



Gleniffer High School

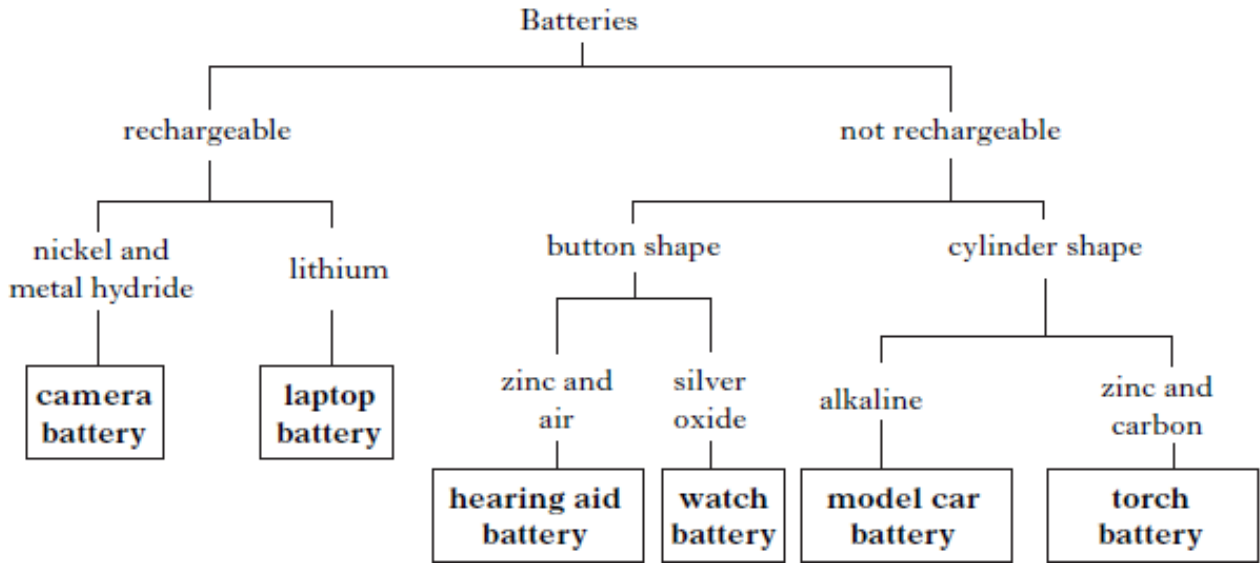


Physics Skills

Paper 2

National 4/5

1. The key below gives information about some batteries.



Use the information in the key to answer these questions.

a) What type of battery is rechargeable and contains lithium?

b) List **all** the information the key gives about a watch battery.

2. The cost of using an electric convector heater depends on its power rating.



The following information was found on the rating plate of the heater.

Model	499002
Watts	2500 W
Volts	230 V
Fuse	13 A
Serial no	42-399-133
Made in the UK	

What is the power rating of the heater?

3. The table below shows the speed of an athlete at different distances along a race track.

Distance (m)	10	20	30	40	50
Speed (kmh ⁻¹)	17	27	31	32	33

Calculate the **average** speed of the athlete.

4. Different types of coal have different moisture content. The heat output depends on the type of coal.

Anthracite coal has a moisture content of 15%. The heat output of anthracite is 9kW/kg. Bituminous coal has a higher moisture content of 20% and gives out 7.5kW/kg. The heat output of lignite coal is 6kW/kg and it has a moisture content of 30%. Brown coal has the lowest heat output, 5kW/kg, and at 45%, it has the highest moisture content.

Show the information above in a table with three suitable headings.

