# Gleniffer High School

# Physics Skills

# Paper 4

# National 4/5

1. Electrical appliances have different power ratings.

| *Appliance* | *Power rating* |
|---|---|
| Light bulb | 20 W |
| Microwave oven | 0·8 kW |
| Computer | 300 W |
| Vacuum cleaner | 1·7 kW |

Which appliance costs most to operate for one hour? _____

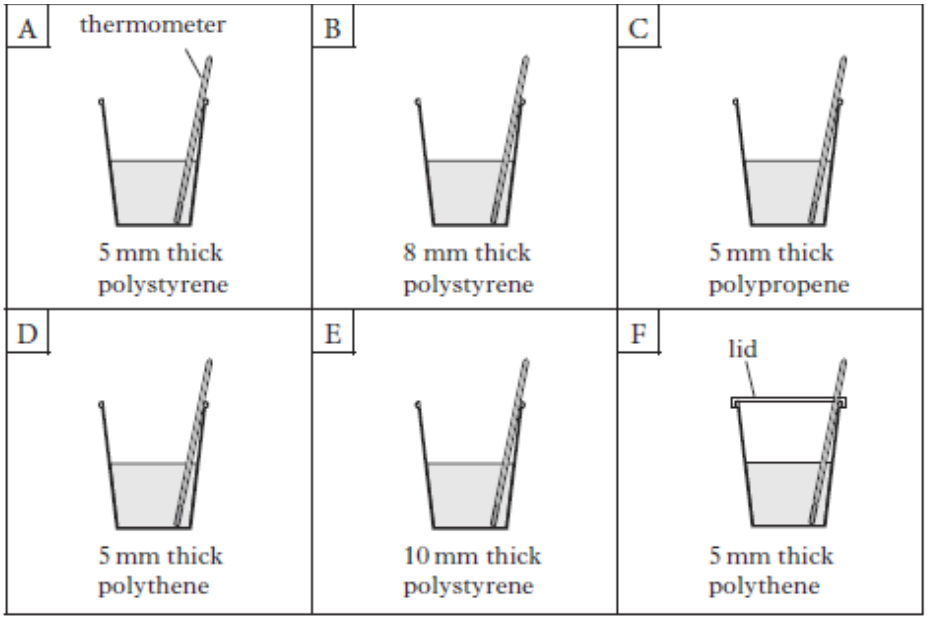
2. Read the following passage:

> **Minerals** are needed by the body to prevent **deficiency diseases**. Different **food sources** can supply these minerals in a healthy diet.
>
> The mineral calcium is needed to help prevent a deficiency disease called rickets. Milk is a good food source of calcium. Anaemia is the deficiency disease caused by having a lack of iron in the diet. Red meat is a good food source of this mineral. Insufficient iodine in the diet can cause the deficiency disease known as goitre. Seafood is a good food source of the minerals iodine and fluorine. A diet which is low in fluorine is a cause of osteoporosis.

Present this information in a table with suitable headings.

