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**ENVIRONMENTAL MANAGEMENT**

**5014/12**

Paper 1

**May/June 2017**

MARK SCHEME

Maximum Mark: 120

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**Published**

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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**PUBLISHED****Section A**

Question	Answer	Marks
1(a)(i)	<p><i>any three of:</i>  low;  flat;  valley / valley floor;  foot of slope / bottom of hill;  grass / shrubs / bushes / trees;  (semi) desert / bare soil;</p>	<b>3</b>
1(a)(ii)	<p><i>any two of:</i>  they are on low(er) ground / in a valley / are usually on high(est) ground / hill / not on high(est) ground / hill;  winds stronger on higher ground;  mountains / hills block wind;</p>	<b>2</b>
1(a)(iii)	<p><i>any two advantages plus one disadvantage OR any two disadvantages plus one advantage:</i></p> <p><i>advantages:</i>  away from population / remote / isolated / empty area;  poor quality land / cheap land / large area;  railway to bring raw materials;</p> <p><i>disadvantages:</i>  no nearby, market / industries / settlements / lengthy transmission lines / remote;  no water for cooling;  no nearby labour force;</p>	<b>3</b>
1(b)	<p><i>any two of:</i>  high / good rainfall;  rain, throughout the year / well distributed;  temperatures above freezing point / warm / mild winters;  little evaporation;</p>	<b>2</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
2(a)(i)	86 000;	<b>1</b>
2(a)(ii)	snow melt;	<b>1</b>
2(a)(iii)	onshore winds drive sea water onto the, land / coast / inland; low air pressure causes sea (surface) to rise;	<b>2</b>
2(a)(iv)	<i>any three of:</i> sewers overwhelmed; water supplies become contaminated / lack of safe water; <u>spread</u> of named disease, i.e. diarrhoea / cholera / typhoid; mosquitoes breed in (stagnant) water; malaria; chest infections; contaminated food supplies (in fields / stores / shops / homes); disease spreads easily in crowded relief camps;	<b>3</b>
2(b)	<i>any three of:</i> farmers lose income as, crops / animals, destroyed / washed away / killed; loss of power reduces, output / sales; industries that use water lose, productivity / sales; loss of output as, factories / offices, damaged; workers unemployed so no income; floods take long time to subside so long term effects on economy; transport routes damaged so transport costs increase / cannot ship goods; high restoration / rebuilding costs; exports reduced, reducing income; tourism industry in dam area reduced; high cost of, rescue / relief / treatment;	<b>3</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
3(a)(i)	September;	<b>1</b>
3(a)(ii)	<i>any two of:</i> shorter duration / 2 months difference; 4 months versus 6 months; August to November versus July to December;	<b>2</b>
3(b)(i)	<i>any three of:</i> ozone protects from / absorbs UV rays from, the Sun; (protects from) skin cancer / sunburn; (protects from) cataracts / eye damage; (protects from) (DNA) mutations; (protects from) damage to the immune system; reduction in ozone / more UV, decreases photosynthesis reducing rates of crop growth;	<b>3</b>
3(b)(ii)	chlorofluorocarbon / CFC / halon / methyl bromide / methyl chloroform / HCFC / tetrachloroethane / trichloroethane / NO / NO <sub>2</sub> / N <sub>2</sub> O / NO <sub>x</sub> ;	<b>1</b>
3(c)	<i>any three of:</i> not all countries, may enforce the ban / agree the ban; CFCs / halogens / chemicals, that destroy ozone are, stable / stay in the atmosphere a long time; last 40–120 years (accept any figure in between); some products made before the ban are still in use; HCFCs only slowly being phased out;	<b>3</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
4(a)(i)	4–4.1 million;	<b>1</b>
4(a)(ii)	20;	<b>1</b>
4(a)(iii)	the birth rate was increasing rapidly / the population was growing rapidly / many females of child-bearing age;	<b>1</b>
4(b)	<p><i>any four of:</i>            one / two-child policies;            financial deterrents / incentives to limit the number of children;            family planning / birth control clinics / programmes;            free / cheap / available, contraception;            media advertising / information or awareness programmes / education on family size;            providing education for females;            encouraging females to have careers;            making abortion / sterilisation available;            encouraging later marriage;</p>	<b>4</b>
4(c)	<p><i>max two of:</i>            better health care / more doctors;            better diets;            better sanitation / water supply;</p> <p><i>plus any of, up to max three:</i>            high numbers at present in the 20+ age group;            (leading to) lower death rate/higher life expectancy;</p>	<b>3</b>

