



Gleniffer High School

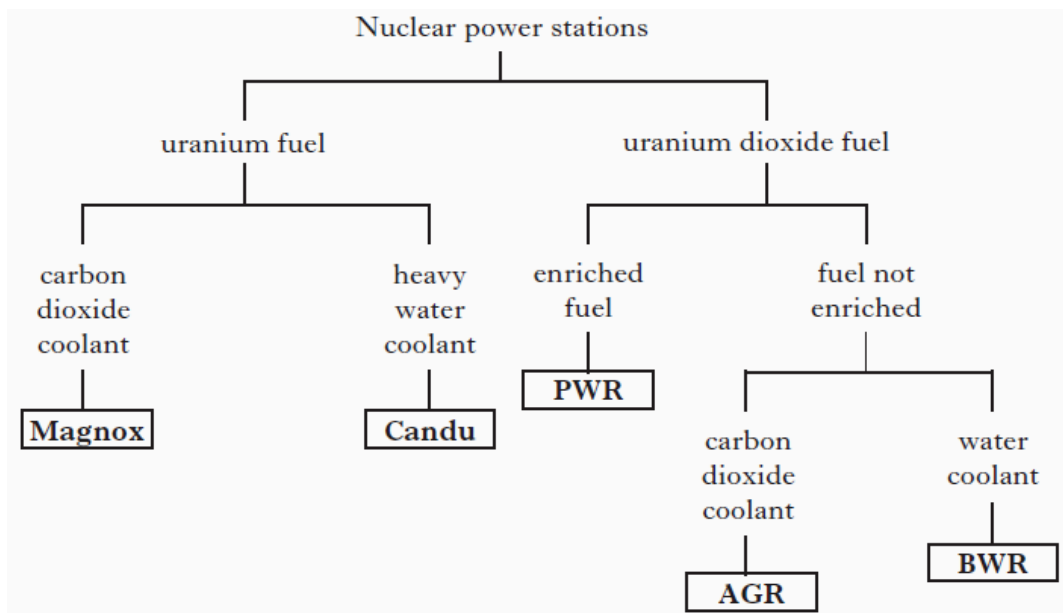


Physics Skills

Paper 3

National 4/5

1. The key below gives information about some nuclear power stations.



a) Give **one** difference between a Candu power station and a Magnox power station.

b) List **all** the information that the key gives about a BWR nuclear power station.

2. The table below shows the generating capacity of four power stations.

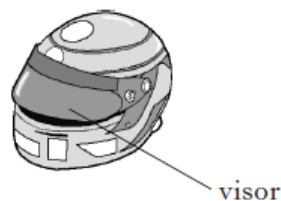
<i>Power station</i>	<i>Generating capacity (MW)</i>
Auchben	660
Benglow	700
Cairnallan	400
Dunvetin	240

a) Calculate the **total** generating capacity of the four power stations.

b) Calculate the percentage of the total generating capacity provided by Cairnallan.

3. Use the information **in the passage** to answer the questions which follow.

The crash helmets used in motor racing provide maximum protection for the driver's head and increase the aerodynamic performance of the car. 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 3mm 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.

- a) How many layers are there in a motor racing helmet?
- b) Explain why the helmet must be rigid and light.
- c) Which material provides protection from impact?
- d) Name **all** the substances filtered from the air by the ventilation system.
- e) Explain why the visor has a chemical tint.

4. Read the following passage about smoking.

There are four countries in the UK. In each **country** some men have **never smoked** and some are **ex-smokers**.

In Wales, 45% of men have never smoked and 28% are ex-smokers. 35% of the male population in Northern Ireland have never smoked with another 37% being ex-smokers.

26% of the male population in Scotland are ex-smokers. In both England and Scotland 41% of men have never smoked. In England 31% of men are ex-smokers.

