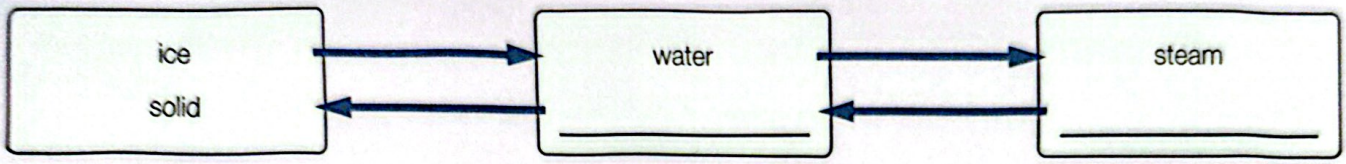
7Ha OUR MATERIAL WORLD

1 The diagram shows how water changes from one state to another.



Add the names of the states to the boxes.

Label the arrows to show the physical changes (the changes of state).

2 Sea water is a solution of dissolved substances such as salt. What does the term solution mean?

_____

_____

3 We can use changes of state to separate materials from mixtures. Which change of state would you use to separate salt from sea water?

_____

4 During evaporation, a liquid turns into a gas. Tick (✓) the statements that are true:

- ☐ **A** Liquids *only* evaporate once the boiling point has been reached.
- ☐ **B** During evaporation, particles leave the liquid as a gas.
- ☐ **C** Evaporation gets faster as the liquid gets hotter.
- ☐ **D** Evaporation only occurs when it is warm.
- ☐ **E** Evaporation gets slower as the liquid gets hotter.
- ☐ **F** Liquids *only* evaporate at temperatures below their melting point.

5 Draw *one* line from each change to show whether it is a physical or chemical change.

Change	**Type of change**
boiling a kettle to make steam	
mixing sand and water	chemical change
frying an egg	
iron rails rusting	physical change
water turning to ice	

7Ha SORTING RESOURCE DATA (WS)

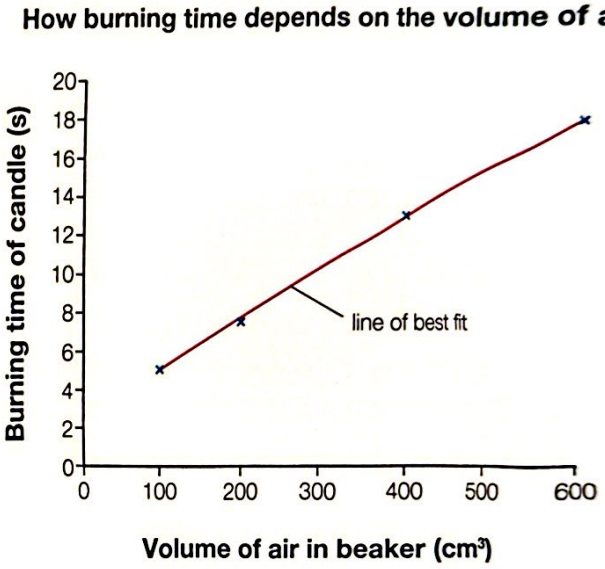
1 Complete the sentences using words from the box. Use each word once.

data	descriptions	discrete	limited	numbers	quantitative

_____ data uses numbers. Qualitative data uses _____.

Quantitative data can be continuous or _____. Continuous data can have any value between two _____. Discrete _____ has a _____ number of choices.

2a The scatter graph shows the relationship between two variables that are both quantitative. Write a set of rules for drawing a good scatter graph.



b Work in a group to share ideas by comparing your lists. Write down *two* things about your list that were good.

c Write down *one* thing about your list that could be improved.

