

Question		Answer	Marks	Guidance
1	(a)	<p>any two from: lithosphere includes the crust (1) lithosphere includes outer part / upper part of the mantle (1)</p> <p>lithosphere is (relatively) cold (1) lithosphere is rigid (1) lithosphere is made up of tectonic plates or correctly named plates continental / oceanic (1)</p>	2	<p>not lithosphere includes the core not lithosphere includes the atmosphere</p>
	(b)	<p>to forecast future eruptions (1)</p> <p>to reveal information about the structure of the Earth (1)</p>	2	<p>allow to forecast the magnitude of the eruption ignore to forecast earthquakes</p> <p>allow to find out how volcanoes work / to find out how lava moves</p>
Total			4	

Question	answer	Marks	Guidance
2	<p>[Level 3] One explanation why the levels of pollution have decreased and an explanation as to why it is important that atmospheric pollution is controlled. Explanations illustrated by a balanced symbol equation or word equation. Quality of written communication does not impede communication of the science at this level (5 – 6 marks)</p> <p>[Level 2] One explanation why the levels of pollution have decreased and an explanation as to why it is important that atmospheric pollution is controlled. Quality of written communication partly impedes communication of the science at this level (3 – 4 marks)</p> <p>[Level 1] One explanation why the levels of pollution have decreased or an explanation as to why it is important that atmospheric pollution is controlled. Quality of written communication impedes communication of the science at this level (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to A. Indicative scientific points at level 3 must include:</p> <ul style="list-style-type: none"> • $2\text{CO} + 2\text{NO} \rightarrow \text{N}_2 + 2\text{CO}_2$ • $2\text{CO} + \text{O}_2 \rightarrow 2\text{CO}_2$ • $2\text{NO} \rightarrow \text{O}_2 + \text{N}_2$ • carbon monoxide + nitric oxide \rightarrow nitrogen + carbon dioxide • carbon monoxide + oxygen \rightarrow carbon dioxide • nitric oxide \rightarrow nitrogen + oxygen <p>Relevant points at all levels could include explanations</p> <ul style="list-style-type: none"> • carbon monoxide and oxides of nitrogen emissions from road transport has decreased due to increased used of catalytic converters on vehicles • catalytic converter removes carbon monoxide and oxides of nitrogen and converts them to nitrogen and carbon dioxide • less sulfur dioxide because less coal is burnt or sulfur is now removed from diesel • more efficient combustion of fuels to reduce carbon monoxide <p>needs to be controlled because:</p> <ul style="list-style-type: none"> • air pollution travels everywhere • atmospheric pollution affects the environment • atmospheric pollution affects people’s health / can trigger asthma • these effects will get worse unless atmospheric pollution is controlled • want to have less acid rain (due to sulfur dioxide) • sulfur dioxide or nitrogen oxides causes acid rain • carbon monoxide is toxic • want to have less photochemical smog • want to reduce greenhouse gases
	Total	6	

Question		Answer	Marks	Guidance
3	(a)	<p>any one from:</p> <p>equipment required to predict eruptions is expensive (1)</p> <p>not enough geologists (to study all the volcanoes in the world) (1)</p> <p>eruptions may occur in remote parts of the world / eruptions may be underwater (1)</p> <p>difficult to research magma beneath the Earth's surface (1)</p>	1	<p>allow insufficient evidence to predict eruptions / difficult to spot the indicators of an eruption / no warning signs (to help predict eruption)</p> <p>allow there were new volcanoes that had not erupted before</p> <p>ignore idea of uncertainty in prediction</p> <p>allow have not got equipment to investigate the mantle</p>
	(b)	<p>any two from:</p> <p>It explains a wide range of evidence / there is (now) more evidence / there is (now) lots of evidence (1)</p> <p>subsequent research has supported the theory (1)</p> <p>it has been tested (1)</p>	2	<p>allow examples of specific evidence eg</p> <ul style="list-style-type: none"> • similar fossils found in Africa and South America • evidence of sea-bed spreading • accurate measuring of the movement of tectonic plates
		Total	3	

Question		Answer	Marks	Guidance
4	(a)	78 % (1)	1	allow any percentage between 77% and 79%
	(b)	no (0) idea that people were not burning fossil fuels to the same extent prior to 1800 (1) up to 1800 the level of carbon dioxide remained constant (1) BUT idea that despite the increase in population up to 1800 the carbon dioxide levels remained constant (2)	2	allow yes (0) because both the carbon dioxide level and the population increased from 1800 or because as the population increases the demand for energy e.g. burning fuels / using cars increases (1) ignore references to respiration
		Total	3	

Question		Answer	Marks	Guidance
5	(a)	<p>[Level 3] Answer comprehensively describes the theory of plate tectonics and uses this to explain subduction. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] An attempt is made to describe the theory of plate tectonics and subduction. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] An attempt is made to describe the theory of plate tectonics or subduction. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to A/A*</p> <p>Indicative scientific points at Level 3 may include:</p> <ul style="list-style-type: none"> • convection currents in the mantle cause plates to move • ocean floor (oceanic plate) more dense than continents (continental plates) • plates cooler at ocean margins so sink and pull plates down, ocean floor goes under continent • (partial) re-melting occurs • tectonic plates are less dense than the mantle <p>Indicative scientific points at Levels 1 and 2 may include:</p> <ul style="list-style-type: none"> • upper layer of Earth is made up of tectonic plates • idea that the tectonic plates move slowly • subduction happens when two plates collide • oceanic and continental plates collide • subduction may cause mountain forming and/or volcanic activity • during subduction one plate goes underneath the other

Question		Answer	Marks	Guidance
5	(b)	<p>any two from:</p> <p>because idea that crust is too thick (to drill through) / AW (1)</p> <p>references to increased temperature (as mantle or core or centre of Earth is approached) / AW (1)</p> <p>scientists need to use seismic waves / shock waves produced by earthquakes or man made explosions (1)</p>	2	<p>allow idea that no-one has dug all the way to the mantle (1) e.g. can't get deep enough</p> <p>allow it is too hot (inside the Earth) (1)</p>
		Total	8	

Question	Answer	Marks	Guidance
6 a	<p>idea that amount of CFCs rises at first and then gradually decreases (1)</p> <p>use of CFCs banned (about 1992-1995) (1)</p>	2	<p>allow the amount peaked and then went down</p> <p>ignore reference to actual years</p> <p>allow laws introduced to ban use of CFCs</p> <p>ignore idea that there was evidence that CFCs were dangerous</p>
b	<p>any three from:</p> <p>(idea that at first CFCs were welcomed because) they had many uses (1)</p> <p>idea that they are inert / non-toxic / do not react (1)</p> <p>idea that later CFCs were linked to ozone depletion (1)</p> <p>idea that scientists wanted (use of) CFCs to be banned (1)</p>	3	<p>allow CFCs were used as refrigerants, aerosols etc</p> <p>seems like a good thing when first discovered / were very useful are not sufficient</p> <p>harmless or safe to use are insufficient</p> <p>allow reacts with ozone in (upper) atmosphere / destroys the ozone layer / damages the ozone layer / makes ozone holes</p>
	Total	5	