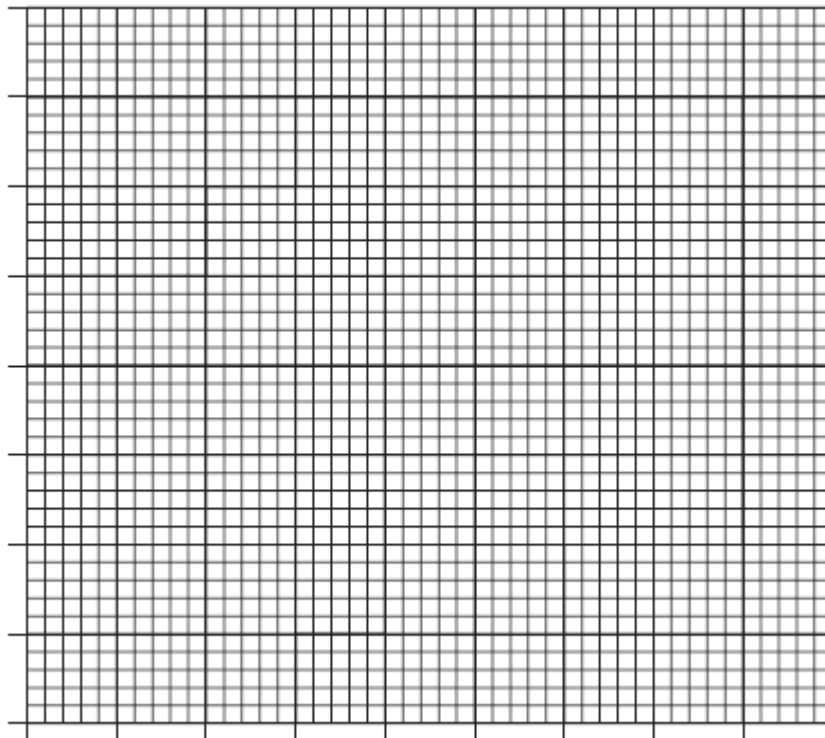
Present the information in **this** passage in a table with suitable headings.

Smoking habits of men in the UK

5. The table below shows information about the average daily use of water by each person in Britain.

<i>Use of water</i>	<i>Volume of water (litres)</i>
toilet	64
bathing	55
laundry	23
cooking	16

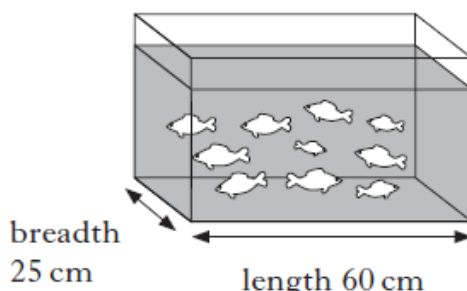
Present the information in the table as a bar graph.



6. The surface area of water in a fish tank can be calculated using the formula shown below.

$$\begin{matrix} \text{surface area} & = & \text{length} & \times & \text{breadth} \\ (\text{cm}^2) & & (\text{cm}) & & (\text{cm}) \end{matrix}$$

Fish tank



- a) Calculate the surface area of the water in the fish tank shown above.

- b) The surface area of water needed for each fish to survive is 50cm^2 . Calculate the **maximum** number of fish that can survive in this fish tank.

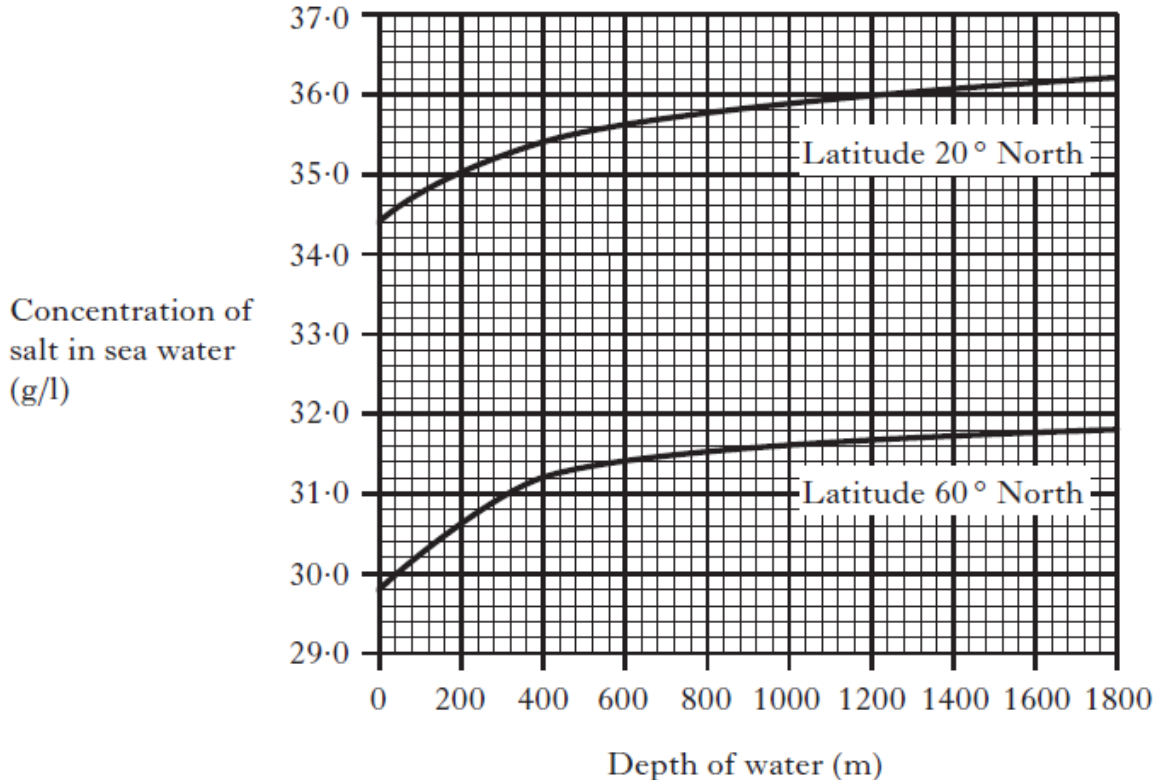
7. Francine set up six experiments. She put 50ml of water at 20°C in each beaker and measured the time taken for the temperature to reach 40°C .