5. Grant investigated the strength of a model bridge.

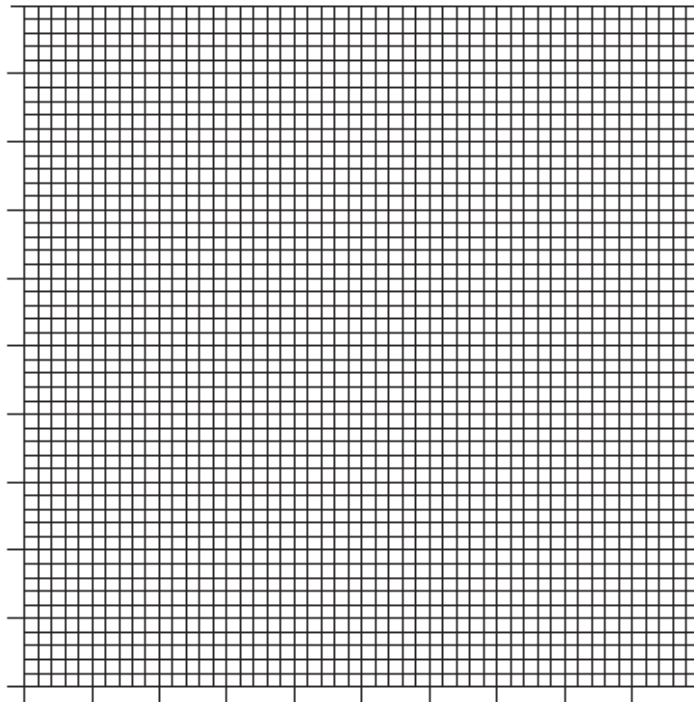


When six 25g and four 5g masses were placed on the bridge, it collapsed. Calculate the **total** mass placed on the bridge.

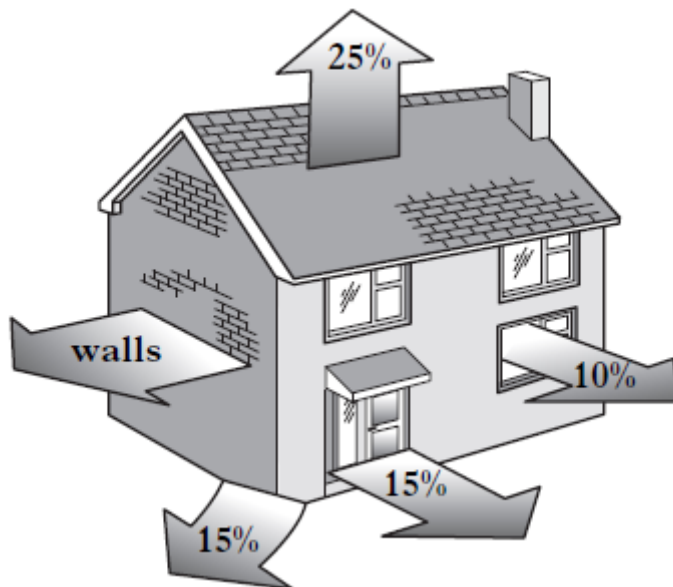
6. The table shows the tensile strength of four materials.

<i>Material</i>	<i>Tensile strength (MPa)</i>
Aluminium	80
Polypropene	36
Nylon	72
Solder	45

Present this information as a bar graph.



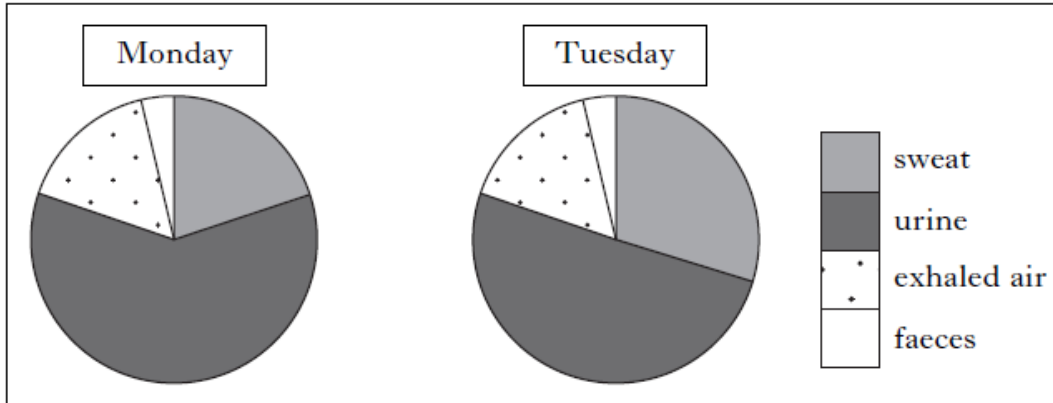
7. Heat energy is lost from five parts of a house as shown in the diagram below.



