1(a). Kay is a geologist. She takes samples of minerals from a range of rocks.

She tests their melting points and electrical conductivity so that she can work out the bonding and structure of each mineral.

The table shows her results.

Mineral	Melting point in °C	Electrical conductivity of solid	Electrical conductivity when molten	Electrical conductivity when dissolved in water
A	1083	good	good	insoluble
B	1600	does not conduct	does not conduct	insoluble
C	801	does not conduct	good	good
D	373	does not conduct	good	insoluble

Kay thinks minerals **C** and **D** are both ionic compounds with a giant structure.

Explain why Kay thinks this.

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[2]

(b). Compare minerals **A** and **B.** What type of structure and bonding do minerals **A** and **B** have?

Explain your answer.

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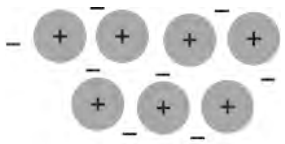
[4]

2.

Explain how the atoms are held together in a metal.

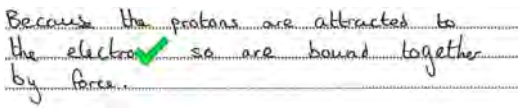
Refer to this diagram in your answer.



---[3]

END OF QUESTION PAPER

Question			Answer/Indicative content	Marks	Guidance
1	a		do not conduct when solid but do when molten so ionic ✓ have a high melting point so giant structure ✓	2	
	b		both have giant structures as both have high melting points ✓ A conducts electricity when solid or molten, B does not conduct electricity ✓ therefore A is a metal with a giant structure ✓ B is a covalent compound with a giant structure ✓	4	
			Total	6	

Question			Answer/Indicative content	Marks	Guidance
2			strong forces/bonds/attraction / electrostatic attractions between ✓ (free/delocalised/sea of) electrons ✓ and positive ions (from metal) ✓	3 (AO 3 × 1.1)	DO NOT ALLOW intermolecular forces IGNORE metal atoms DO NOT ALLOW protons/nuclei <u>Examiner's Comments</u> Most candidates correctly identified the negative particles as electrons. Some thought that they were negative ions. Misconception A very common misconception is that the '+' particles in a metal structure are positive protons. Furthermore, there is confusion (which also occurs in later questions about ionic and covalent bonding) about the various types of bonds. 'Intermolecular forces' is a term often used for any type of force, even for those in a metal. Exemplar 4  Because the protons are attracted to the electron ✓ so are bound together by force. This answer does show correct identification of the negative charges in the diagram (electrons) for one mark. However, the candidate believes the positive charges to be protons, so the description given is that of an atom rather than a metal structure, so only one mark credited.
			Total	3	