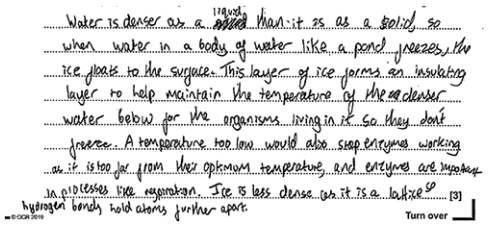
Mark scheme: Biological Molecules - Water

Question			Answer/Indicative content	Marks	Guidance
1			**D ✓**	**1**	**Examiner's Comments** This was answered quite well, although a significant number of candidates opted for the distractors **A** or **B**.
			Total	**1**	
2		i	hydrogen	1	
		ii	molecules are polar (1) (polarity) enables (water) molecules to, attract / bind to, solute molecules (1)	2	
		iii	hydrogen ions used to affect / regulate pH (1) sodium ions used to regulate water potential (1)	2	
			Total	**5**	
3			**1** ice, is less dense than water / floats ✓ **2** ice, provides habitat for some species / AW ✓ **3** (floating) ice insulates (water below) ✓ (aquatic) animals / gametes / spores, can move **4** **or** oxygen / nutrients / resources / AW, can circulate ✓ **5** water is similar density to living organisms ✓ **6** organisms can float ✓	3 max (AO 1.1) (AO 2.1)	**ALLOW** AW for 'ice' throughout, e.g. solid water **2 CREDIT** examples, e.g. penguins / bacteria **4 IGNORE** organisms **4 ALLOW** food particles can move **6 ALLOW** buoyancy **6 ALLOW** any named organism floating **Examiner's Comments** A lot of candidates gained 2 marks for a discussion of the density of idea and its ability to insulate the water below. Fewer candidates also gained a third mark, usually for reference to ice being a habitat, buoyancy, or animals being able to swim. A minority of candidates did not refer to density, and discussed other properties of water, such as specific heat capacity or surface tension, which were not credited.

					Exemplar 2  Water is denser as a liquid than it is as a solid, so when water in a body of water like a pond freezes, the ice floats to the surface. This layer of ice forms an insulating layer to help maintain the temperature of the denser water below for the organisms living in it. So they don't freeze. A temperature too low would also stop enzymes working as it is too far from their optimum temperature and enzymes are important in processes like respiration. Ice is less dense as it is a lattice so hydrogen bonds hold atoms further apart. [3] © OCR 2019 Turn over This response gained 2 marks. The reference to organisms living in it is not sufficiently informative to gain either the 3rd or the 6th marking point. The response then mentions some information about the thermal properties of water, unrelated to density and finally explains the reason for ice's low density without relating this further to the survival of organisms.
			Total	**0**	
4			(good) solvent ✓, high specific heat (capacity) / temperature stability OR described ✓ (high) density (so frog floats / buoyant) ✓ ice is less dense than water ✓	2 max	**ALLOW** it has <u>oxygen</u> dissolved in it **IGNORE** 'high heat capacity', 'no temperature change', **IGNORE** 'specific latent heat' **<u>Examiner's Comments</u>** This question asks candidates to match what they know about the properties of water to how this makes water a good habitat. The majority of responses gave 'a high specific heat capacity' as one property. Many candidates added 'ice is less dense than water' or water being a 'good solvent' to gain the second mark.
			Total	**2**	