

Science Skills

Reading Tables

Level 4

Book 1

<i>Metal</i>	<i>Specific heat capacity (J/kg/°C)</i>	<i>Mass of metal (kg)</i>	<i>Temperature rise (°C)</i>
Aluminium	900	1.0	11.0
Aluminium	900	2.0	5.5
Aluminium	900	3.0	3.7
Iron	450	1.0	22.0
Iron	450	2.0	11.0
Iron	450	3.0	7.3

Name: _____

Class: _____

Tables

Tables are used to display the results of an investigation.

- Tables are used to **compare** things.
They show the **relationship** between two or more things.
At Level 3 this is usually only one aspect of the things to be compared.

Level 3 This table shows the power generated by a wind turbine at different wind speeds.

Headings	<i>Wind speed (m/s)</i>	7.5	9	10	11	12	14	Data
Headings	<i>Power generated (kW)</i>	100	200	300	400	500	600	Data

You read this table like this:

When the **wind speed** is **7.5 metres per second**, the **power generated** is **100 kilowatts**.
When the wind speed is 9 metres per second, the power generated is 200 kilowatts.
When the wind speed is 10 metres per second, the power generated is 300 kilowatts. Etc.

At **Level 4** you will often find a number of aspects compared in the same table.

Level 4 The same amount of energy was used to heat up samples of iron and aluminium.
The table shows the results of the experiments.

The **headings** are the most important part of a table. Without headings, the table is meaningless.

<i>Metal</i>	<i>Specific heat capacity (J/kg°C)</i>	<i>Mass of metal (kg)</i>	<i>Temperature rise (°C)</i>
Aluminium	900	1.0	11.0
Aluminium	900	2.0	5.5
Aluminium	900	3.0	3.7
Iron	450	1.0	22.0
Iron	450	2.0	11.0
Iron	450	3.0	7.3

Two metals are being **compared**, aluminium and iron.

The *specific heat capacity* is the **aspect of the metals** which the scientist considers relevant to the investigation.

In the investigation, three masses of each metal were heated; 1kg, 2kgs and 3 kgs.
This is the **variable** which changed.

The **temperature rise** was the information that was unknown before the investigation but has now been found out.

<i>Metal</i>	<i>Specific heat capacity (J/kg/°C)</i>	<i>Mass of metal (kg)</i>	<i>Temperature rise (°C)</i>
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Aluminium	900	2.0	5.5
Aluminium	900	3.0	3.7
Iron	450	1.0	22.0
Iron	450	2.0	11.0
Iron	450	3.0	7.3

It is usually helpful to read the information aloud, in **sentences**, across the table, **building in the headings**.

For example, from the table you can see that...

- The first metal is **aluminium**, which has the specific heat capacity of **900 J/kg/°C**. When you heat **one kilogram**, the temperature rise is **11°C**.
- The other metal is **iron** which has the specific heat capacity of **450 J/kg/°C**. When you heat **one kilogram**, the temperature rise is **22°C**.

Drawing Conclusions

You have to draw conclusions from tables. You do this by **comparing the data** in the table. Words used include "more than"; "greater than"; "less than"; "increasing"; "decreasing" etc.

In the examples below, the **conclusion** is the sentence **in red**. It starts with the word "**So**".

The **evidence** is the rest of the paragraph.

a) Compare the **temperature rise** and the **metals**

- The **temperature rise** for **one kg** of aluminium is **11°C**; the temperature rise for one kg of iron is **22°C**.
So the temperature rise of iron is double the temperature rise of aluminium. (The temperature rise of aluminium is half the temperature rise of iron.)
- The temperature rise of aluminium is **also half** of the temperature rise of iron when **2 kilograms** are heated, and **just over half** when **3 kilograms** are heated.

b) Compare the **temperature rise** and the **mass**

- The temperature rise for one kilogram of aluminium was **11°C**; for 2 kilograms it was **5.5°C**; and for 3 kilograms it was **3.7°C**.
So the temperature rise decreases as the mass heated increases. (The temperature rise gets smaller as the mass gets bigger.)
- The temperature rise for iron **also** decreases as the mass heated increases.

c) Compare the **specific heat capacity** of the **metals**

- The specific heat capacity of aluminium is **900 J/kg/°C**. The specific heat capacity of iron is **450 J/kg/°C**. **So the specific heat capacity of aluminium is higher than the specific heat capacity of iron.**

Predicting from a Table

Tables are used to **predict**. Predictions are sometimes called **projections**.

