Science Skills

Reading Tables
Level 4
Book 2

Metal	*Specific heat capacity* (J/kg/°C)	*Mass of metal* (kg)	*Temperature rise* (°C)
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.

1. 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

Wind speed (m/s)	7·5	9	10	11	12	14
Power generated (kW)	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.

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

Metal	*Specific heat capacity* (J/kg/°C)	*Mass of metal* (kg)	*Temperature rise* (°C)
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

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.

Metal	*Specific heat capacity* (J/kg/°C)	*Mass of metal* (kg)	*Temperature rise* (°C)
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

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

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 **11ºC**; the temperature rise for one kg of iron is **22ºC**.
  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 **11ºC**; for 2 kilograms it was **5.5ºC**; and for 3 kilograms it was **3.7ºC**.
  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/ºC.** The specific heat capacity of iron is **450 J/kg/ºC . *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:

Metal	*Specific heat capacity* (J/kg/°C)	*Mass of metal* (kg)	*Temperature rise* (°C)
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/ºC.
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/ºC. This is less than aluminium and more than iron, so it would go between them in the table.

Metal	*Specific heat capacity* (J/kg/°C)	*Mass of metal* (kg)	*Temperature rise* (°C)
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 11ºC. The rise for iron was 22ºC. 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 11ºC and 22ºC"

1. Vaccinations are given to protect people from diseases caused by micro-organisms.

The following table gives information about some vaccines.

Vaccine	*Time vaccine is effective* (years)	*Booster vaccine required within effective period*	*Method of vaccination*
Hepatitis A	10	yes	injection
Hepatitis B	5	no	injection
Meningitis	5	no	injection
Polio	10	no	by mouth
Rabies	2	no	injection
Tetanus	10	no	injection
Typhoid	3	no	injection

1. Which vaccine is effective for the shortest time?

_____

2. Which vaccine requires a booster to be given within the effective period?

_____

3. Which vaccine is effective for 10 years, is given by injection and does not require a booster to be given?

_____

4. List all the information which can be obtained from the table about the meningitis vaccine.

_____

_____

_____

2. The table gives information on the hardness of some steel alloys.

Carbon present in steel alloy/%	*Hardness/units*
0·1	123
0·2	157
0·3	190
0·4	220
0·5	260

Predict the hardness of a steel alloy containing 0.6% carbon.

_____ units

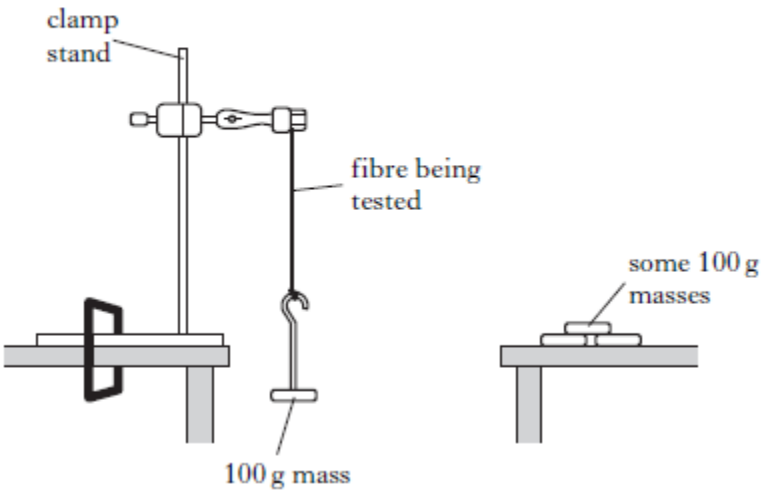
3. The average production of sperm cells by a bull throughout the year is shown in the table below.

Month	*Average sperm production* (millions/day)	*Month*	*Average sperm production* (millions/day)
January	14,000	July	10,500
February	13,500	August	10,000
March	13,000	September	10,500
April	12,500	October	11,500
May	12,000	November	12,000
June	11,000	December	14,500

Describe the pattern of sperm production over one year.

_____
_____
_____
_____

4. A student used the apparatus shown to investigate the strength of different fibres.



His results are shown in the table.

