Question	Part	Step	Answer	Mark scheme
1	a	5th 5th	a substance that contains hydrogen and carbon only	**2 marks** – 1 for each point
	b	6th 6th	carbon dioxide water [Allow in either order.]	**2 marks** – 1 for each point
	c	5th	**C** carbon monoxide	**1 mark**
2	a	5th	Any one from: ● bright, white flame ● white ash left	**1 mark**
	b	5th	**C** oxidation	**1 mark**
	c	6th 6th	0.8 g (of oxygen) the total mass before and after is the same/mass of magnesium oxide – mass of magnesium	**2 marks** – 1 for each point
3	ai	7th	transfers energy, so the temperature of the surroundings increases	**1 mark**
	aii	5th	fuel, heat and oxygen	**1 mark** – All three needed for the mark
	aiii	3rd	**C** oxidising	**1 mark**
	bi	5th	the fuel used/ethanol and propanol	**1 mark**
	bii	5th	the temperature rise (of the water)	**1 mark**
	biii	4th 4th	Any two from: ● volume or mass of water and use the same volume or mass of water ● height of the calorimeter/beaker above the flame, and use the same height ● size of flame, and use the same size of flame [Do not allow same mass of fuel/ethanol and propanol.] [Do not allow same time, because that is given in the question.]	**2 marks** – 1 for each point
4	a	5th	Any one from: ● burning any type of fuel that releases carbon dioxide ● deforestation ● livestock farming ● respiration	**1 mark**

Question	Part	Step	Answer	Mark scheme
	b	**5th**	Any one from: ● climate change ● more storms ● more floods ● more droughts ● rising sea levels ● melting glaciers/ice caps ● global warming ● increase in greenhouse effect	**1 mark**
5	**ai**	**5th**	a small particle from which all substances are made	**1 mark**
	aii	**5th**	a single substance made up of only one type of atom/a substance that cannot be broken down any further	**1 mark**
	aiii	**5th**	a substance that can be split up into simpler substances/a substance that contains two or more elements chemically joined together	**1 mark**
	bi	**6th**	**D** copper	**1 mark**
	bii	**6th**	**D** potassium	**1 mark**
	ci	**7th**	C_2H_6 [Allow H_6C_2]	**1 mark**
	cii	**7th**	3 g	**1 mark**
	di	**6th**	**A** alkali metals	**1 mark**
	dii	**6th** **6th**	lithium hydroxide hydrogen [Allow in either order.]	**2 marks** – 1 for each point
6	**a**	**6th**	liquid	**1 mark**
	b	**6th**	52 °C ± 2 (as there is no grid on the graph)	**1 mark**
	c	**7th** **7th**	the extra energy supplied by heating is used to overcome the forces between the particles so particles escape from the liquid	**2 marks** – 1 for each point
7	**a**	**6th** **6th**	a substance that speeds up/increases the rate of a reaction but is not used up/the mass stays the same	**2 marks** – 1 for each point
	bi	**6th** **6th**	oxygen water [Allow in either order.]	**2 marks** – 1 for each point
	bii	**6th**	2 : 3 [Allow 1 : 1.5]	**1 mark**
	c	**5th**	**B** copper	**1 mark**
	di	**5th** **5th**	effervescence/fizzing/stream of bubbles magnesium disappears/dissolves; colourless solution left [Do not allow gas/hydrogen given off.]	**2 marks** – 1 for each point

Question	Part	Step	Answer	Mark scheme
	dii	9th 9th	$Mg + H_2SO_4 \rightarrow MgSO_4 + H_2$	**2 marks** – 1 mark for LHS, 1 mark for RHS
8	a	4th	**B** student 3; student 5	**1 mark**
	b	4th	temperature rise: 5 °C/student 4	**1 mark**
	c	6th	Any one from: ● the magnesium ribbon was shorter than 3 cm ● the reaction was not finished *or* the student did not wait long enough before measuring the final temperature [Do not allow the volume of acid was less than 20 cm^3.]	**1 mark**
9		7th 8th 7th 8th	the atoms/particles are all the same size in the pure metal so the layers of atoms can slide over each other (when a force is applied) the atoms/particles are different sizes in an alloy and this disrupts the structure/prevents the layers from sliding over each other	**4 marks** – 1 for each point
10	a	7th 7th	smaller crystals are formed when the magma cools quickly/larger crystals are formed when the magma cools slowly there is less time for the crystals to form when the magma cools quickly/there is more time for the crystals to form when the magma cools slowly	**2 marks** – 1 for each point
	b	5th 5th	heat pressure	**2 marks** – 1 for each point
	c	5th 5th	water gets into cracks it expands when it freezes (forcing the crack to get bigger)	**2 marks** – 1 for each point
	d	6th 6th	dead plants or animals fall to the sea bed covered with layers of sediment	**2 marks** – 1 for each point
	e	5th	metamorphic	**1 mark**
	f	5th 5th	Any two from: ● less damage to the environment from mining/quarrying ● reduces pollution from mining or quarrying ● reduces amount sent to landfill ● allows supplies of metal (ores) to last longer ● uses less energy than extracting the metal from its ore	**2 marks** – 1 for each point

Final Step Calculation

Marks	Step
1–5	Below 3rd
6–11	3rd
12–21	4th
22–32	5th
33–42	6th
43–50	7th
51–55	8th
56–60	9th