Question	Answer	Marks
6(a)(i)	*any three of:* within the tropics; (mainly) close to coasts; more on east coasts (than west coasts); especially between Asia and Oceania / in the Pacific; some in middle of oceans (around islands); list of the areas;	3
6(a)(ii)	too cold / AVP;	1
6(b)	positive relationship OWTTE; anomaly at 220 coral species;	2
6(c)(i)	*all three correct, in the same order and correct shading [2]* *one correct and correct shading [1]* *all three correct but no shading / incorrect shading [1]*	2
6(c)(ii)	Oceania; *allow any answer in range of:* 58–59; low;	3
6(c)(iii)	*any three of:* variance in protection methods; enforcement of protection; demand for fish; for example, population size, good infrastructure, eat a fish diet etc.; some reefs are more productive therefore more fishing is done; education of those who catch fish; accessibility of reefs;	3
6(c)(iv)	*any one of:* growth of population / growth of demand; technology, such as sonar; increase in size of, boats / nets;	1

Question	Answer	Marks
6(c)(v)	*any four of:* quotas; international agreements; banning fishing in certain areas; increase size of net apertures; smaller nets; no fishing during breeding season; increased use of aquaculture; use of sustainable fishing methods, e.g. rod and line;	4
6(d)(i)	phytoplankton;	1
6(d)(ii)	(*phytoplankton*), zooplankton, corals, fish, (*seals*);; *(if answer incorrect, allow one mark for two correct organisms [1])*	3

Question	Answer	Marks
6(e)	*any two from each category, up to max six:* *oil refinery:* oil causes birds' feathers to lose ability to regulate body temperature / so they cannot fly / so they lose their waterproofing; birds / fish, may swallow oil which is poisonous / eggs or larvae killed by oil; eggs / larvae, of many fish killed by oil; oil damages fish gills so they die from lack of oxygen; oil on the surface stops photosynthesis so phytoplankton die / reduces dissolved oxygen / suffocates fish; oil clumps onto the sea bed and coats coral / other organisms; *farming:* release of pesticides may poison, fish / other marine life; excess, fertilizer / animal waste, can lead to, algal blooms / causes eutrophication; dead / decaying algae / plants, decrease oxygen levels so marine animals die; soil erosion / sediment, washed into the water kills corals; *lead mining and processing:* lead (which is a heavy metal) is, poisonous / toxic; invertebrates and other sea-bed feeders ingest lead; concentrates in organs such as the liver as little lost through faeces; so such organisms are very toxic to consumers; bioaccumulation of lead can occur; acid from lead processing lowers the pH of seawater; lead affects the nervous system of fish;	**6**

Question	Answer	Marks
6(f)	*Level of response marked question:* Level 3 [5–6 marks] Must include an international dimension for this level. Answer will give details of problems of controlling pollution. Level 2 [3–4 marks] Answers will cover a number of aspects with limited explanation **or** maybe one reason in depth. Level 1 [1–2 marks] Answer may well be a list or descriptive rather than an explanation **or** may provide a basic explanation of one or two points. A list of sources of pollution but no methods of control would achieve max Level 1. No response or no creditable response [0]. *Level of response marking indicative content:* *Marine pollution spreads with ocean currents and so its effects are not limited to the area offshore from the polluter; so if some*	**6**

Question	Answer	Marks
2(a)(i)	snow melt;	**1**
2(a)(ii)	*any two from:* to prevent / reduce, flooding; to store / supply, water (to Los Angeles / city); HEP; irrigation;	**2**
2(a)(iii)	there is plenty of water available (in the mountains) where few people live and there are cities where water shortages will occur (in the dry summers);	**1**
2(a)(iv)	*any two from:* evaporation; infiltration; precipitation; condensation; surface run-off; throughflow; groundwater flow;	**2**
2(b)	*any four from:* reduces in volume qualified; increases in volume qualified: polluted by discharges of industrial waste; oil spills; polluted by sewage disposal; especially if drains overflow / after heavy rains; polluted by, rubbish / litter; less, animal / plant life ; may be in culvert / covered over; artificial / concrete, channel; straightened;	**4**

6(a)(i)	*any two from:* trawl dragged along sea-floor; chain / frame, holds trawl open / allows it to sink; fish, enter net / are trapped (at narrow end); fish loaded onto trawler;	**2**
6(a)(ii)	*any two from:* heavy chains dig into the sea-floor / skids cut grooves in the sea-floor / sediment disturbed; (both) destroy, sea-floor habitats / food sources / plants / animals / e.g. corals; parts of the trawl left on sea-floor causing, damage / pollution; lack of time for sea-floor to recover;	**2**
6(a)(iii)	when more fish are caught than can be replaced (by breeding) / fishing that is not sustainable;	**1**