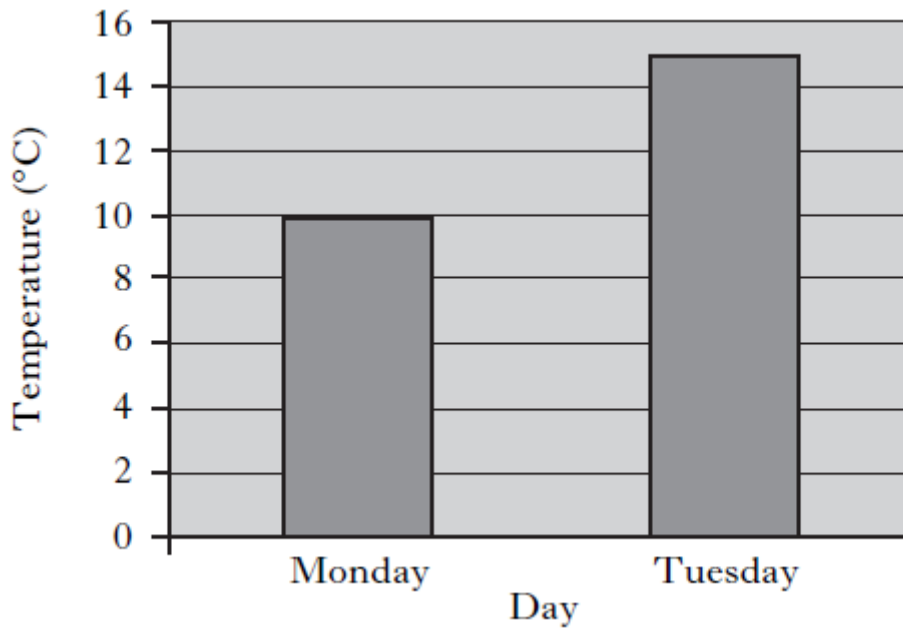
a) State the percentage of energy lost through the walls.

b) The total energy lost from the house was 3000kJ. Calculate the amount of energy lost through the roof.