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

3. Hamish investigated heat loss from different cups, each containing 100ml of hot water.

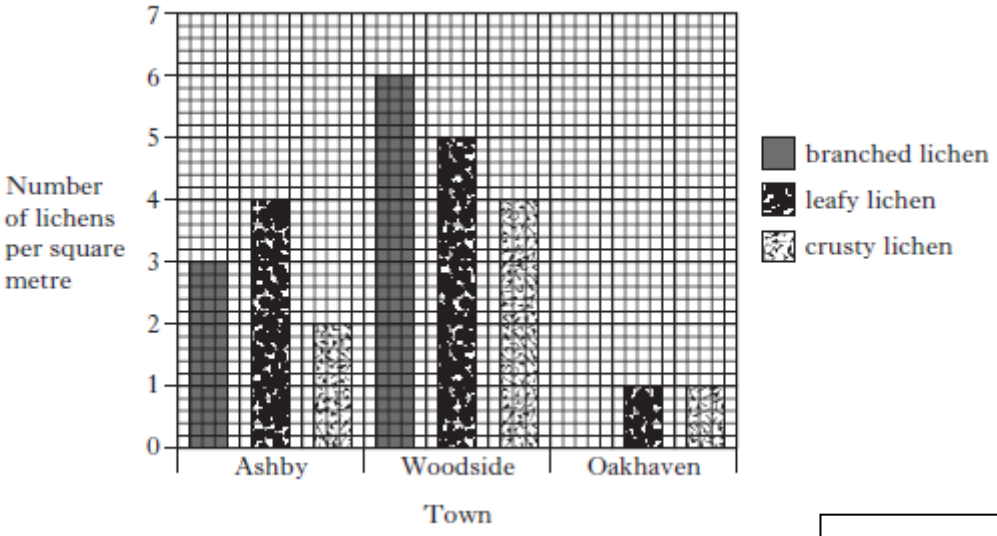


a) Write down the letters of the two experiments which should Hamish use to compare the heat loss from polystyrene cups and polythene cups?

b) Predict what Hamish would be trying to find out if he compared experiments A, B and E?

c) To make the investigation fair, Hamish used the same volume of water in each container. Name another factor that he should keep the same.

4. The graph below shows the number and type of lichens found on trees in three towns.




a) In which town were there 4 leafy lichens per square metre?

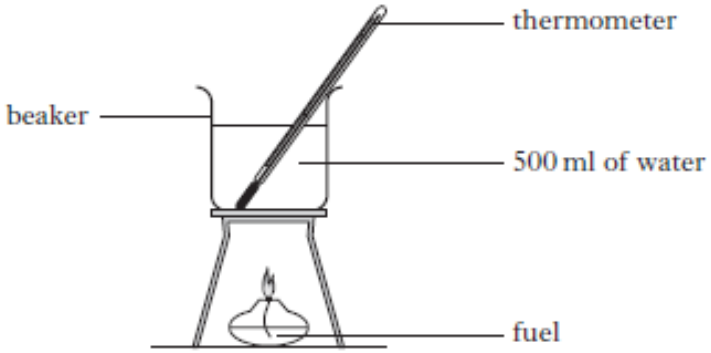
b) Calculate the total number of lichens per square metre in Woodside.

5. The fuel economy of a new car was tested. The results are shown in the table below.

| Location | city | motorway | country | main roads | suburbs |
|---|---|---|---|---|---|
| Fuel Economy (litres per 100km) | 8.5 | 6.4 | 7.3 | 7.1 | 8.2 |

Calculate the average fuel economy of the car.

6. The apparatus below is used to compare the best heat output from different fuels.
The increase in water temperature was measured for each fuel.




The results are shown in the table.

| *Fuel* | *Mass of fuel burned* (g) | *Increase in water temperature* (°C) |
|---|---|---|
| methanol | 1 | 4 |
| methanol | 2 | 8 |
| ethanol | 1 | 5 |
| ethanol | 2 | 10 |
| propanol | 1 | 6 |

a) **Predict** the increase in water temperature when 5g of ethanol are burned.