Question	Answer	Marks
6(a)(iv)	*any three from:* large / increasing, human population; large / increasing, demand / need for fish; better, technology / fish detection; example of improved technology, e.g. sonar, freezer trawler; big nets / large number of fishing boats / bigger boats; small mesh size; lack of, regulation / policing;	**3**
6(a)(v)	*any three from:* fish population decreases; loss of food for, predators / consumers / species higher up the food chain; so their numbers decrease / death of predators; predators will feed on other prey species / other prey species decrease; increase in, species lower down the food chain / plankton;	**3**
6(b)(i)	20;	**1**
6(b)(ii)	*any three from:* overall increase / increases from 2005 or 2007 to 2014; no increase 2005–2007; small increase 2007–2009; large increase since 2009; greatest yearly increase between 2011 and 2012; data to illustrate change, including at least two figures or calculation of change;	**3**
6(c)(i)	152;	**1**
6(c)(ii)	56;; *(if answer incorrect, allow one mark for 152–96 [1]);*	**2**
6(c)(iii)	fish stocks are, increasing / improving / recovering;	**1**

Question	Answer	Marks
6(c)(iv)	*any three from:* increase mesh size; ban fishing in certain areas; ban fishing for particular species; allow fishing for only part of the year / avoid fishing in breeding seasons; licences or permits or sensible legislation; authorities should eliminate hidden subsidies, e.g. subsidising the cost of fuel for travelling to fishing grounds;	**3**
6(d)(i)	2006;	**1**
6(d)(ii)	2003–2005;	**1**
6(d)(iii)	7.4;	**1**
6(d)(iv)	*any three from:* some cyclones more powerful; those that reach land cause more damage; some hit, populated areas / high density of buildings; some hit low-lying areas; damage more costly to repair in developed nations; areas less prepared / areas without defences suffer more damage / houses not as strong;	**3**
6(d)(v)	correctly marked at 8,42;	**1**
6(d)(vi)	*any two from:* no relationship; no best fit line / damage does not increase with frequency; data to justify answer;	**2**
6(d)(vii)	*any three from:* warm water / ocean temp 27 °C or greater; energy from evaporation; warm air rises (quickly); causing low pressure; draws in more air at ocean surface; the air spins due to the, Coriolis effect / Earth's rotation; cold air sinks in centre; increase in atmospheric energy due to global warming;	**3**

Question	Answer	Marks
6(e)	*Level of response marked question:* Level 3 [5–6 marks] Detailed explanations of pollutants, reduction and challenges. Needs to reach a conclusion based on the evidence presented. Level 2 [3–4 marks] Some explanation of a source of pollution, how it can be reduced and an idea about the challenges faced. Level 1 [1–2 marks] Limited reference to pollution sources and their reduction. Little or no explanation. No response or no creditable response [0]. *Level of response marking indicative content:* Expect candidates to deal with major pollution sources in oceans, such as oil spills, sewage, plastics and possibly fertilisers / heavy metals. It is not necessary to cover all of these. The main focus should be on whether the sea pollutants	**6**

Question	Answer	Marks
2(a)(i)	two lines in correct positions (e.g. at 61 and 71 or at 61 and 90); segments correct to key;	**2**
2(a)(ii)	90(%);	**1**
2(a)(iii)	*any four from:* increased demand (from growing population); increased size of fishing vessels / vessels go further from shore; development of factory ships; more effective fishing methods / new technology used; e.g. sonar to find fish shoals / satellite technology; increased size of nets / drift nets (as large as one km wide); fishers get a good price for the fish so catch as many as possible; illegal nets / fishing illegally / overfishing / ignoring quotas; no enforcement of rules / no rules / fishing during breeding season; lack of education over the consequences of overfishing;	**4**
2(b)(i)	*any two from:* a limit is set for the number of a type of fish that can be caught (within a time period); fishing then has to stop; leaves enough fish for stocks to increase / prevents overfishing;	**2**
2(b)(ii)	*any one from:* some fish caught that are not allowed / bycatch, often die before they are returned to the sea; quotas may be, incorrectly set / too high;	**1**

Question	Answer	Marks
6(a)(i)	157.0;	1
6(a)(ii)	*any three from:* wild fish catch greater than farmed fish catch; total fish catch has increased each year / valid data on total fish catch, e.g. overall increase of 29 million tonnes / from 137.3 to 166.3 million tonnes; amount of wild fish catch, has fluctuated / is fairly constant / increased slightly / valid data on wild fish catch, e.g. range of 1.8 million tonnes / 88.6 to 90.4 million tonnes; amount of farmed fish has increased (each year) / valid data on farmed fish catch, e.g. increased from 47.3 to 75.9 million tonnes / increased by 28.6 million tonnes;	3
6(a)(iii)	*any two from:* decreasing wild fish stocks / overfishing; increase in demand (for fish) / increase in world (human) population; prices make farmed fish more economical; improved fish farming techniques; more fish farms;	2