<p>A</p> <p>thermometer</p> <p>glass beaker</p> <p>alcohol</p>	<p>B</p> <p>thermometer</p> <p>copper beaker</p> <p>paraffin</p>	<p>C</p> <p>thermometer</p> <p>glass beaker</p> <p>petrol</p>
<p>D</p> <p>thermometer</p> <p>aluminium beaker</p> <p>alcohol</p>	<p>E</p> <p>thermometer</p> <p>aluminium beaker</p> <p>petrol</p>	<p>F</p> <p>thermometer</p> <p>glass beaker</p> <p>paraffin</p>

- a) Which **two** experiments should Francine compare to find out if paraffin or alcohol heats water more quickly?

- b) Francine compared the results of experiments C and E. **Predict** what she was trying to find out.

8. The graph shows the concentration of salt in sea water at two different latitudes.



a) **From the graph**, select the concentration of salt found in sea water at a depth of 200metres and latitude of 20° North.

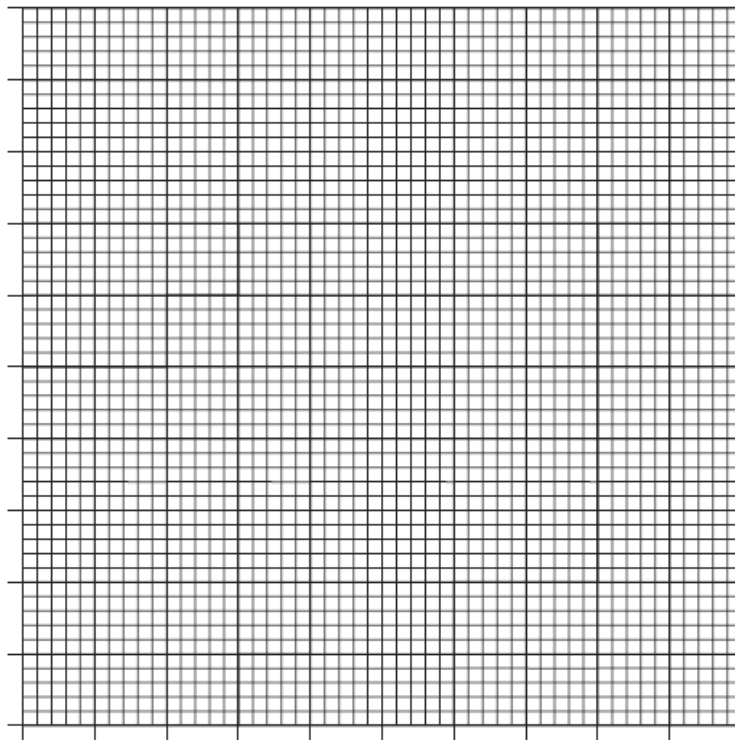
b) When the concentration of salt in sea water is 31.4g/l, from the graph **select** the depth of sea water at latitude 60°North?

c) State and **explain two** conclusions that can be drawn from the information in the graph.