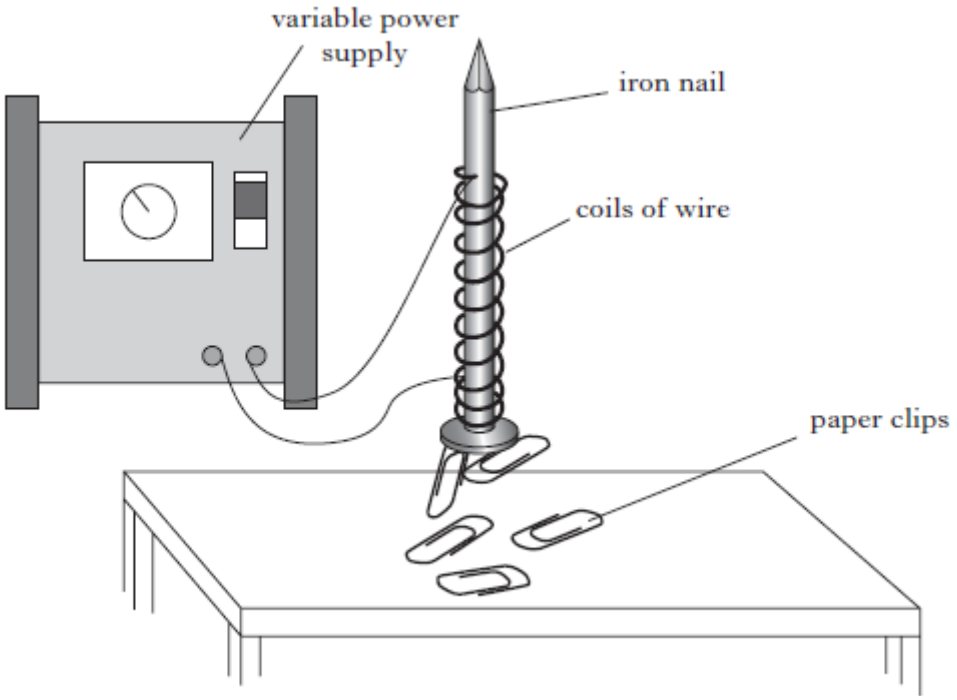
b) When 3g of a fuel are burned the water temperature increases by 18°C.
**Select** which fuel is being burned?

c) **Predict** how much methanol is burned to increase the water temperature by 10°C.

7. David and Julie investigated factors affecting the strength of an electromagnet.

They made an electromagnet by wrapping wire round an iron nail and connecting the wire to a variable power supply set to 2V.

They measured the strength of the electromagnet by counting the number of paper clips it could lift.




Their results are shown below.

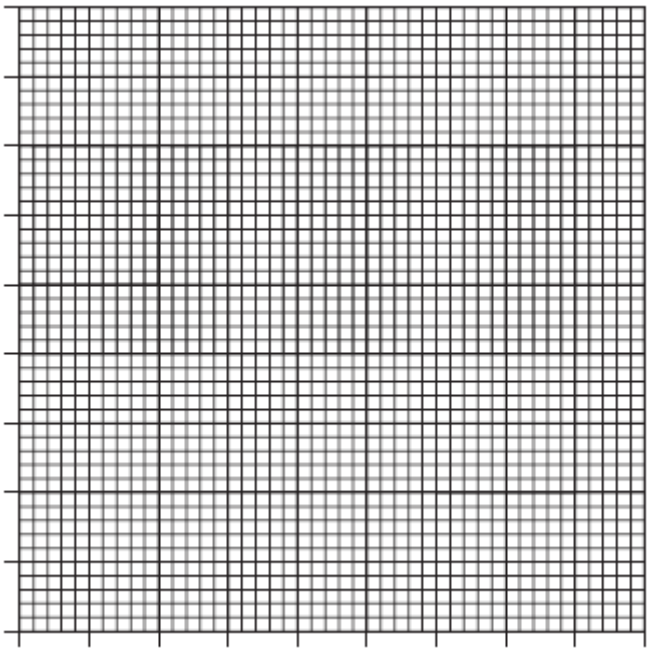
| *Number of coils of wire* | *Number of paper clips lifted* |
|---|---|
| 10 | 2 |
| 15 | 3 |

The investigation could be improved.
Suggest **two** ways to improve the reliability of the investigation.

8. The table gives information about three planets.

| *Planet* | *Distance from the Sun* (millions of km) | |
|---|---|---|
| | *Minimum* | *Maximum* |
| Mercury | 48 | 70 |
| Venus | 108 | 110 |
| Earth | 148 | 154 |

a) Construct a single bar graph to show **all** the above information.



b) Calculate the **minimum** distance between Mercury and Venus.

c) Calculate the **maximum** distance between Venus and Earth.

