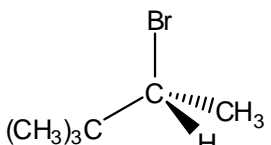
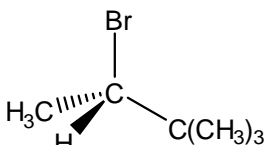
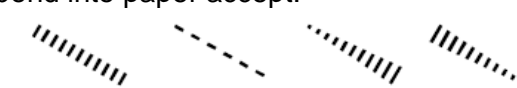


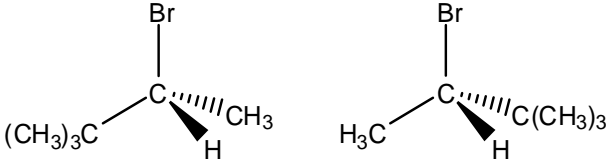
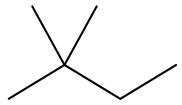
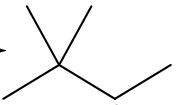
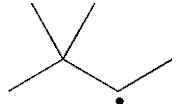
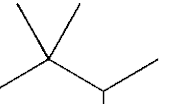
## Mark Scheme

Question	Answer	Marks	AO element	Guidance
1	A	1	AO1.2	

## Mark Scheme

Question			Answer	Marks	AO element	Guidance
2	(a)	(i)	2-bromo-3,3-dimethylbutane ✓	1	1.2	<p><b>IGNORE</b> lack of hyphens or addition of commas</p> <p><b>ALLOW</b> 3,3-dimethyl-2-bromobutane</p> <p><b>DO NOT ALLOW</b> 2-bromo-3-dimethylbutane methy for methyl methly for methyl brom for bromo</p>
	(b)	(i)	<p><b>Stereoisomers</b> Same structural formula <b>AND</b> Different arrangement (of atoms) in space <b>OR</b> different spatial arrangement (of atoms) <b>AND</b> <b>Type: Optical</b> ✓</p>	1	1.2	<p><b>ALLOW</b> structure/displayed/skeletal formula</p> <p><b>DO NOT ALLOW</b> same empirical formula <b>OR</b> same general formula</p> <p><b>IGNORE</b> same molecular formula <b>IGNORE</b> references to chiral molecules/compounds</p>
		(ii)	<p>One 3D structure with correct groups attached to the chiral C ✓</p> <p>Two 3D structures of <math>(\text{CH}_3)_3\text{CCHBrCH}_3</math> that are mirror images <b>AND</b> correct connectivity in both ✓</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>	2	<p><b>2.5</b></p> <p><b>1.2</b></p>	<p><b>ALLOW</b> small slip in one of the groups OR use of <math>\text{C}_4\text{H}_9</math></p> <p>3D structures must have four central bonds with <b>at least two wedges</b>.</p> <p>For bond into paper accept:</p> <div style="text-align: center;">  </div> <p><b>ALLOW</b> two 3D structures with 2 groups swapped e.g.</p>

## Mark Scheme

Question	Answer	Marks	AO element	Guidance
				
(c)	<div style="border: 1px solid black; padding: 5px;"> <p><b>Initiation</b>  <math>\text{Br}_2 \rightarrow 2\text{Br}\cdot</math> ✓</p> <hr/> <p><b>Propagation</b></p> <p>  + <math>\text{Br}\cdot \rightarrow</math>  + <math>\text{HBr}</math> ✓         </p> <p>  + <math>\text{Br}_2 \rightarrow</math>  + <math>\text{Br}\cdot</math> ✓         </p> </div>	3	1.2    2.5x2	<p><b>ALLOW</b> <math>\text{Br}_2 \rightarrow \text{Br}\cdot + \text{Br}\cdot</math>  <b>IGNORE</b> dots for initiation step,  i.e. <b>ALLOW</b> <math>\text{Br}_2 \rightarrow \text{Br} + \text{Br}</math> <b>OR</b> <math>\text{Br}_2 \rightarrow 2\text{Br}</math></p> <p><b>DOT REQUIRED</b> at correct position on chain.</p> <p><b>ALLOW 1 mark</b> if both propagation equations are correct by atom but dot(s) missing or on incorrect C in chain</p> <p><b>ALLOW 1 mark</b> if both propagation equations are correct including position of dot(s) but structures are not shown using skeletal formula</p> <p><b>ALLOW</b> ECF from incorrect intermediate</p>

## Mark Scheme

Question		Answer	Marks	AO element	Guidance
	(d)	further substitution/s <b>OR</b> produces different termination products <b>OR</b> More than one termination step <b>OR</b> Mixture of products are formed ✓  substitution at different positions along chain ✓	2	1.1×2	<b>ALLOW</b> dibromo/multibromo compounds formed <b>OR</b> an example of a further substitution product <b>OR</b> an example of a different termination product <b>ALLOW</b> more than one hydrogen (atom) can be replaced <b>ALLOW</b> radicals react with each other to form other products <b>IGNORE</b> references to separation of products <b>IGNORE</b> references to atom economy or yield  <b>ALLOW</b> a hydrogen (atom) on a different carbon (atom) can be replaced