'Predict' means use the information in the table to make an intelligent guess about something which is **not** in the table.

Example:

<i>Metal</i>	<i>Specific heat capacity (J/kg/°C)</i>	<i>Mass of metal (kg)</i>	<i>Temperature rise (°C)</i>
Aluminium	900	1.0	11.0
Aluminium	900	2.0	5.5
Aluminium	900	3.0	3.7
Iron	450	1.0	22.0
Iron	450	2.0	11.0
Iron	450	3.0	7.3

You have the table and the question is:

Stainless steel has a specific heat capacity of 510 J/kg/°C.

Predict the temperature rise when the same amount of energy is used to heat 1.0 kg of stainless steel.

What to do:

1. Stainless steel does not appear in the table. Look for the information you are given about stainless steel in the question to decide where it would go in the table.
2. You are told that stainless steel has a specific heat capacity of 510 J/kg/°C. This is less than aluminium and more than iron, so it would go between them in the table.

<i>Metal</i>	<i>Specific heat capacity (J/kg/°C)</i>	<i>Mass of metal (kg)</i>	<i>Temperature rise (°C)</i>
Aluminium	900	1.0	11.0
Aluminium	900	2.0	5.5
Aluminium	900	3.0	3.7
Stainless steel	510	1.0	
Iron	450	1.0	22.0
Iron	450	2.0	11.0
Iron	450	3.0	7.3

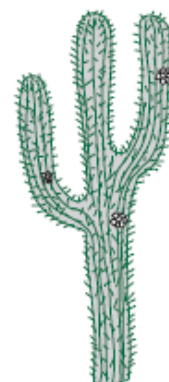
3. You are told that 1.0 kg of stainless steel is heated. Work out where this would go.
4. The temperature rise for 1 kg of aluminium was 11°C. The rise for iron was 22°C. Stainless steel must be somewhere in between, higher than 11 but lower than 22.

At Level 4, the correct answer to this question is "between 11°C and 22°C"

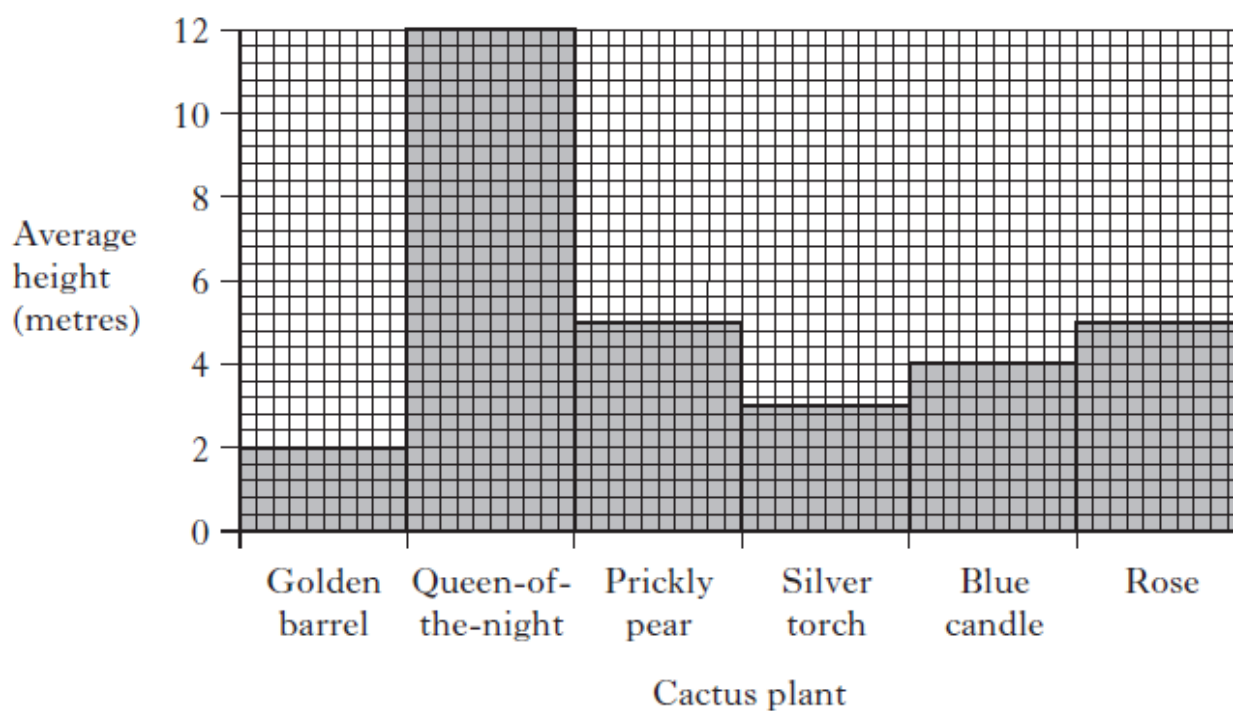
1. Cactus plants have fleshy stems covered with spines. Many cactus plants produce flowers.