9. To measure the water speed in a local river, Brian timed how long it took for a piece of wood to travel 100 metres. He carried out the experiment five times.

His results are shown in the table.

| Experiment Number | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Time Taken (s) | 41 | 39 | 42 | 37 | 41 |

a) Calculate the **average** time taken to travel 100 metres.

b) Use your answer to part a) to calculate the **average** water speed for the 100 metres.

c) Further downstream the average water speed was 2.0 $ms^{-1}$.
**Predict** the average time taken to travel 100 metres in this part of the river.

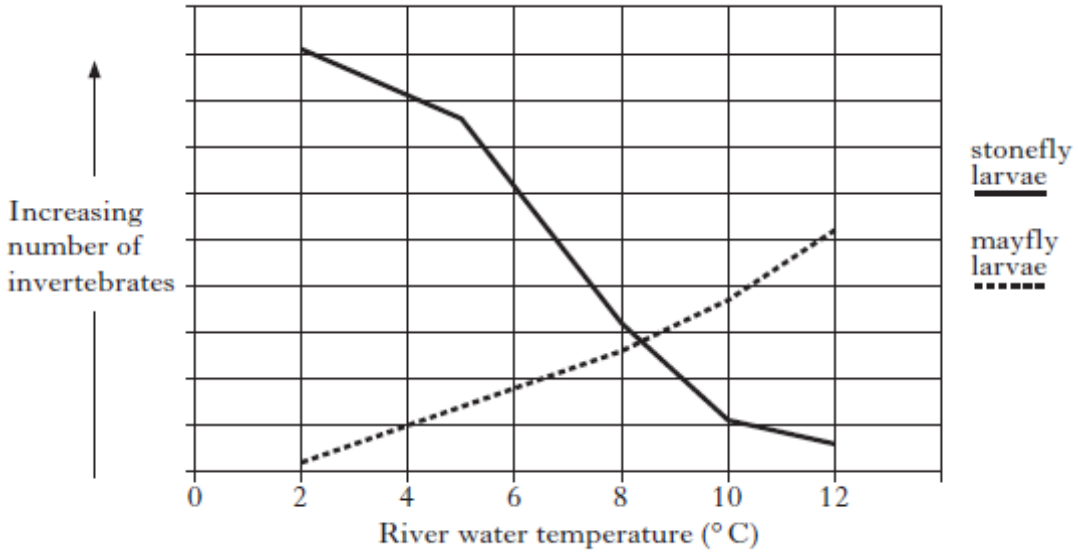
10. The table below shows the solubility of carbon dioxide gas in water at different temperatures and pressures.

| *Temperature* (°C) | *Solubility of carbon dioxide* (g/100 g of water) | | |
|---|---|---|---|
| | Pressure 1·0 atm | Pressure 1·3 atm | Pressure 1·5 atm |
| 10 | 225 | 325 | 380 |
| 20 | 180 | 300 | 365 |
| 30 | 135 | 275 | 350 |
| 40 | 105 | 255 | 335 |
| 50 | 85 | 240 | 320 |

a) Draw **two** conclusions from the information in the table.

b) **Predict** the solubility of carbon dioxide when the pressure is 1.4 atm and the temperature is 20°C.