8. The pie charts below show how a man lost water from his body on two different days.



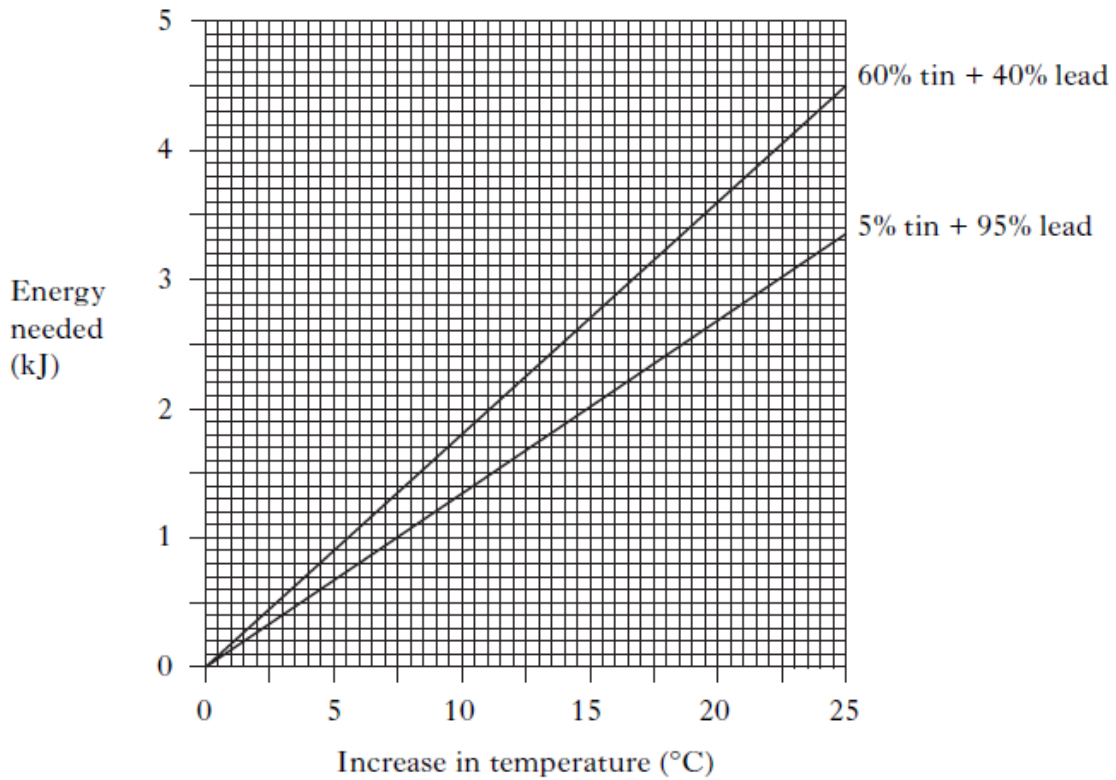
The graphs show the air temperature for each day.



Draw **two** conclusions using both the pie charts and the graph.

9. Solder is a mixture of two metals – tin and lead.

Alasdair heated two different types of solder and measured the energy needed to increase the temperature of each solder.



a) Draw **two** conclusions from Alasdair's results.

b) Another type of solder is made of 30% tin and 70% lead. Predict the energy needed to increase the temperature of this solder by 15°C.

10. Ammonia is an important gas used to make fertilisers. The table shows some information about the process used to make ammonia.

<i>Temperature (°C)</i>	<i>Pressure (bar)</i>	<i>Rate of ammonia production (kg/min)</i>
1000	100	50
750	100	140
500	100	270
500	150	320
500	200	410

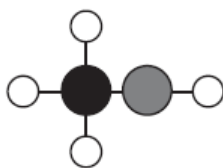
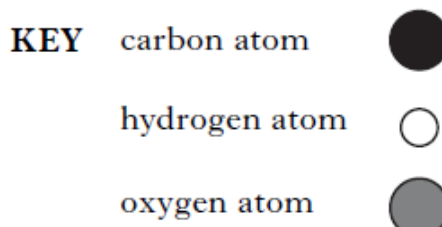
a) State **two** conclusions from this information.

- b) Predict the rate of ammonia production when the temperature used is 600°C and the pressure is 100bar.

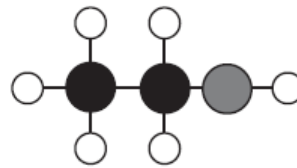
11. Alcohols can be burned to give energy.

<i>Name of alcohol</i>	<i>Boiling point (°C)</i>	<i>Energy given out (kJ/mol)</i>
methanol	65	727
ethanol	79	1367
propanol	97	2020
butanol	117	2677

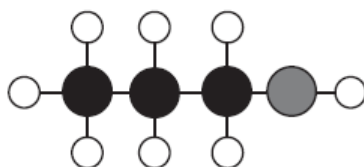
The diagrams show the number of carbon atoms, hydrogen atoms and oxygen atoms in each alcohol.



