Q1. An atom of aluminium has the symbol $^{27}_{13}Al$

(a) Give the number of protons, neutrons and electrons in this atom of aluminium.

Number of protons .....

Number of neutrons .....

Number of electrons .....

(3)

(b) Why is aluminium positioned in Group 3 of the periodic table?

.....

.....

(1)

(c) In the periodic table, the transition elements and Group 1 elements are metals.

Some of the properties of two transition elements and two Group 1 elements are shown in the table below.

	Transition elements		**Group 1 elements**	
	Chromium	Iron	Sodium	Caesium
Melting point in °C	1857	1535	98	29
Formula of oxides	CrO Cr_2O_3 CrO_2 CrO_3	FeO Fe_2O_3 Fe_3O_4	Na_2O	Cs_2O

Use your own knowledge **and** the data in the table above to compare the chemical and physical properties of transition elements and Group 1 elements.

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(6)
(Total 10 marks)

Q2. Sodium is a Group 1 element.

(a) (i) A small piece of sodium is added to some water containing Universal Indicator solution.

Describe what you would **see** happening.

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(3)

(ii) Complete **and** balance the equation for the reaction of sodium with water.

.....Na + ...H_2O → ..... + H_2

(2)

(b) Francium is the most reactive element in Group 1.

Explain why in terms of electronic structure.

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(3)

(c) The transition elements have different properties from the elements in Group 1.

Give **two** of these different properties of transition elements.

1 .....

.....

2 .....

.....

(2)
(Total 10 marks)

Q3. Transition elements and their compounds have many uses.

Iron oxide and cobalt oxide have been added to the glazes on pottery for hundreds of years.



(a) State why transition metal oxides are added to pottery glazes.

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(1)

(b) Use the table of ions on the Data Sheet to help you work out the formula of iron(III) oxide.

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(1)

(c) Cobalt oxide is reacted with hydrogen to form cobalt.

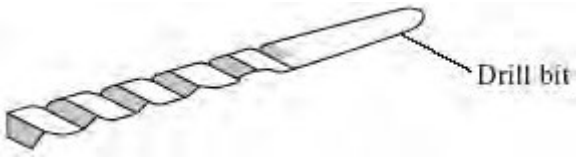
(i) Balance the equation for this reaction.

$Co_3O_4 + \ldots\ldots H_2 \rightarrow 3\,Co + \ldots\ldots H_2O$

(1)

(ii) Cobalt is mixed with other transition metals to make alloys.

These alloys are used to make cutting tools which remain sharp at very high temperatures. They can cut through other metals.



Suggest **two** properties of transition metals that make them suitable for making cutting tools.

1 .....

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2 .....

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(2)
(Total 5 marks)

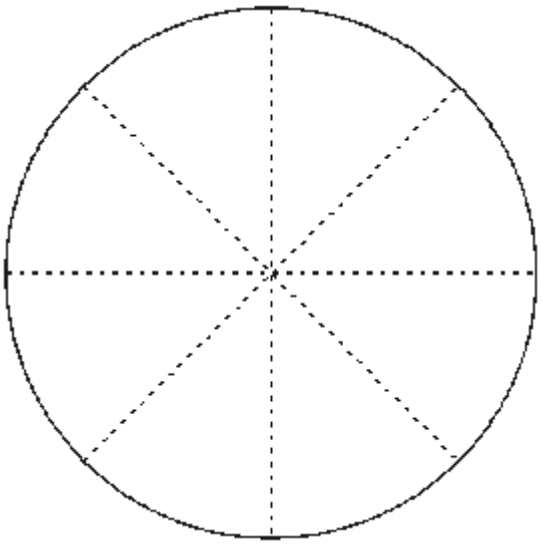
Q4. The table shows the % composition by mass of modern British coins.

COIN	% COMPOSITION BY MASS			
	copper	nickel	tin	zinc
£1	70	5.5	–	24.5
20p	84	16	–	–
5p, 10p, & 50p				
1p &2p (until 1991)	97	–	0.5	2.5
1p &2p (1992 onwards)	Copper plated steel			

(a) Use the Data Sheet to help you to complete the table by filling in the information about 5p, 10p and 50p coins which are made of cupronickel.

(1)

(b) Shade the pie chart to represent the % of copper in a £1 coin.



(1)

(c) Name the metal present in:

(i) all these coins,

.....

(1)

(ii) a £1 coin but **not** in a 20p coin.

.....

(1)

(d) The following is a list of properties.

- bends easily
- good conductor of electricity
- hard
- high melting point
- poor conductor of heat
- unreactive

From this list, choose two properties which coinage metals should have. For each property, give a reason for your answer.

Property 1 .....

Reason .....

Property 2 .....

Reason .....

(2)
(Total 6 marks)