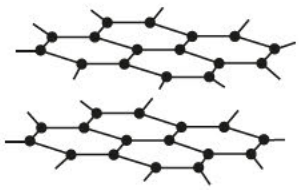
1 Diamond and graphite are two naturally-occurring forms of carbon.

The diagrams below show the arrangement of the carbon atoms in diamond and in graphite. The black dots (•) represent carbon atoms.

Diamond	Graphite
	

(a) Name the type of structure in diamond and explain, in terms of its bonding, why diamond has a high melting point.

(4)

(b) Explain, in terms of its structure, why graphite can act as a lubricant.

(2)

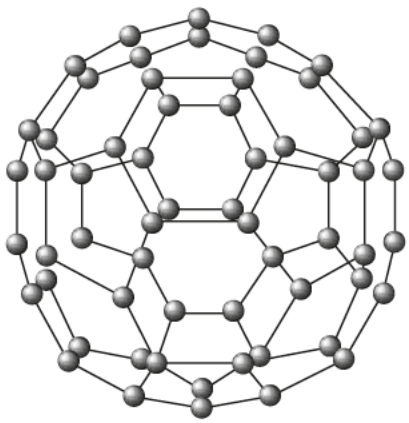
(c) The structure of graphite has one feature in common with that of metals. This feature allows graphite to conduct electricity.

Suggest what this feature is and why it allows graphite to conduct electricity.

(2)

(d) In 1985, a new form of carbon was discovered. It was called buckminsterfullerene after the architect Buckminster Fuller, who designed buildings with complex geometric shapes.

Buckminsterfullerene (C_{60}) has a simple molecular structure containing 60 carbon atoms per molecule. It looks a little bit like a football.

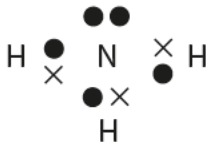


Suggest why buckminsterfullerene has a much lower melting point than diamond.

(2)

(Total for Question 1 = 10 marks)

2 The diagram represents a particle of ammonia.



(a) This particle of ammonia is

(1)

- ☒ **A** an atom
- ☒ **B** an ion
- ☒ **C** a lattice
- ☒ **D** a molecule

(b) Which type of bonding is present in this particle of ammonia?

(1)

- ☒ **A** covalent
- ☒ **B** hydrogen
- ☒ **C** ionic
- ☒ **D** metallic

(c) What is the formula of ammonia?

(1)

.....

(Total for Question 2 = 3 marks)

3 The table shows the names of some substances. It also shows whether each substance is an element or a compound, and the type of bonding in the substance.

(a) Complete the table. One example of each has been done for you.

(3)

Substance	Element or compound	Type of bonding
ammonia		
hydrogen chloride	compound	
oxygen		covalent
magnesium oxide		

(b) What is the formula of magnesium oxide?

(1)

☒ **A** Mg_2O

☒ **B** MgO

☒ **C** MgO_2

☒ **D** Mg_2O_2

(c) Which state symbol represents the physical state of hydrogen chloride at room temperature?

(1)

☒ **A** aq

☒ **B** g

☒ **C** l

☒ **D** s

(Total for Question 3 = 5 marks)