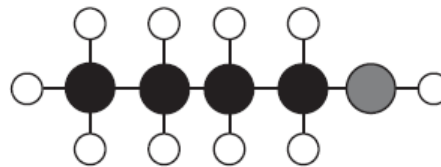
methanol



ethanol



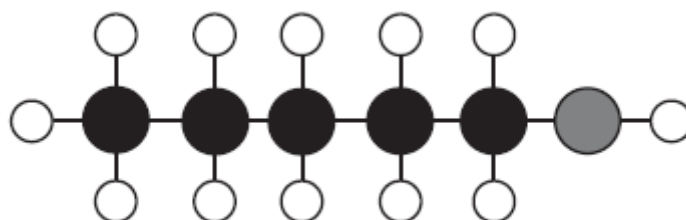
propanol



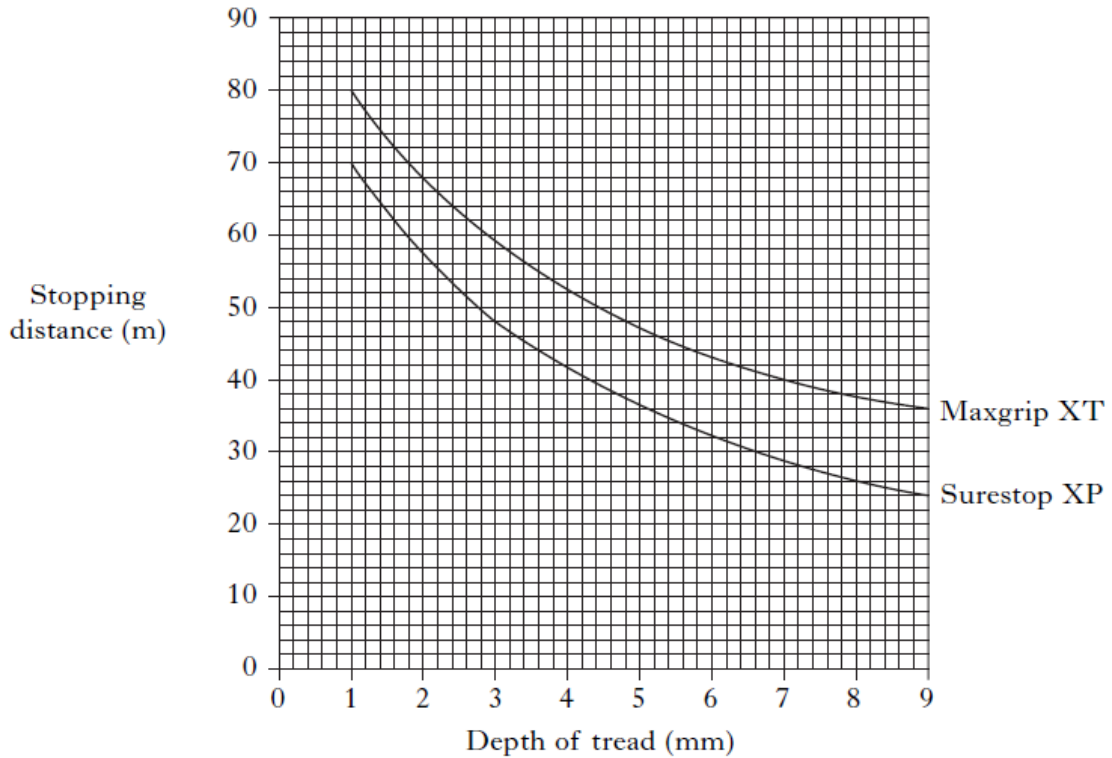
butanol

- a) Draw **two** conclusions using both the table and the diagrams.

- b) Predict the boiling point for the alcohol shown in the diagram below.



12. A car manufacturer tested two types of tyre with different depths of tread to compare stopping distances on wet roads.



- a) Draw two conclusions from this graph.

- b) The legal minimum tread for a tyre is 1.6mm.