Fibre	Mass to break fibres/g
cotton	600
polyester	1200
wool	200
poly(chloroethene)	1000
poly(propene)	1100

1. How does the strength of the synthetic fibres (polyester, poly(chloroethene) and poly(propene))compare to the strength of the natural fibres (cotton and wool)?

_____
_____

2. He tested another fibre and found that the mass needed to break it was 300g. Predict whether this fibre is natural or synthetic.

_____

5. In an investigation into the judgment of distance, a volunteer was asked to thread a needle 10 times with both eyes open and then with only one eye open.

The time taken for each attempt is recorded in the tables below.

	Time taken to thread needle (seconds)	
Attempt	*Two eyes open*	*One eye open*
1	12	38
2	12	35
3	10	37
4	11	36
5	9	34
6	9	33
7	10	30
8	8	31
9	7	29
10	7	28

Give **two** conclusions which can be drawn from the results.

a) _____
_____
_____

b) _____
_____
_____

6. The table gives information about the distribution of lichens in and around a city. Sulphur dioxide (SO_2) levels in the atmosphere and the pH of rainwater were also recorded.

Distance from city centre (km)	*Number of lichen species per* km^2	*Atmospheric* SO_2 *concentration* ($\mu g/m^3$)	pH *of rainwater*
0 – 1·5	0	240	4·6
1·6 – 3·0	1	220	4·8
3·1 – 4·5	7	185	5·0
4·6 – 6·0	13	120	5·5

1. Describe the relationship between the distance from the city centre and the number of lichen species per km^2.

As the distance from the city centre increases, _____
_____
_____

2. Describe the relationship between the distance from the city centre and atmospheric SO_2 concentration.

As the distance from the city centre increases, _____
_____
_____

3. Describe the relationship between atmospheric SO_2 concentration and rainwater pH.

As the atmospheric SO2 concentration increases, _____
_____
_____

7. The table shows the percentage of sulphur trioxide produced at different temperatures.

Temperature of catalyst/°C	Percentage of sulphur trioxide produced
442	99·5
475	95·0
518	88·0
600	63·0

1. What effect does increasing the temperature of the catalyst have on the percentage of sulphur trioxide produced?

_____
_____
_____

8. The following table shows the power produced by the wind generator at different wind speeds.

wind speed (metres per second)	*power output of wind generator* (watts)
2	8
4	16
6	
8	32
10	40

Suggest the power produced when the wind speed is 6 metres per second.

_____

9. The moisture content of soil can be measured using a meter of the type shown below. The scale goes from 1 (driest) to 10 (wettest).

The following table gives information about watering some different plant species.

Plant species	*Ideal moisture reading*	*How often soil moisture should be checked*
African violet	3	**
Azalea	8	***
Begonia	7	***
Fuchsia	7	***
Orchid	1	**
Poinsettia	1	*
Rubber plant	4	*

* once a week ** every 4/5 days *** every 3 days

1. How often should the soil moisture of a Begonia be checked?

_____

2. Which of the plant species needs the most water?

_____

3. The table below gives the **actual moisture readings** for two plants.

Compare these readings with the **ideal moisture readings** and decide if each plant needs watered.

Complete the table.

Plant species	**Actual moisture reading**	**Does the plant need watered?**
Poinsettia	3	
Orchid	1	

10. The higher the octane number of a fuel, the better it burns.

Number of carbon atoms	Octane number	
	alkane	alkene
4	94	98
5	62	93
6	25	85
7	0	75

1. How does the number of carbon atoms affect the octane number of the alkenes?

_____
_____
_____

2. Predict the **octane number** of the **alkene** with 3 carbon atoms.

_____

3. In general, how does the octane number of an **alkane** compare with the octane number of the **alkene** with the same number of carbon atoms?

_____
_____
_____
_____

11. The table shows how the level of carbon dioxide in the atmosphere has changed since 1975.

Year	Level of carbon dioxide/units
1975	330
1985	345
1995	358
2005	374
2015	

Predict the level of carbon dioxide in the atmosphere in 2015 if the trend continues.

_____ units