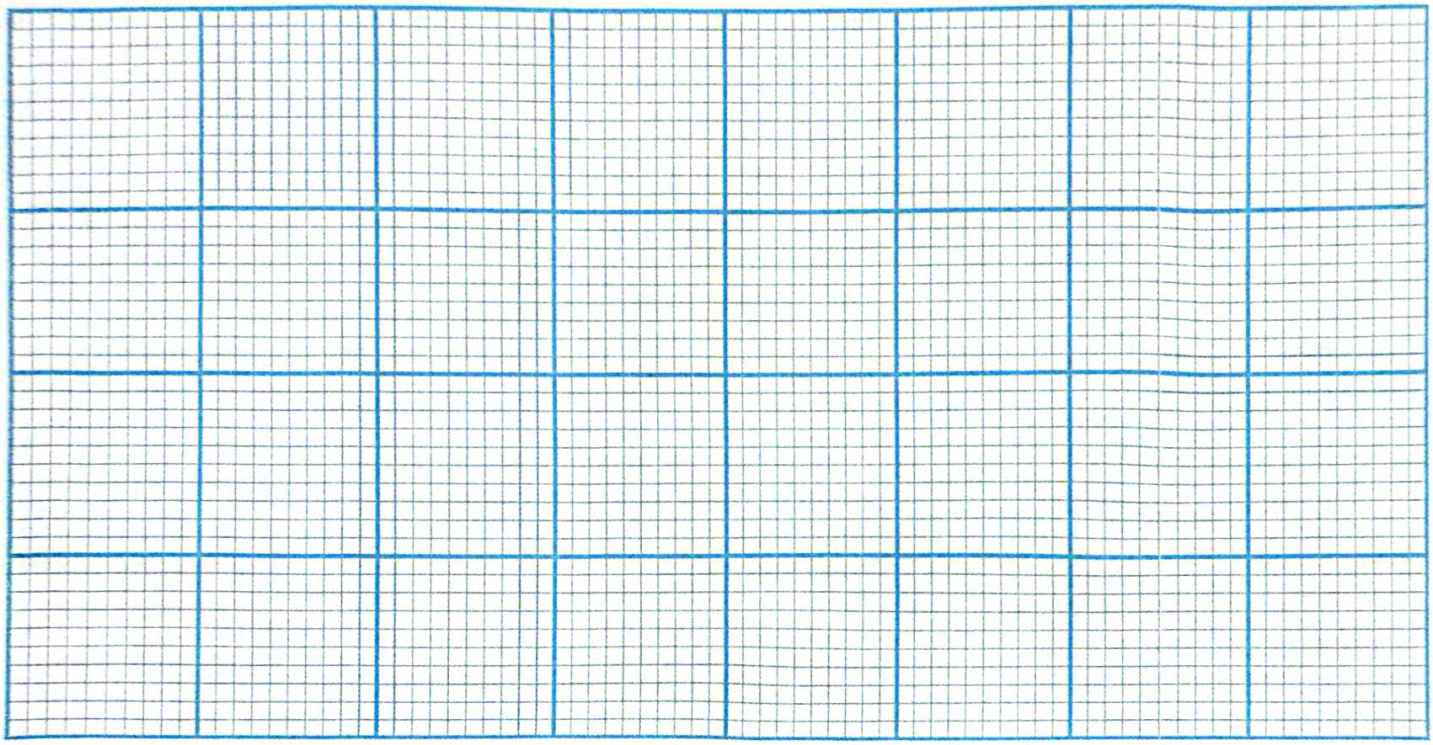
7Ha SORTING RESOURCE DATA (WS)

3 The table contains information on how long certain metal resources will last if we keep using them at the current rate.

Metal	Years left
nickel	90
copper	61
silver	29
zinc	46

a How could you sort this data in the table?

b Draw a bar chart of the data on the grid below.



4 The table shows the results of an investigation into how the length of time a candle burns for depends on the volume of air.

Volume of air in the beaker (cm^3)	Time candle burns for (s)
50	3.9
100	5.2
150	7.1
200	7.6
250	10.6

a A variable is anything that can change. List the two variables in this experiment.

b **i** Is the data qualitative or quantitative?

ii Is the data continuous or discrete?

7Ha THE AIR WE BREATHE

1 Decide whether each statement is true or false. Cross out the answer you do *not* want.

a Atoms are the simplest particles.	True/False
b Molecules contain only two atoms joined together.	True/False
c The atoms in a molecule must be different.	True/False
d The atoms in a molecule of water can be joined in any way.	True/False

2 What is the periodic table? _____

_____

3 Tick (✓) *one* box to answer each of parts **a** and **b** below.

a Pure oxygen is:
- ☐ **A** a mixture.
- ☐ **B** an element.
- ☐ **C** a compound.
- ☐ **D** a solution.

b The reason for this is because:
- ☐ **A** it contains many molecules.
- ☐ **B** it contains many atoms.
- ☐ **C** it only contains one type of atom.
- ☐ **D** it is a gas.

4a Draw *one* line from each particle type to the correct description. Then draw one line from each description to the drawing that *best* illustrates it.

