Section A:

1. Write a definition for oxidation and reduction in terms of electrons.

Oxidation - _____

Reduction - _____

2. Using your handout showing the list of common ions and their formulae, complete the table below.

Compound formula	Ions that make up the compound
$Mg(NO_3)_2$	Mg^{2+} and $2\ NO_3^-$
$AgNO_3$	
HCl	
Na_2O	
$CuCl_2$	
$LiOH$	
$CuSO_4$	
H_2CO_3	
$Ca(OH)_2$	
$Al(OH)_3$	

3. Using your knowledge of reduction and oxidation, complete the table below:

A	B	Would A need to gain or lose electrons to become B?	How many electrons?
$H_{(g)}$	$H^+_{(aq)}$		
$Li^+_{(aq)}$	$Li_{(s)}$		
$F_{2(g)}$	$2F^-_{(aq)}$		
$2I^-_{(aq)}$	$I_{2(s)}$		
$2Cl^-_{(aq)}$	$Cl_{2(g)}$		
$Ca_{(s)}$	$Ca^{2+}_{(aq)}$		
$S^{2-}_{(aq)}$		Lose	2
	$Mg_{(s)}$	Gain	2
$Al^{3+}_{(aq)}$		Gain	

Section B

1. State one way in which ionic equations are different to chemical equations.

_____

_____

2. Explain what is meant by the term 'spectator ions'.

_____

3. Using the ionic equation below, complete the gaps in the sentences.

$$Ca_{(s)} + Cu^{2+}_{(aq)} \rightarrow Ca^{2+}_{(aq)} + Cu_{(s)}$$

- *Calcium _____ lose 2 electrons to become _____charged ions.*
- *This loss of electrons means that calcium is _____.*
- *Copper _____ gain 2 electrons to become _____ atoms.*
- *This gain of electrons means that copper is _____.*

4. Copper reacts with hydrochloric acid.

(a) Write the word equation for this reaction.

_____

(b) Write the **balanced** chemical symbol equation for this reaction.

_____

(c) Cross out any spectator ions in the equation in part (b)

(d) Write the ionic equation for this reaction.

_____

5. Potassium reacts with magnesium sulphate solution.

(a) Write the chemical symbol equation for this reaction.

_____

(b) Write the ionic equation for this reaction.

_____

Section C

A student did an experiment to extract copper from copper oxide. They used the following method.

- Mix 1g copper oxide with 2g powdered carbon in a test tube
- Heat the mixture for 5 min
- Leave the mixture to cool

Carbon powder and copper oxide are both a dull, black colour.

Copper metal is a red-orange, shiny colour.

1. The container of copper oxide has the following hazard symbol.

   State what this hazard symbol shows and describe a precaution the student should take when using copper oxide.

   _____
   _____
   _____

2. A gas is produced during this reaction.

   State the name of this gas and describe how to test for it.

   _____
   _____
   _____

3. Suggest what would be observed in the test tube at the end of this experiment.

   _____
   _____

4. Write the balanced chemical equation for the reaction between copper oxide and carbon.

   _____

5. Is this a displacement reaction? Explain how you know.

   _____
   _____

6. Explain whether copper is reduced or oxidised in this reaction.

   _____
   _____
   _____