**PUBLISHED****Section B**

Question	Answer	Marks
5(a)	metamorphic; igneous; sedimentary;	<b>3</b>
5(b)(i)	<i>any three of:</i> vegetation and soils removed; overburden removed; waste rock / soil stored, out of the way; ore loosened using explosives; diggers / mechanical shovels; load ore onto trucks;	<b>3</b>
5(b)(ii)	<i>any three of:</i> pit infilled using waste rock; use as landfill site; soil replaced; fertilisers added; vegetation planted / agriculture; <i>allow</i> to flood; and use as, reservoir / leisure / nature reserve / aquaculture;	<b>3</b>
5(c)(i)	Australia;	<b>1</b>
5(c)(ii)	China; 977 (million tonnes);	<b>2</b>
5(c)(iii)	little / no, iron ore mined in those countries; many industries that use, iron / steel;	<b>2</b>

Question	Answer	Marks
5(d)(i)	<p><i>any three of:</i>  formed over <u>millions</u> of years or in carboniferous (era);  from dead, organisms / trees / plants;  <i>reference to</i> lack of oxygen / anaerobic;  on sea beds / in swamps;  formed a thick layer of peat;  covered with, sediments / mud / sand;  pressure turns, vegetation / peat, to coal OWTTE;</p>	<b>3</b>
5(d)(ii)	<p><i>any three of:</i>  shafts, bored / dug (to access coal seams);  coal cutter cuts coal;  coal transported to shaft by train;  coal raised to surface;  tunnel roof supported by pit props;</p>	<b>3</b>
5(e)(i)	<p><i>6 correct [3]  4 to 5 correct [2]  2 to 3 correct [1]</i></p> <p>sulfur dioxide, nitrogen dioxide,  limestone, iron ore,  carbon dioxide, slag;;;</p>	<b>3</b>
5(e)(ii)	<p><i>any four of:</i>  sulfur dioxide and/or nitrogen oxides, produced;  dissolves in / mixes with / reacts with, water (in the atmosphere);  forming weak acids / lowering pH;  such as, sulfurous / sulfuric / nitric;  rain falls;</p>	<b>4</b>
5(f)(i)	<p><i>allow any answer in range of: 535–540 (million tonnes);;</i></p> <p><i>(if answer incorrect, allow one mark for correct figures for China (55–60 mt) and RoW (480 mt) [1])</i></p>	<b>2</b>
5(f)(ii)	2007;	<b>1</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
5(f)(iii)	<p><i>any three of:</i>            RoW little changed whereas China has increased (greatly);            1988 China (only) 55–60 million tonnes, RoW 480 million tonnes;            China increase greatly, RoW, little change / slight decline / fluctuates;            2013 China 710 million tonnes, RoW 460 million tonnes;            China highest in 2013 whereas RoW highest in 1988;            China increased by 645–650 million tonnes, RoW decreased by 20 million tonnes;            China lowest 55–60 million tonnes, RoW lowest 410 million tonnes;            China increased by 660 million tonnes, RoW decreased by 20 million tonnes;</p>	<b>3</b>
5(f)(iv)	got worse / declined;	<b>1</b>



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Question	Answer	Marks
5(f)(v)	<p><i>Level of response marked question:</i></p> <p>Level 3 [5–6 marks]            Answers must look at both sides of the argument and reach a conclusion. Detail of at least three aspects required for max marks. Two aspects covered well and a balance will be sufficient for five marks.</p> <p>Level 2 [3–4 marks]            Answers may look at both sides of the argument but with only limited detail. More likely they will be one-sided. Good answers of this type covering at least two aspects can achieve four marks, whereas those that lack some detail or cover one aspect in detail should be awarded three marks.</p> <p>Level 1 [1–2 marks]            Answers will be basic with little detail or explanation. Most will be descriptive or a list of problems or solutions caused by increasing population without really addressing the question.</p> <p>No response or no creditable response [0].</p> <p><i>Level of response marking indicative content:</i>            Candidates may well refer back to iron production producing CO<sub>2</sub>, SO<sub>2</sub>, NO<sub>x</sub> and therefore state that as countries industrialise more air pollution will be caused. More able candidates will look at other ways development leads to air pollution; such as increased car ownership; more flights taken; increased electricity production; other mineral processing leads to air pollution. On the other hand, candidates may quote success in stopping CFC production; increasing use of renewable energy sources; recycling as resources become rare and expensive, flue gas desulfurisation and cleaner transport.</p>	<b>6</b>