9. An engineer measured the strength of concrete while it was setting. Her results are shown below.

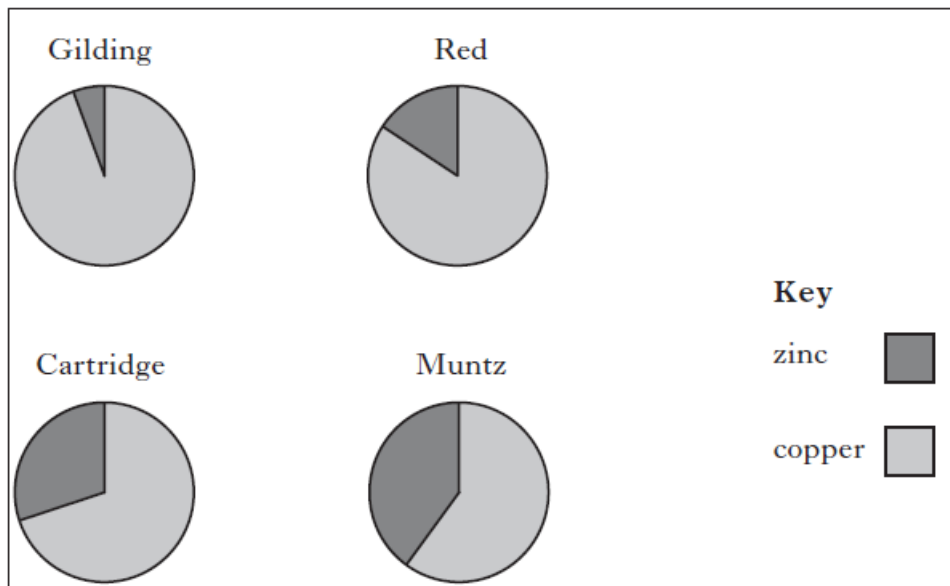
<i>Time (days)</i>	0	5	10	15	20	25
<i>Strength (MPa)</i>	0	10	16	20	22	22

a) Draw a line graph to show these results.



- b) The engineer found that a sample of concrete had strength of 15MPa. **Predict** how long the sample of concrete had been setting.

10. The pie charts show the composition of different types of brass.



The table below shows some of the properties of the different types of brass.

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<i>Type of brass</i>	<i>Tensile strength (MPa)</i>	<i>Hardness (units)</i>
Gilding	245	52
Red	280	64
Cartridge	357	72
Muntz	378	80

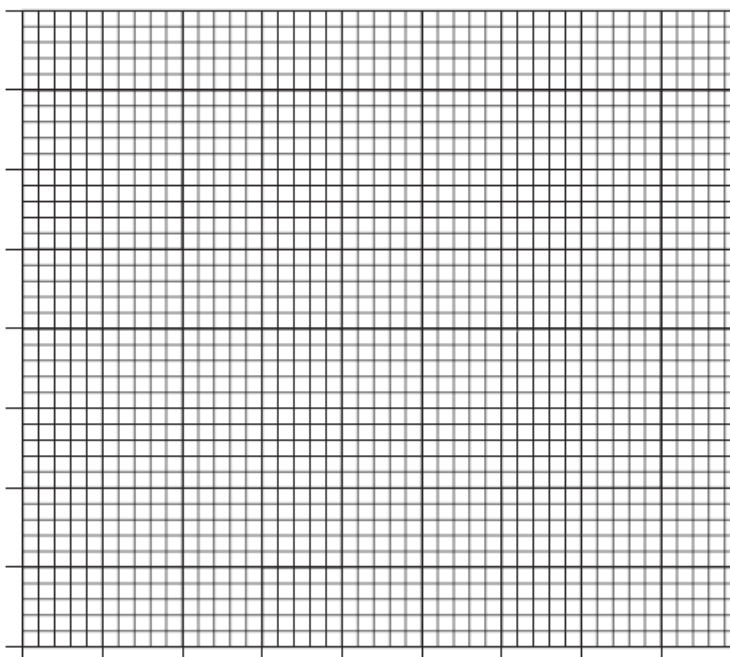
a) What **conclusion** can be drawn about the composition of brass and its hardness?

b) **Predict** the tensile strength of brass which contains 75% copper.

11. The table shows the oil production from three North Sea oilfields in the years 2004 and 2006.

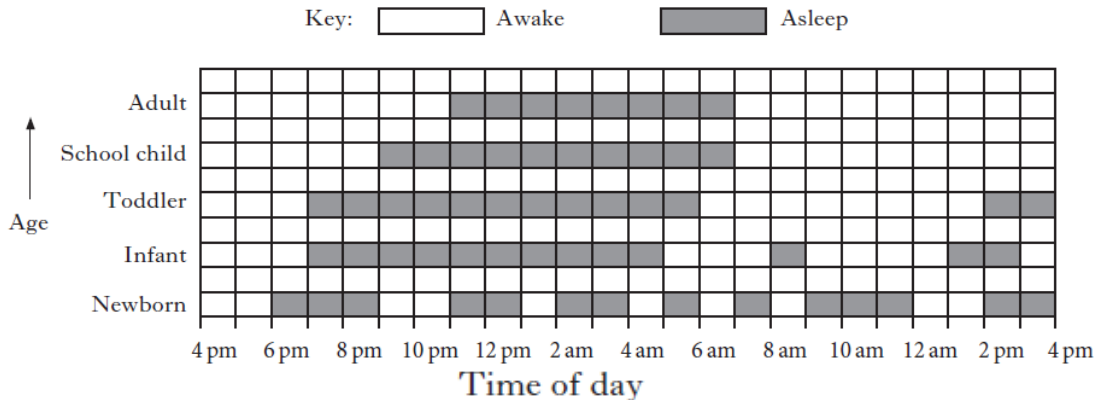
<i>Oilfield</i>	<i>Oil production (thousands of tonnes)</i>	
	<i>2004</i>	<i>2006</i>
Buchan	370	320
Thistle	180	160
Tartan	175	105

