

Mark scheme: Biological Molecules - Water

Question		Answer/Indicative content	Marks	Guidance
1		D ✓	1	<p>Examiner's Comments</p> <p>This was answered quite well, although a significant number of candidates opted for the distractors A or B.</p>
		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		<p>1 ice, is less dense than water / floats ✓</p> <p>2 ice, provides habitat for some species / AW ✓</p> <p>3 (floating) ice <u>insulates</u> (water below) ✓</p> <p>(aquatic) animals / gametes / spores, can move</p> <p>4 or</p> <p>oxygen / nutrients / resources / AW, can circulate ✓</p> <p>5 water is similar density to living organisms ✓</p> <p>6 organisms can float ✓</p>	<p>3 max (AO 1.1)</p> <p>(AO 2.1)</p>	<p>ALLOW AW for 'ice' throughout, e.g. solid water</p> <p>2 CREDIT examples, e.g. penguins / bacteria</p> <p>4 IGNORE organisms</p> <p>4 ALLOW food particles can move</p> <p>6 ALLOW buoyancy</p> <p>6 ALLOW any named organism floating</p> <p>Examiner's Comments</p> <p>A lot of candidates gained 2 marks for a discussion of the density of ice 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.</p>

				<p>Exemplar 2</p> <p>Water is denser as a solid^{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 colder water below for the organisms living in it so they don't freeze. A temperature too low would stop enzymes working as it is too far from their optimum temperature and enzymes are made in a cell so they like oxygenation. Ice is less dense as it is a lattice of hydrogen bonds hold atoms further apart.</p> <p style="text-align: right;">Turn over</p>
		Total	0	
4		<p>(good) solvent ✓, high specific heat (capacity) / temperature stability OR described ✓</p> <p>(high) density (so frog floats / buoyant) ✓ ice is less dense than water ✓</p>	2 max	<p>ALLOW it has <u>oxygen</u> dissolved in it IGNORE 'high heat capacity', 'no temperature change', IGNORE 'specific latent heat'</p> <p>Examiner's Comments</p> <p>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.</p>
		Total	2	