The table shows information about some cactus plants.

<i>Cactus plant</i>	<i>Colour of spines</i>	<i>Colour of flowers</i>
Golden barrel	yellow	pink
Queen-of-the-night	yellow	white
Prickly pear	white	yellow
Silver torch	white	red
Blue candle	black	white
Rose	black	pink



The graph shows the average height of each cactus plant.



Use the information in the table and the bar chart to answer the following questions.

a) Which cactus plant has an average height of 5 metres and has yellow flowers?

b) What is the average height of the cactus plant with white spines and red flowers?

c) Two of the cactus plants have pink flowers. Which one has the greater average height?

d) Name and describe the cactus plant with an average height of 4 metres.

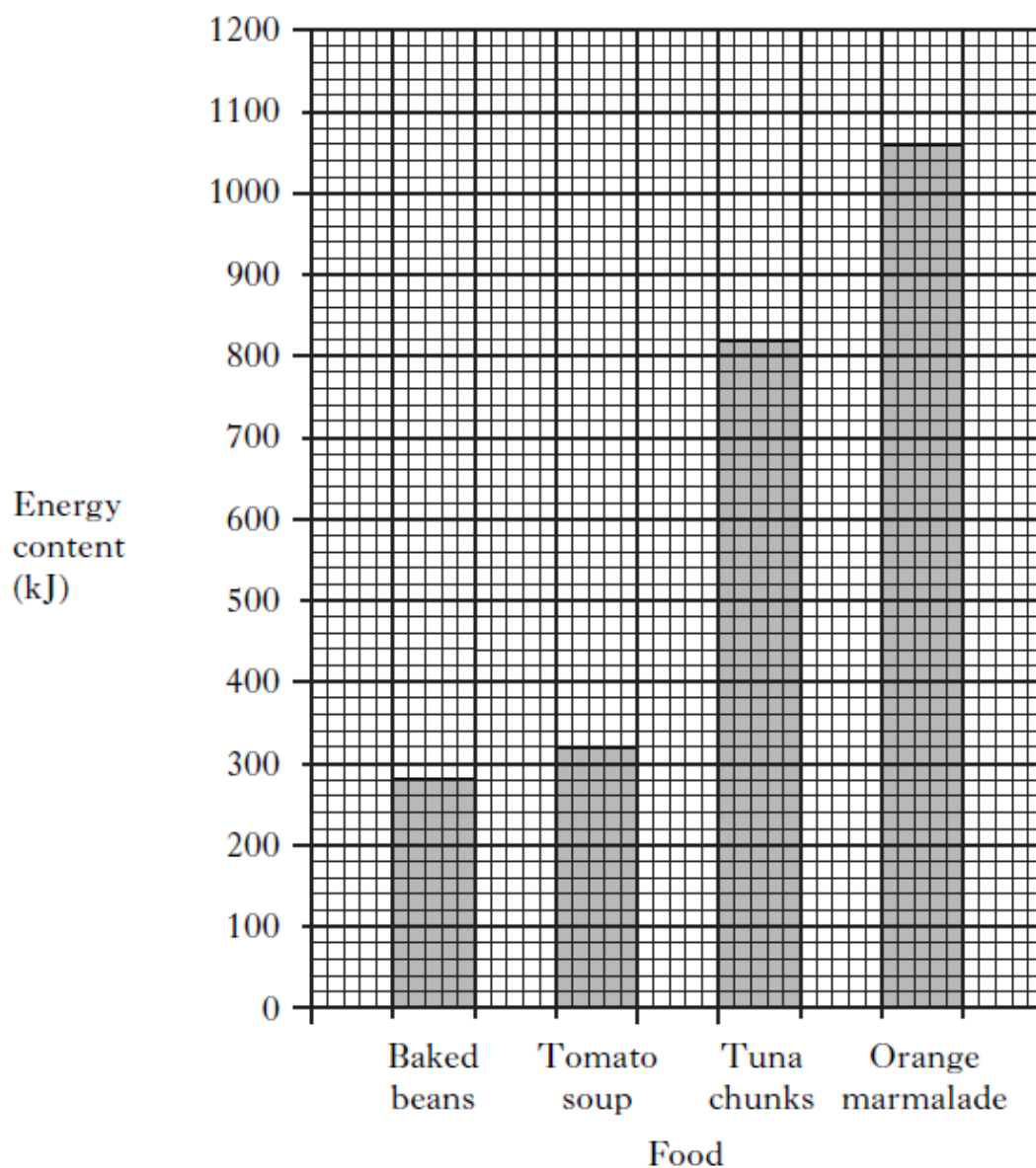
Name: _____

Description: _____

2. The table shows information about 100 g samples of four foods.

<i>Food</i>	<i>Sugar content (g)</i>	<i>Fat content (g)</i>
Baked beans	3.5	0.2
Tomato soup	7.9	2.7
Tuna chunks	0.0	10.8
Orange marmalade	60.7	0.2

The graph shows the energy content of each food.



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

a) Which food has a fat content of 0.2g and an energy content of 1060kJ?

b) What is the fat content of the food with an energy content of 820kJ?

c) What is the energy content of the food with a sugar content of 7.9g?

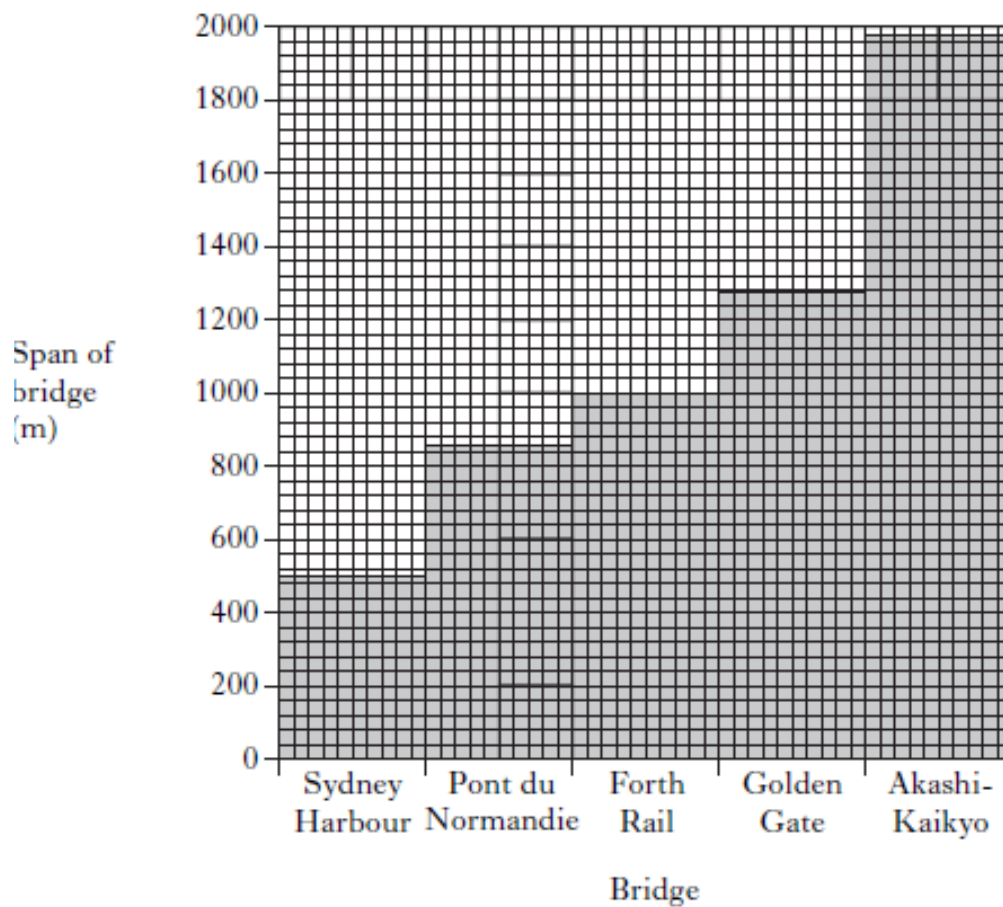
3.

The table below shows information about some famous bridges.