Particle	Description	Diagram
atom	contains only atoms of the same type	
element	the simplest type of particle	
molecule	contains atoms of different types, which are chemically joined	
compound	two or more atoms joined together	

b Describe the difference between:

i elements and compounds _____

_____

ii atoms and molecules. _____

_____

7Ha THE AIR WE BREATHE

5 The following are some gases found in the air.

argon	carbon dioxide	helium	neon	nitrogen	oxygen

Complete the sentences using words from the box.

a The gas that makes up the highest percentage of air is _____.

b The gas in air that supports burning is _____.

c The gas in air that is a compound is _____.

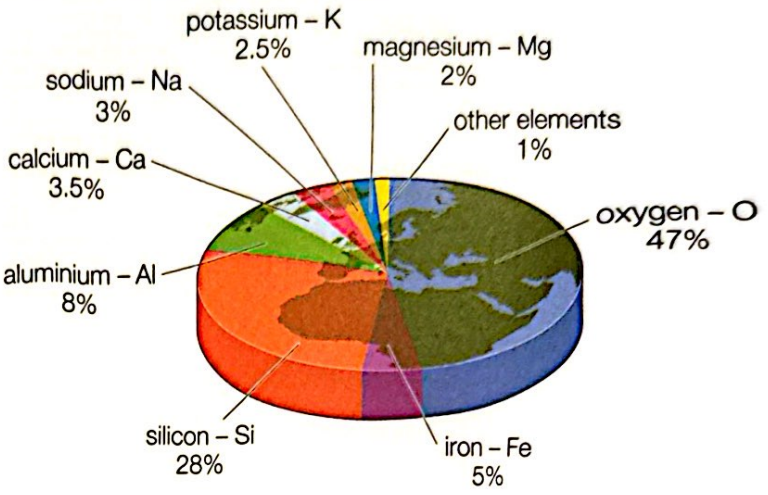
6 The water of our seas and oceans covers over half the surface of the Earth. Each water particle is formed by joining two atoms of hydrogen to one atom of oxygen. The sea also contains dissolved substances, including sodium chloride (salt) and oxygen gas, which supports all sea life.

Using examples of substances from the above passage explain the difference between pure substances and mixtures, elements and compounds, and atoms and molecules.

7Hb EARTH'S ELEMENTS

1 What is all matter made up of? _____

2 The elements found in the Earth's crust are shown in the pie chart.



Tick (✓) the percentage data shown in the pie chart.

- ☐ **A** qualitative
- ☐ **B** discrete
- ☐ **C** quantitative
- ☐ **D** descriptive

3 Complete the sentences using words from the box. Use each word once.

atoms	element	joined	molecule	same	two

A compound contains _____ or more elements that are chemically _____. Gold is an _____ because all the _____ in gold are the _____ type. Oxygen gas is a _____ of two oxygen atoms joined together.

4 Give the symbols for the following elements.

a iron _____ **b** sodium _____ **c** calcium _____

5a Which gas from the air do we need to help things burn? _____

b Give the names of *two* gases in the air that are elements.

_____

6 Complete the following sentences.

a A property of gold is that it is shiny. This makes gold useful for _____.

b Copper is a good conductor of heat. This is why copper is used to make _____.

c Carbon, as graphite, is soft. This is why graphite is used to make _____.

7H C METALS AND NON-METALS

1 Write down *three* physical properties of most metals.

_____

2 Which three metals are magnetic?

_____

3 Iodine is a non-metal. It is a dark grey, brittle solid that melts at 114 °C and does not conduct heat or electricity. How is iodine similar to sulfur?

_____

4 The properties of elements A and B are compared in the table.

Property	Element A	Element B
melting point	1085 °C	−7 °C
boiling point	2562 °C	59 °C
conductor of heat	yes	no
conductor of electricity	yes	no
malleable	yes	no

a Explain whether element A is a metal or a non-metal.

Element A is a _____.

This is because _____

_____.

b Explain which element would be used to make the wires in a lamp.

_____

c Which properties in the table are quantitative data? _____

_____

5 Silicon is a non-metal. Describe *one* way in which it is similar to a metal.

_____

6 Give *one* reason why we recycle aluminium products.

Recycling aluminium is useful because _____.

7Hc OBTAINING METALS (STEM)

1 What is the name given to a rock from which a metal can be obtained? _____

2 Complete the paragraph by crossing out the incorrect term in each sentence.

Crushing rock is a *physical / chemical* process. The ore is then removed and heated to separate the metal from the rest of the compound. In a *physical / chemical* process new substances are made. Changes of state are *physical / chemical* processes.

3 The ore malachite contains copper carbonate.

a Name the elements other than copper present in copper carbonate.