Question	Answer	Marks
6(b)	*any three from:* restriction on, numbers caught / size caught / quotas / laws / licensing / boat numbers; limits to fishing areas / marine reserves / restricted areas; seasons for fishing (to avoid, spawning / breeding season); smaller nets / types of nets / fishing type; larger mesh size / shape of mesh;	3
6(c)	*any three from:* data is based on samples; not all fishermen declare catch / illegal fishing; governments or countries may under-report catch / no enforcement of quotas; data might not include bycatch; some species not included in the recording;	3

Question	Answer	Marks
8(a)	*any three from:* at, edges of seas / coastlines; mainly between the tropics; in the Indian Ocean; in the Pacific Ocean; (high concentration) in Oceania; east coast of Africa; Caribbean / central America / south of North America;	**3**

Question	Answer	Marks
8(b)(i)	*any two from:* climate change / increasing sea temperatures; chemical / oil, pollution; acidification of the sea; disease; human damage by, collecting / boats / fishing / tourism;	**2**
8(b)(ii)	150 000;	**1**
8(c)	*any three from:* difficult to accurately outline the area or restrict access; coral reef may be in the territory of more than one country and all countries need to agree; difficult to patrol; reduces income of local people who use the coral reef; coral reefs bring in money from tourists; (oil) pollution in ocean currents cannot be prevented from entering marine ecological reserves;	**3**

Question	Answer	Marks
2(a)	*any one from:* to keep fish in; to keep, predators / other fish, out; to control diet; so fish, live / breed, in their natural ecosystem; to, harvest / monitor, fish easily;	1

Question	Answer	Marks
2(b)	*any two from:* regulation of, mesh size / net design; other species-specific methods, e.g. pole and line; fishing quotas ; closed seasons; protected areas / reserves; conservation laws; international agreements / implementation / monitoring;	2
2(c)	*any two from:* parasites / sea lice; disease; habitat destruction; pollution from waste; invasive species; use of antibiotics;	2

Question	Answer	Marks
5(a)	*any three from:* situated on, the coast / coastlines; of western mainland Scotland / owtte; of islands, to north(east) / in North Sea; of islands, to (north)west / in Atlantic Ocean;	3
5(b)(i)	*any two from:* pesticides enter the ocean; (possible) toxic effect on marine life; impact on, food web / ecosystem; bioaccumulation;	2
5(b)(ii)	change identified as 20 000 000; (20 000 000 ÷ 2 000 000 × 100 =) 1000%;	2
5(b)(iii)	*any two from:* wrasse are being caught from the wild; impact on ecosystems from, removal / addition, of fish; wrasse are being caught at a greater rate than being replaced; wrasse normally live in England not Scotland; fish might escape from fish farms; bycatch;	2

Question	Answer	Marks
5(b)(iv)	*any four from:* easier to catch / guaranteed catch; controlled feeding; controlled breeding; controlled harvesting; control of disease; faster growth / greater yield; less predation; breeding of improved stock rather than wild types; no bycatch; less damage to seabed;	4

Question	Answer	Marks
2(a)	shovelling / sweeping overboard / putting back in the sea; because bycatch is unwanted species caught during fishing (for target species);	2
2(b)(i)	*any two from:* decline of fish stocks; reduction / extinction of fish species / biodiversity; death of bycatch; alteration to food, chain / web; causing death of, birds / sharks / dolphins / turtles / predators;	2
2(b)(ii)	*any two from:* changing fishing practice / education; modifications to, fishing gear / net type / mesh size; reduce / ban, fishing in hotspots / closed season (create) reserves; quotas; laws / international agreements; fish farming;	2

Question	Answer	Marks
5(a)(i)	bar for trout plotted from 5.0 to 6.5 with same width as other bars;	1
5(a)(ii)	bacteria;	1

Question	Answer	Marks
5(a)(iii)	*any four from:* fewer types of organisms / some organisms die / less biodiversity; population of carp decreases; population of snails decreases; population of, bacteria / frogs / perch / insects / plants, unchanged / increased; trout may decrease (as at edge of pH range); AVP;	4
5(b)(i)	*any five from:* oxides of nitrogen; released into air (by reaction at high temperatures)from engines/ vehicles/ cars; sulfur dioxide; released into air by combustion of fossil fuels; by named source, e.g. vehicles, factories, industry; dissolves in water (in atmosphere); reduces pH (of rain); precipitation as (dilute), sulfuric / nitric, (acid rain);	5
5(b)(ii)	*any three from:* reduce vehicle emissions; introduce transport policies/ use of electric vehicles/ examples e.g. car pooling; use catalytic converters on vehicles; reduce combustion of fossil fuels; use renewable energy; conserve energy / reduce energy waste; use flue-gas desulfurisation in chimneys/ low sulfur fuels; follow international agreements/ emissions legislation; AVP;	3