Eight: Elements and compounds [3 marks]**

Phosphorus is a chemical element, with the symbol P. It has 15 protons, 15 electrons and 16 neutrons.

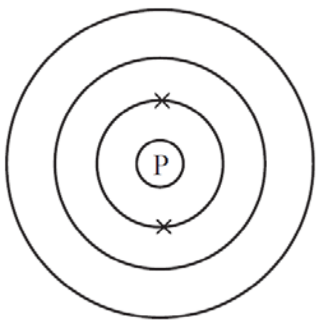
(a) What is the **atomic number** of phosphorous? [½]

| |
|---|
| |

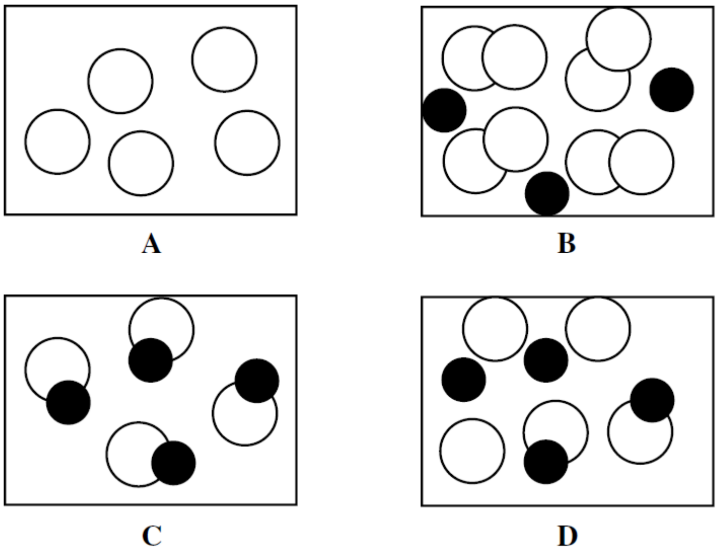
(b) How is the **mass number** of phosphorous calculated? [½]

| |
|---|
| |

(c) Complete the diagram using **x**'s, to show the electron arrangement in an atom of phosphorus. [½]



(d) Here are four diagrams of particles.

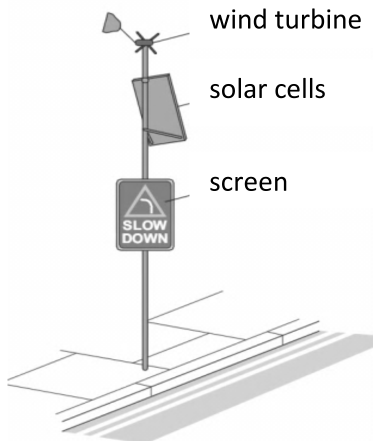



Which of the diagrams above (A - D) represents a compound? Explain your choice. [½ + 1]

| |
|---|
| Diagram: |
| Explanation: |
| |
| |

**Question Nine: Energy [4 marks]**

(a) The diagram shows an electronic road sign.




Match types of energy, A, B, C and D, with the sentences (i) – (iv). [½ + ½]

A electrical energy
B thermal energy
C light energy
D kinetic energy

(i) The useful energy output from the screen is ___ .

(ii) The energy input to the wind turbine is ___ .

(iii) The useful energy output from the solar cells is ___ .

(iv) The wasted energy output from the road sign is ___ .

(b) This task is about matching what we notice about sound to science ideas about sound. *Scientists often start with an idea and then observe carefully to find evidence that their idea might be right.*

Danny's group collected some scientists' ideas about sound. They then wrote down some things they knew or had noticed about sound.

In the boxes beside each piece of evidence write the letter of the science idea that it relates to.

**Scientists' ideas**

| **A** | **B** | **C** | **D** |
|---|---|---|---|
| Sound travels through solids | Sound travels through water. | Sound travels through air. | Sound cannot travel through a vacuum. |

| Evidence | Letter of Science idea |
|---|---|
| Dolphins call to each other while travelling through the water. | |
| We can hear people talking in the room next to us. | and |
| There is no sound in Space. | |
| We can feel the vibrations if a metal pipe are struck by something hard. | |

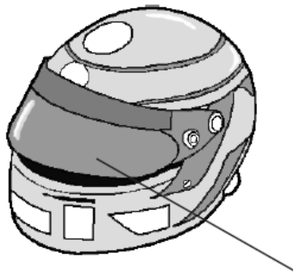
[½ + ½ + ½+ ½]

(c) In a thunder storm, there is the rumble of thunder and a bright flash of light.