_____

b How many of the elements in copper carbonate are metals? _____

SB **4** The following data is about a proposed copper mine.

	Costs per 1000 kg of ore handled
The amount of copper that can be obtained from the ore is 1%. The present selling price of copper is £4.50 per kg.	survey and research = £11.00 mining operations = £19.50 transport of ore = £10.00 extracting metal = £31.00 admin and sales = £14.00 distribution of metal = £4.50

a You need to work out if the mine will make a profit or not. Do you have all the data that you will need? Look at diagram A in 7Hc Obtaining Metals to check.

_____

b Calculate the total cost of handling 1000 kg of the copper ore.

_____

_____

c Show that the mine is not going to make a profit.

_____

_____

d What would the selling price need to be to avoid making a loss?

_____

7Hd MAKING COMPOUNDS

1 What is the difference between a mineral and an ore?

_____

_____

2 Complete the sentences by crossing out the incorrect terms.

Elements / compounds are made when *elements / compounds* join together. During the reaction, the *elements / compounds* form bonds. The new *element / compound* made has different properties from the *elements / compounds* found in it.

3 Silicon dioxide is a very common substance in the Earth's crust. Tick (✓) the statements that are true.

- ☐ **A** Silicon dioxide is a mixture of silicon and oxygen.
- ☐ **B** Silicon dioxide is made from a metal joined with a non-metal.
- ☐ **C** Silicon dioxide is a compound made from silicon and oxygen.
- ☐ **D** Silicon dioxide has properties that are the same as those of oxygen.
- ☐ **E** Silicon dioxide is an element, which is what makes it valuable.
- ☐ **F** Silicon dioxide is a mixture of compounds.

4 When a compound name ends in *–ide,* the compound contains just two elements. The name of the metal element goes first. Write the names of the compounds formed when the following pairs of elements join.

a potassium and bromine _____

b calcium and oxygen _____

c tin and sulfur _____

d fluorine and magnesium _____

5 Read the following statements then answer the questions below.

Iron reacts with sulfur to form iron sulfide. We need to heat the test tube to get the reaction started, but once going, it will keep glowing and giving out heat.

a circle the non-metal element

b underline the phrase that provides evidence that energy is being given out

c highlight the compound made.

B **6** When some powdered aluminium is mixed with crystals of iodine, nothing happens. If a few drops of warm water are added, flames and purple fumes are produced and a white solid is left.

a What tells you a reaction has occurred? _____

b What is the name of the compound formed? _____

7He CHEMICAL REACTIONS

SB

1 What happens in all chemical reactions?

_____

2 List *three* criteria used to decide if a chemical reaction is taking place.

_____

3 Nitrogen dioxide is formed when oxygen reacts with the most common gas in the air. In this reaction, name the:

a reactant(s) _____

b product(s). _____

4 Write word equations for these reactions.

a magnesium metal burning in oxygen gas to produce magnesium oxide

_____

b hydrogen gas combining with iodine to form hydrogen iodide

_____

c aluminium iodide being formed when iodine and aluminium react

_____

5a Complete these word equations for thermal decomposition reactions.

i mercury oxide → mercury + _____

ii copper carbonate → copper oxide + _____

iii calcium carbonate → _____ + carbon dioxide

iv magnesium carbonate → _____ + _____

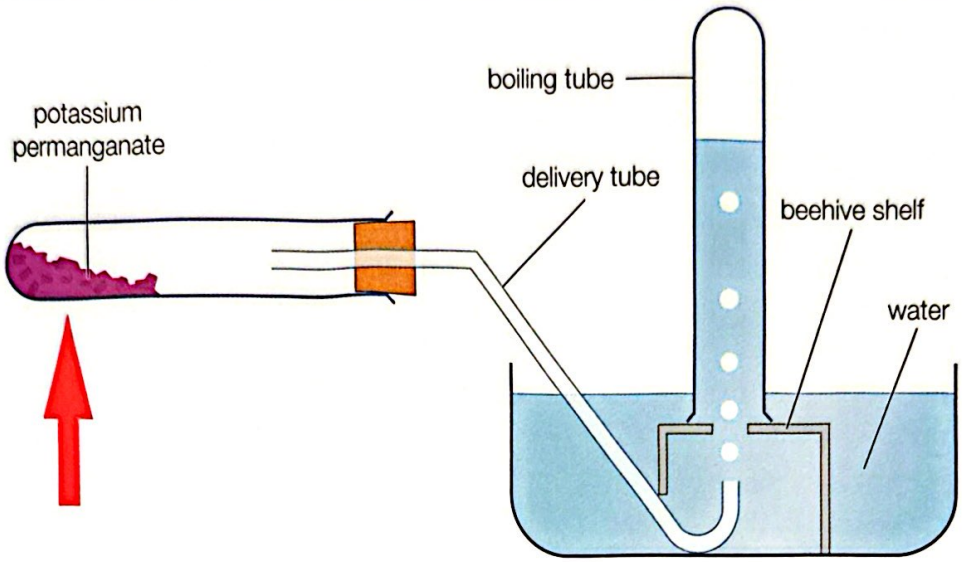
b How is the reaction in **i** different from the reactions in **ii** to **iv**?