a) Construct **one** bar graph to show all the information in the table.



b) Calculate the percentage **decrease** in oil production in the Tartan oilfield between 2004 and 2006.

12. As humans get older their sleep patterns change.
The chart below shows sleep patterns over a 24 hour period for five people.



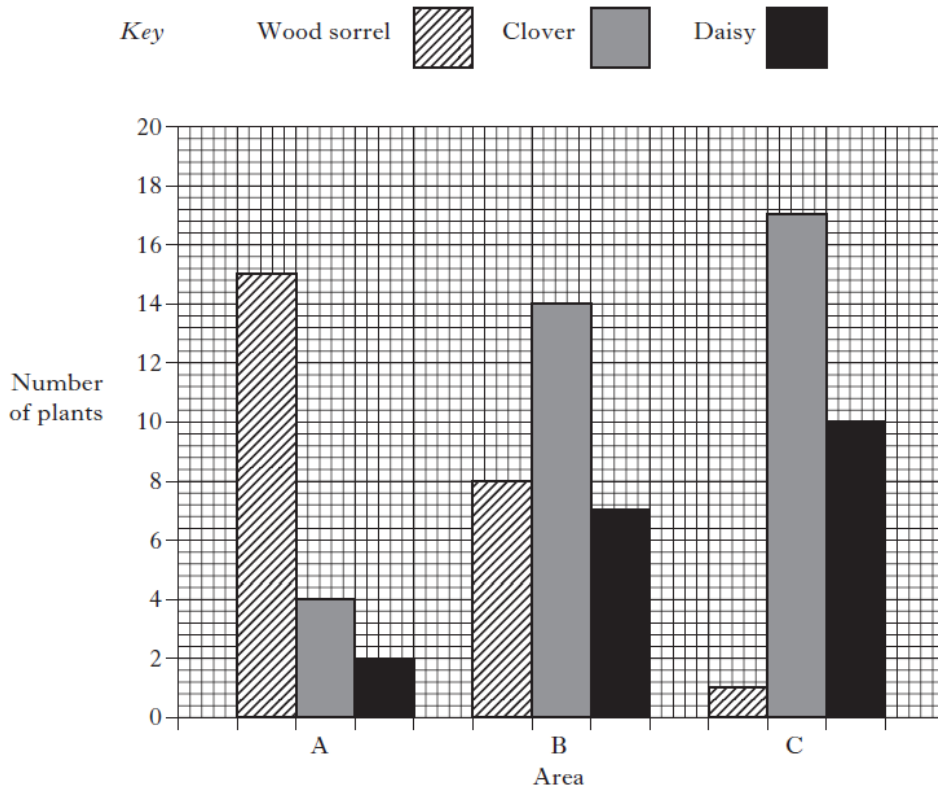
- a) Which person has the longest continuous period of sleep?
- b) Which person sleeps for a total of ten hours?
- c) Which **two** people are awake between 2pm and 4pm?
- d) The infant has the same sleep pattern everyday for one week.
Calculate the **total** number of hours of sleep the infant gets in this week.

13. The table below shows the percentage of men and women being treated for heart disease.

Age range (years)	Percentage being treated for heart disease (%)	
	men	women
45 – 54	3	1
55 – 64	9	5
65 – 74	17	11
75 – 84	20	16

- a) Draw **two** conclusions from the information in the table.
- b) In a sample of 250 women aged 75-84 years, **calculate** how many are being treated for heart disease.

14. A group of students investigated the effect of light intensity on the numbers of wild plants in a woodland. They counted the numbers of wood sorrel, clover and daisies in areas A, B and C. For each area they recorded the light intensity. The results are shown in the bar graph and table below.



<i>Area</i>	<i>Light intensity (units)</i>
A	5
B	10
C	15

- a) Draw **two** conclusions using information from both the bar graph and the table.

- b) What is the light intensity in the area with the highest total number of plants?

- c) **Predict** the number of wood sorrel plants in an area which has a light intensity of 7 units.