(i) What do we "observe" first, the rumble or the flash? [½]

(ii) Use Science ideas to explain your answer to (c)(i). [½]

**Question Ten: Reading information [3 marks]**




*The crash helmets used in motor racing provide maximum protection for the driver's head. They must be designed and manufactured to a higher specification than standard helmets. For example, a motor racing helmet is made from seventeen layers of different materials but a standard helmet has only three layers. Carbon fibre layers are used to make motor racing helmets rigid and light. This minimises stress on the driver's neck. Kevlar layers make the helmet fireproof and polyethylene layers provide protection from impact. Aluminium and titanium layers reinforce the helmet and epoxy resin bonds the layers together.*

*The helmet has a ventilation system, with a filter which removes oil, carbon and brake dust particles from the air. The visor is 3 mm thick and is made from fireproof polycarbonate. It has a chemical tint which automatically adjusts to changing light levels so that the driver is unaffected by the glare of the sun. The helmet also contains a radio which allows the driver to communicate with his team.*

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

(a) How many **more** layers are there in a motor racing helmet than a standard helmet? [½]

(b) How is stress on the drivers neck minimised? [½]

(b) What is the job of the epoxy resin? [½]

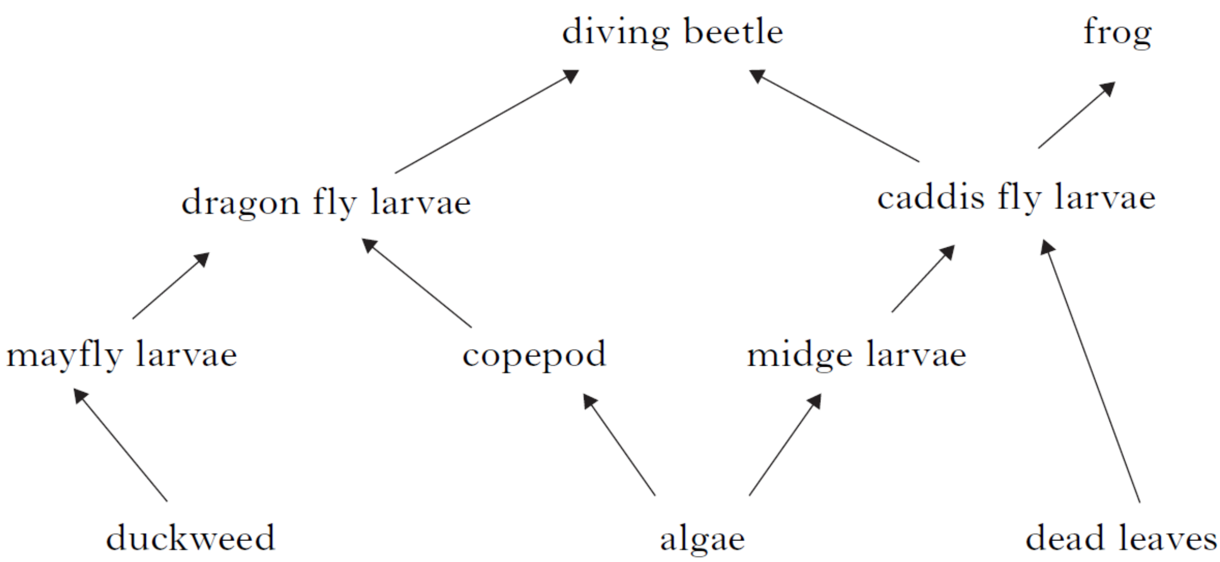
(d) Which material provides protection from impact? [½]

(e) What substances are filtered from the air by the ventilation system. [½]

(f) Why is the polycarbonate material "tinted" with a chemical? [½]

**Question Eleven: Food chains and webs [3 marks]**

The diagram below shows part of a fresh water food web.




(a) What must all food chains **always** start with? [½]

(b) Add the following information to the food web.

- Diving beetles can eat small fish.
- Copepods are eaten by small fish.

[½ + ½]

(c) All of the mayfly larvae die out.