_____

c What test could we use to identify the gas formed in reaction **iii**?

_____

6 When potassium permanganate is heated in the apparatus shown below, the following reaction occurs:
potassium permanganate → potassium manganate + manganese dioxide + oxygen



a Explain why this is a chemical reaction.

_____

b What will collect in the boiling tube? _____

c What does the red arrow represent? _____

d Tick (✓) the name of this type of reaction.

- ☐ **A** neutralisation
- ☐ **B** thermal decomposition
- ☐ **C** oxidation
- ☐ **D** combustion

7 Which statement *best* describes the thermal decomposition of hydrated (blue) copper sulfate?
Tick (✓) *one* box.

- ☐ **A** There is a physical change, forming white copper sulfate and water.
- ☐ **B** The atoms in the copper sulfate break apart to form different atoms, in a chemical reaction.
- ☐ **C** The copper sulfate evaporates.
- ☐ **D** There is a chemical reaction, in which one of the products is water.

8 What elements are in:

a sodium phosphate _____

b lead nitrate _____

c copper sulfate? _____

7He PROBLEMS WITH ELEMENTS

1 Read the paragraph below.

Key

a Underline all the metal elements in one colour. ☐

b Underline all the non-metal elements in another colour. ☐

c Underline all the compounds in a different colour. ☐

Add your colours to the boxes on the right to act as a key.

Lead is mainly used to make batteries and is produced in many low-income countries. Its ores usually contain minerals such as lead sulfide or lead oxide. Getting pure lead out of these minerals involves several stages, using chemical reactions. The first stages remove impurities (e.g. sulfur) from the minerals. Extremely high temperatures are then used to get the pure lead, and in the process lead dust and smoke are released. The process produces wastes that contain poisonous metals, such as lead, arsenic and mercury.

d State *one* problem caused by making batteries.

_____

2 Give three properties that can be used to separate metals and non-metals.

i _____

ii _____

iii _____

3a Which drawing shows a chemical reaction and which shows a change of state?

_____

_____

_____

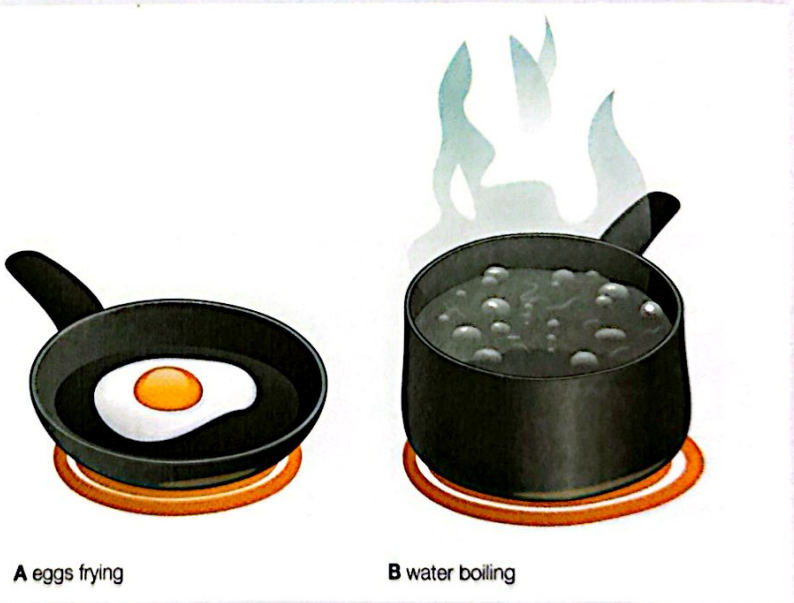
_____

b Give a reason for your answer.

_____

_____

_____



A eggs frying

B water boiling