<i>Bridge</i>	<i>Type</i>	<i>Country</i>	<i>Total length (m)</i>
Sydney Harbour	arch	Australia	1149
Pont du Normandie	cable-stayed	France	2143
Forth Rail	cantilever	Scotland	2529
Golden Gate	suspension	America	2737
Akashi-Kaikyo	suspension	Japan	3911

The **span** of a bridge is the distance between its support towers.

The graph below shows the span of each bridge.



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

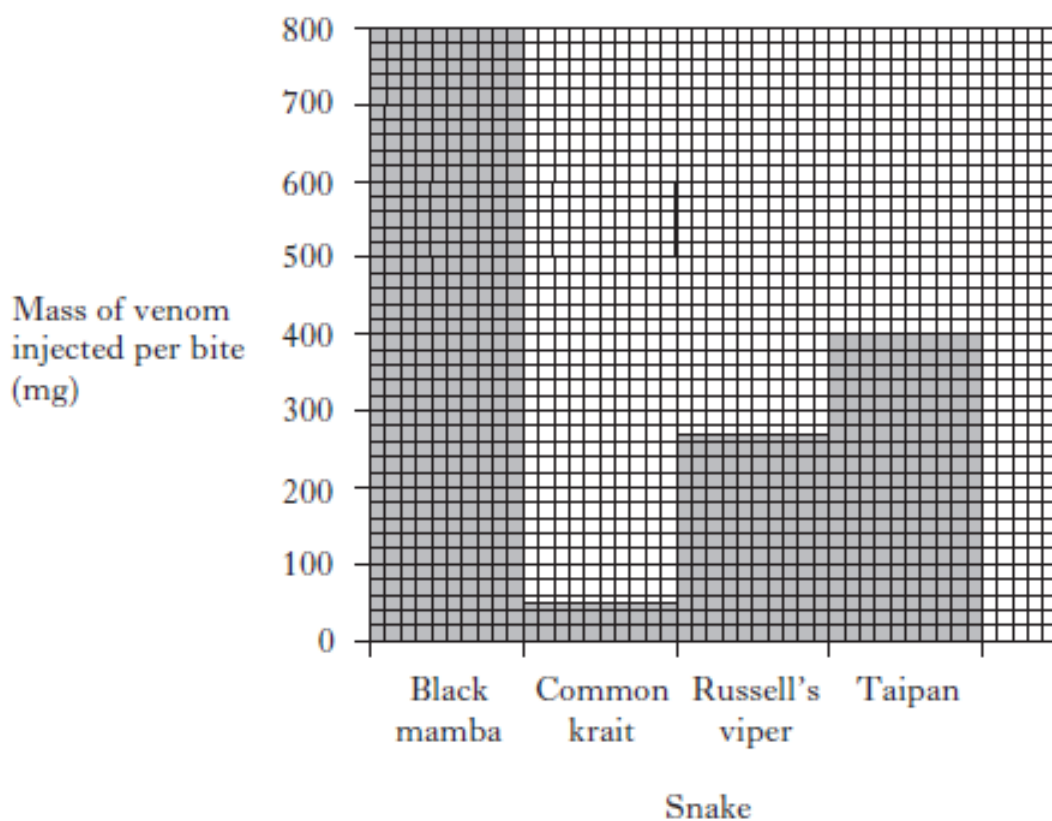
a) In which **country** is the longest bridge?

b) What is the **span** of the cantilever bridge?

c) What is the **total length** of the bridge with a span of 500m?

d) What **conclusion** can be drawn about the total length and span of these bridges?

4. The graph shows some information about poisonous snakes.



The table gives some further information about these snakes.

<i>Snake</i>	<i>Where snake is found</i>	<i>Lethal dose of venom (mg)</i>	<i>Death rate of people bitten (%)</i>
Black mamba	Southern Africa	10	95 to 100
Common krait	South East Asia	1	75 to 95
Russell's viper	South East Asia	12	30 to 65
Taipan	Australia	3	25 to 50



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

a) Which of the snakes found in South East Asia injects more venom per bite?

b) What is the death rate of people bitten by the snake which injects 50mg of venom per bite?

c) Calculate the number of lethal doses of venom that a Black Mamba snake injects in a single bite

Working

Number of lethal doses: _____

5. The same amount of energy was used to heat up samples of iron and aluminium.

The table shows the results of the experiments.

<i>Metal</i>	<i>Specific heat capacity (J/kg/°C)</i>	<i>Mass of metal (kg)</i>	<i>Temperature rise (°C)</i>
Aluminium	900	1.0	11.0
Aluminium	900	2.0	5.5
Aluminium	900	3.0	3.7
Iron	450	1.0	22.0
Iron	450	2.0	11.0
Iron	450	3.0	7.3

Here is one conclusion from these results.