(i) The number of copepods would probably… (Circle the correct answer) [½]

decrease increase stay the same

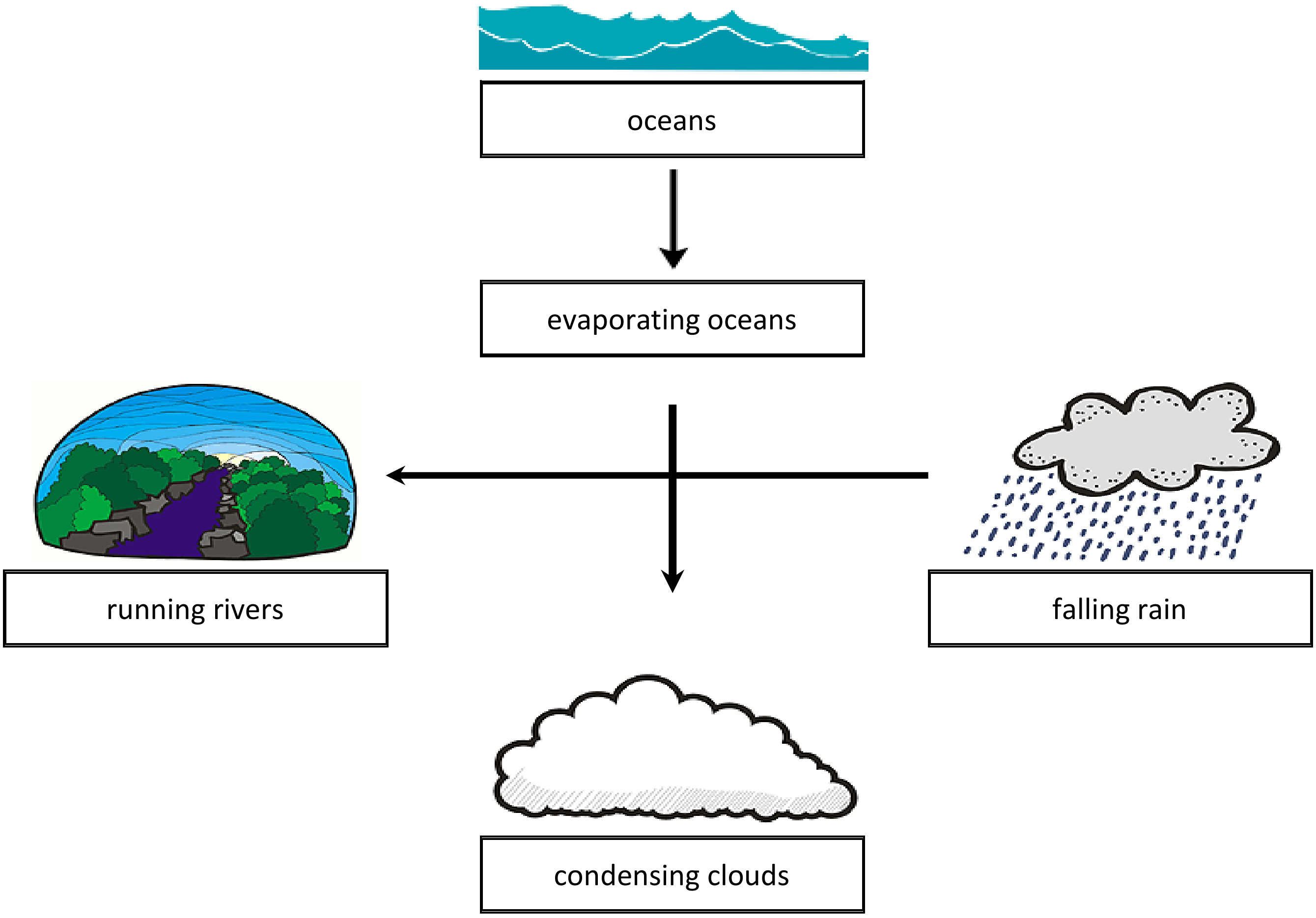
(ii) Explain your answer. [½]

(d) Dead leaves provide energy for the caddis fly larvae and other decomposers. Decomposers break down waste and release substances from it. Which organism from the food web can make use of these substances again? Circle the correct answer. [½]

A algae
B copepod
C dragon fly larvae
D diving beetle

**Question Twelve: Water Cycle [4 marks]**

The diagram below shows the parts of the water cycle




(a) Draw **three more arrows** on the diagram to show the different directions of water movement in the water cycle. Some arrows have already been drawn in for you. [½ + ½]

(b) Explain in detail how the water cycle happens. [1 + 1 + 1]

**Now do Paper A or Paper C**