11. The effect of river water temperatures on the numbers of two invertebrates is shown in the graph.

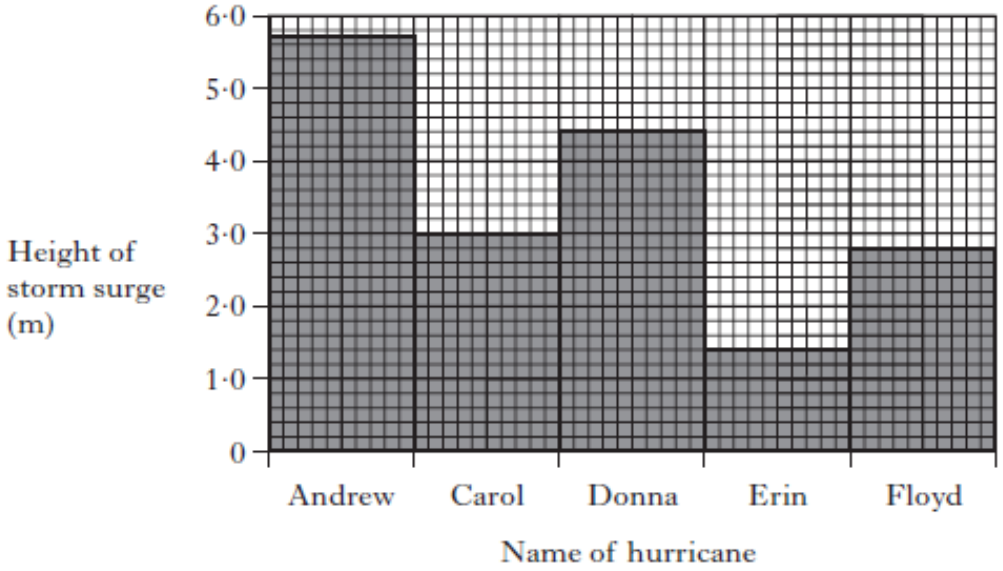



Draw **two** conclusions from these results.

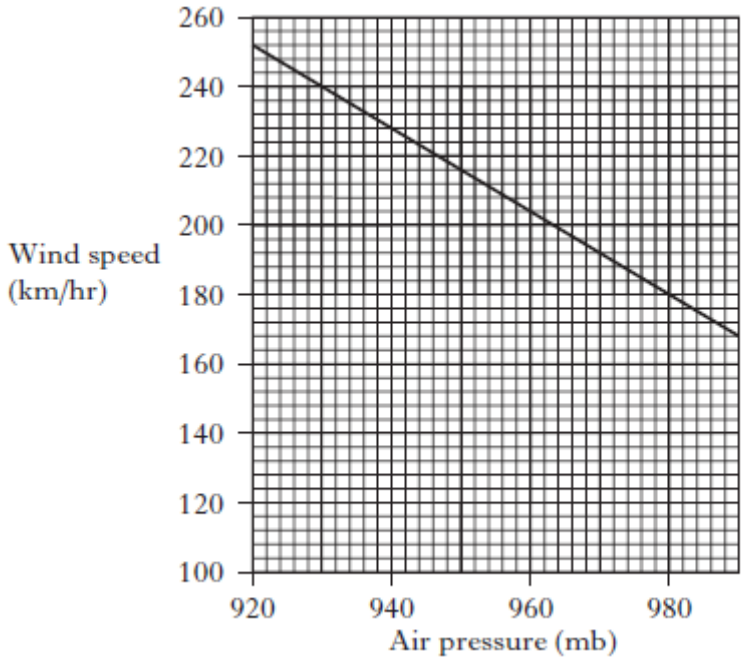
12. The table below gives some information about hurricanes.

| *Category of hurricane* | *Height of storm surge* (m) | *Wind speed* (km/hr) | *Damage to houses* |
|---|---|---|---|
| 1 | 1·2 to 1·7 | 120 to 154 | none |
| 2 | 1·8 to 2·6 | 155 to 179 | light |
| 3 | 2·7 to 3·9 | 180 to 209 | moderate |
| 4 | 4·0 to 5·5 | 210 to 249 | severe |
| 5 | more than 5·5 | 250 or more | very severe |

The bar graph below shows the height of the storm surge for some hurricanes.




The line graph shows how the wind speed of a hurricane is related to the air pressure.




Use all of the information on hurricanes to answer the following.

a) What is the height of the storm surge from hurricane Floyd?

b) What damage to houses was caused by hurricane Floyd?

c) What was the air pressure when hurricane Floyd's wind speed was 180km/hr?

d) What damage to houses was caused by hurricane Erin?

e) Name the hurricane with air pressure of 920 mb.