

Section A: Answer ALL questions in this section, using the spaces provided.

This section carries 60 marks.

1. A) Fill in the blanks to complete the following sentences:

Raisa decided to teach her son Jack some scientific concepts that take place in the kitchen. This is what she did:



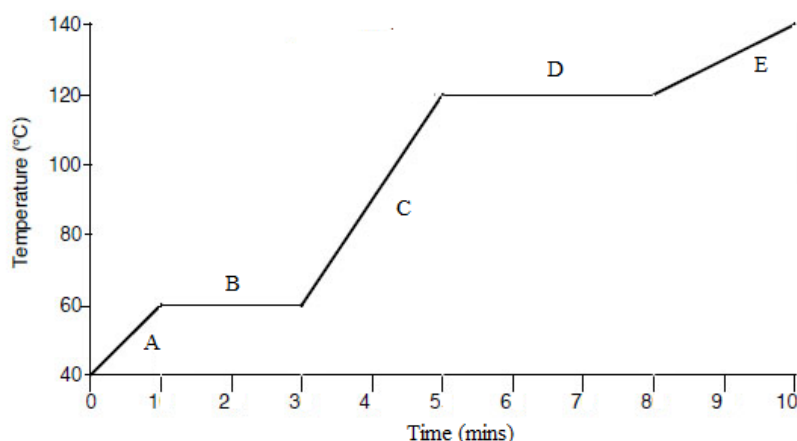
- i. First she took some ice cubes from the freezer and placed them in a saucepan. After some time the ice cubes _____ and turned to _____.
- ii. She then placed the saucepan with its contents on the cooker burner and started heating it. The _____ turned into _____. This is called _____.
- iii. Jack immediately noticed that droplets were forming on the kitchen tiles. This is because the _____ was turning into _____. This is called _____.

(4 marks)

B) Use the **kinetic theory** to explain what was happening during step (ii) above.

(2 marks)

C) Raisa found a container in her kitchen with a mysterious solid substance inside. She decided to heat this substance and record the temperature of the substance every minute. She then plotted her points on a graph paper and she obtained the following graph.



- i. What is the melting point of this substance? _____
- ii. What is state of the substance at 100°C? _____
- iii. What term is used to describe the change that occurs if the substance is changed directly from A to E? _____
- iv. Could this mysterious substance be pure water? Why? _____

(4 marks)

(Total: 10 marks)

2. A) Changes occur around us all the time. Read the following statements and for each one decide whether a **physical** or a **chemical change** has taken place.

- i. Milk turning sour. _____
- ii. Roasting marshmallows. _____
- iii. Sea water evaporating. _____
- iv. Iron nail rusting. _____
- v. Cracking an egg. _____

(5 marks)

B) Complete the following sentences regarding mixtures.

Mike, having a sweet tooth once performed the following experiment:

- i. Mike filled a glass with water and placed a spoon full of sugar in it. The sugar dissolved in the water and a _____ was formed. The water is the _____ while the sugar is the _____.
- ii. Mike continued adding more sugar in the glass of water until no more sugar could dissolve. In this way Mike created a _____ solution. His sister Tania told him that he could dissolve the excess sugar which was at the bottom of the beaker by _____ it.

(5 marks)

C) Explain, **in terms of particles**, what happened in part (i) of Mike's experiment.

(2 marks)

D) While Mike was performing his experiment, his sister Tania wanted to play a joke on him and she placed a handful of soil in his sugar solution.

Explain how Mike can separate the soil from his sugar solution.

(3 marks)

(Total: 15 marks)

3. Robert is a scientist and he is aboard his ship on one of his scientific journeys. One day Robert realizes that all his bottled water has finished and he doesn't have any more water to drink. Surrounded by seawater Robert realizes that he can solve his problem by turning some seawater into drinking water.

A) What is the name of the process by which this mixture can be separated?

(1 mark)

B) Draw a labelled diagram to show Robert how **pure water** can be obtained from a mixture of sea water.

(5 marks)

C) Give one precaution Robert needs to take while carrying out this experiment.

(2 marks)

(Total: 8 marks)

4. A) Larry bought his wife a bottle of perfume for her birthday. He noticed that when his wife uses the perfume he could smell it from across the room. Explain how this could be so.

(2 marks)

B) Atoms are made up of sub-atomic particles. Use the periodic table in order to show how many protons, electrons and neutrons each element has:

Element	Number of electrons	Number of protons	Number of neutrons
Aluminium			
Ca ²⁺			
Cl ⁻			

(9 marks)

C) Continue the following sentences:

- The protons and neutrons are found in the _____.
- The electrons are found in _____.

(2 marks)

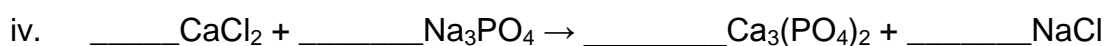
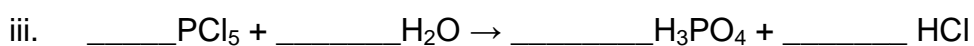
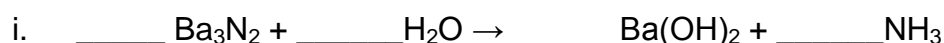
(Total: 13 marks)

5. A) Complete the following table by filling in the missing names or formulae.

Name of compound	Formula of compound
Calcium carbonate	
	FeSO ₄
Aluminium oxide	
	NH ₃
Copper (II) nitrate	
Magnesium hydroxide	

(6 marks)

B) Balance the following reactions:



(8 marks)

(Total: 14 marks)

Section B: Answer BOTH questions in this section on the separate sheets provided. This section carries 40 marks.

6. A) A naturally occurring sample of element X is found to contain 81.8% ¹⁰X and 18.2% ¹¹X.

i. What are such atoms called? (1 mark)

ii. Calculate the relative atomic mass of this naturally-occurring sample of element X.

(3 marks)

B) Atoms can bond together to form compounds. Draw dot-cross diagrams (showing **outer electrons only**) to show the bonding found in the following compounds. For each compound **state what type of bonding is present**.

- i. water
- ii. calcium chloride
- iii. sodium sulfide (12 marks)

C) Write the electronic configurations for the following atoms:

- i. potassium
- ii. neon
- iii. silicon
- iv. oxygen (4 marks)

(Total: 20 marks)

7. While camping, some students came across a small pool of contaminated water. After approval from their camp-leader, they collected some of the contaminated water in an empty jar and they took it with them to school the next day. Whilst in the chemistry lab, the students carried out some tests in order to get to know which chemicals were found in their sample. After a few tests the sample was found to contain:

- Saltwater
- Olive oil
- Sand
- Ammonium chloride

Devise an experiment which the students could carry out in order to obtain **pure sodium chloride crystals** from this mixture and present your work in the form of a laboratory report with the following headings:

- | | |
|--|-----------|
| A) Aim | (1 mark) |
| B) Labelled diagrams of apparatus used | (9 marks) |
| C) Procedure | (9 marks) |
| D) Conclusion | (1 mark) |

(Total: 20 marks)

END OF EXAM