State the **difference** in stopping distance between a car with Maxigrip XT tyres and one with Surestop XP tyres when both have a tread of 1.6mm?

- c) Tread allows the tyre to give better road grip by displacing water on the road as spray. The table shows the volume of water that each tyre can displace in one second.

Maxgrip XT	Depth of tread (mm)	2	3	4	5	6	7	8	9
	Volume of water displaced (litres)	3.4	3.8	4.3	4.8	5.4	6.0	6.7	7.4
Surestop XP	Depth of tread (mm)	2	3	4	5	6	7	8	9
	Volume of water displaced (litres)	4.6	5.3	5.9	6.4	7.0	7.7	8.4	9.2

Use the information in the graph and the table to answer the following questions.

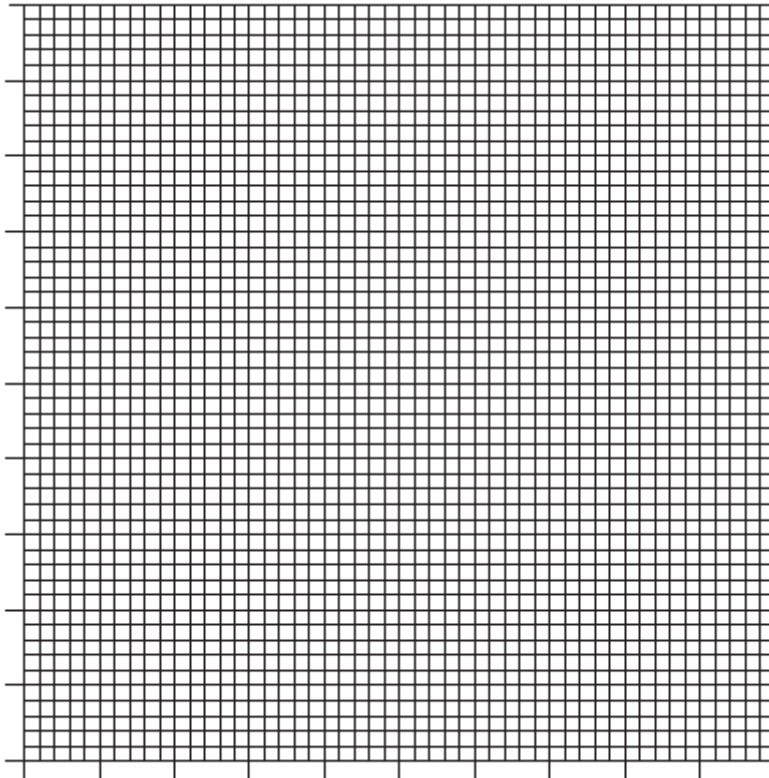
- i) A car fitted with Surestop XP tyres has a stopping distance of 48metres.
What volume of water is displaced by each tyre in one second?

- ii) A car is fitted with Maxgrip XT tyres. Each tyre displaces 6.0litres of water in one second.
What is the car's stopping distance?

13. The table below shows the length of a human baby as it develops in its mother's womb.

<i>Age of developing baby (months)</i>	0	1	2	3	4	5
<i>Length of developing baby (cm)</i>	0	1	4	9	16	25

Draw a line graph to show this information.



14. a) The formula below can be used to estimate the adult height of a girl.

$$h = \left(\frac{f + m}{2} \right) - 7$$

where h = estimated adult height (cm)
 f = height of father (cm)
 m = height of mother (cm)

Katie's mother has a height of 159cm and her father's height is 175cm.

What is Katie's estimated adult height?

- b) The heights of some children in Katie's nursery were measured. The results are shown below.

<i>Child</i>	<i>Age (years)</i>	<i>Height (cm)</i>
Cameron	4	110
Jasmine	4	103
Katie	3	92
Ryan	3	96
Sophie	4	98
Stuart	4	109
Vitek	4	115

What is the **average** height of children aged 4 years?