If the same mass of metal is heated, the temperature rise for aluminium is less than the temperature rise for iron.

Draw **two** other conclusions from these results.

a) _____

b) _____

- c) Stainless steel has a specific heat capacity of 510 J/kg/°C.
 Predict the **temperature rise** when the same amount of energy is used to heat 1.0 kg of stainless steel.

_____ °C

6. The table shows information about the percentage of adults in Scotland who are overweight.

<i>Age (years)</i>	<i>Percentage of adults in Scotland who are overweight (%)</i>	
	<i>Men</i>	<i>Women</i>
25 – 34	58	42
35 – 44	66	52
45 – 54	72	62
55 – 64	76	71

Draw two conclusions from this information.

- a) _____

- b) _____

7. Dylan investigated how much energy was used to heat the water for his bath. His results are shown in the table below.

<i>Volume of water</i> (litres)	<i>Temperature of bath water</i> (°C)	<i>Energy used</i> (MJ)
100	35	14.6
100	40	16.7
100	45	18.8
200	35	29.2
200	40	33.4
200	45	37.6





- a) Draw two conclusions from these results.

- b) Predict the amount of energy used to heat 200 litres of water to a temperature of 43°C.

_____ MJ



8. Toads feed on insects.
They will only snap at and eat moving insects.
During an investigation a hungry toad was offered insects hanging on a thread.

<i>Type of Insect</i>	Black Fly	Bee	Yellow Fly	Robber Fly
<i>Description of Insect</i>	all black	black and yellow stripes	all yellow	black and yellow stripes
	harmless	stings	harmless	harmless
<i>Picture of Insect</i>				

The order in which the insects were offered and the hungry toad's response is shown below.

<i>Order of experiments</i>	<i>Insect offered</i>	<i>Hungry toad's response to insect</i>
1	Black fly	snaps at and eats it
2	Yellow fly	snaps at and eats it
3	Robber fly	snaps at and eats it
4	Bee	snaps at and is stung
5	Robber fly	crouches down and avoids it
6	Yellow fly	snaps at and eats it
7	Robber fly	crouches down and avoids it
8	Black fly	snaps at and eats it

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

a) Which insect has black and yellow stripes and is harmless?

b) Which insect is snapped at and eaten by the toad and is all black?

c) During the investigation, the toad's response to one of the insects changed.
To which insect did the toad change its response?

d) Explain why the toad changed its response to this insect.

9. 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) Draw two conclusions from this information.

1. _____

2. _____

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

_____ kg/min

10. Some information about four alloys containing copper is shown below.
Use all of the information to answer the following questions.

Table 1:

<i>Name of alloy</i>	<i>Other metals in alloy</i>	<i>Use of alloy</i>
bronze	tin and zinc	statues
lynite	aluminium	machinery castings
monel	nickel and iron	water pumps
dental amalgam	mercury	dental fillings

Table 2:

<i>Name of alloy</i>	<i>Percentage of copper present in alloy (%)</i>
bronze	92
lynite	90
monel	18
dental amalgam	30

- a) State the use of the alloy which contains 90% copper.

- b) What is the percentage of copper in the alloy used to make water pumps?

- c) What is the percentage of mercury in dental amalgam?

Working

Answer _____%

11. A group of pupils investigated the level of air pollution in a town

They counted how many types of lichen were growing on trees at four different sites.

For each site, they recorded the percentage lichen cover and the distance from the town centre.

Their results are in the table below.

<i>Site</i>	<i>Number of lichen types</i>	<i>Percentage lichen cover (%)</i>	<i>Distance from town centre (km)</i>
A	1	2	0
B	2	4	1
C	4	20	5
D	6	58	10

- a) Which site was most polluted?

- b) Draw two conclusions from the results.

12. Ben investigated how the thickness of different wires affects their electrical resistance.

<i>Material</i>	<i>Thickness of wire (mm)</i>	<i>Electrical resistance (ohms)</i>
nichrome	0.20	5.25
nichrome	0.28	2.68
nichrome	0.56	0.67
constantan	0.20	2.34
constantan	0.28	1.19
constantan	0.56	0.30

- a) Draw two conclusions from these results.

- b) A wire with a thickness of 0.24mm had an electrical resistance of 1.63 ohms. From which material was the wire made?