Question	Answer	Marks
6(a)(i)	30 (°C);	1
6(a)(ii)	D; C;	2
6(a)(iii)	4 to 5 correct [4] 3 correct [3] 2 correct [2] 1 correct [1]  desert savanna tundra equatorial cool temperate interior;;;	4
6(b)(i)	all three bars correct;;  <i>(if one bar incorrect, allow one mark for two correct bars [1])</i>	2
6(b)(ii)	5 (years);	1
6(b)(iii)	drought / shortage of water; <i>any problem resulting from above such as, loss of income / food shortages / malnutrition;</i>	2

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
6(b)(iv)	<p><i>any three of:</i></p> <p><i>for years of water shortage:</i> water storage systems; use of groundwater; for irrigation; growing drought resistant crops;</p> <p><i>for years of excess water:</i> drainage channels; building on, higher land / stilts; soil erosion prevention methods (<i>allow to max of two marks</i>);;</p>	<b>3</b>
6(c)(i)	<p><i>any two of:</i> lots of exposed roots; straight trunks; narrow trunks; long / narrow leaves;</p>	<b>2</b>
6(c)(ii)	roots covered in water / swampy;	<b>1</b>
6(c)(iii)	<p><i>any three of:</i> monsoon forest lose leaves in dry season, TRF timing of leaf loss throughout year; monsoon forest 3 layers /no emergent, TRF 4 layers / emergent / TRF has more layers; monsoon forest deep roots, TRF shallow roots; greater biodiversity / more species in TRF; greater biomass in TRF; TRF (appears) evergreen, monsoon forest is not; TRF has buttress roots, monsoon forest does not; TRF less groundcover than Monsoon forest;</p>	<b>3</b>

<b>Question</b>	<b>Answer</b>	<b>Marks</b>
6(d)(i)	(flows) north to south / southwards / SSE / (bearing) 160–180°;	<b>1</b>
6(d)(ii)	5; China;	<b>2</b>
6(d)(iii)	<i>any two of:</i> from (southern) China to Cambodia / list of countries / all countries except Vietnam / throughout length of the river; cluster / 5 in N Laos; cluster / 5 in S Laos and Cambodia; few in China;	<b>2</b>

Question	Answer	Marks
6(d)(iv)	<p><i>any three farmers points plus two fishermen points OR any three fishermen points plus two farmers points:</i></p> <p><i>Farmers:</i>  <i>negative points:</i>            lack of floods;            so no silt deposited;            leading to loss of fertility;            leading to increased costs of fertilisers;            lack of flooding means certain crops (rice) can't be grown;            salt penetrates delta;            reducing fertility of the soil;            farmland lost due to, dam / reservoir;            farmers displaced;            reduced, yield / food / income;</p> <p><i>positive points:</i>            water stored for irrigation;            double cropping possible;            floods, stopped / reduced;            so no, crop / animal, loss;            increased, yield / food / income;</p> <p><i>Fishermen:</i>  <i>negative points:</i>            dams stop fish migration;            causing decrease in, breeding / fish stocks;            may lead to extinction of some species;            salt water penetrates delta;            reducing number of fresh water fish;            reduced, catch / food / income;</p> <p><i>positive points:</i>            fish farming possible in reservoirs;            leading to increased, catch / income;</p>	5

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
6(d)(v)	<p><i>any three of:</i>  to aid development;  to power industry;  to export electricity to neighbouring countries;  to provide power for increasingly affluent population;  to provide power for increasing population;  floods devastate economy;</p>	<b>3</b>
6(e)	<p><i>Level of response marked question:</i>  Level 3 [5–6 marks]  Answers must look at causes of water shortages and strategies that could overcome them in affected countries and reach a conclusion and be aware that not all countries face water shortage. Detail of at least three aspects for max marks. Two aspects covered well and a balance will be sufficient for five marks.</p> <p>Level 2 [3–4 marks]  Answers should look at causes and strategies that could overcome water shortages but with only limited detail or concentrate on strategies. Good answers of this type covering at least two aspects can achieve four marks; those that lack some detail, three marks.</p> <p>Level 1 [1–2 marks]  Answers will be basic with little detail / explanation. Most will be descriptive or a list of problems caused by lack of rain or increasing demand without really addressing the question.</p> <p>No response or no creditable response [0].</p> <p><i>Level of response marking indicative content:</i>  Some countries are water poor; e.g. in arid and semi-arid regions; so will struggle to meet demand; especially as populations increase. Water supply may be reduced by upstream countries extracting more water from rivers. Climate change may reduce rainfall in some parts and increase it in others. As Earth warms rainfall more likely to increase. Underground supplies largely being used faster than they are refilled. More pollution of water as increased industry and use of pesticides. Coastal countries may use desalination; but this is expensive and uses a lot of energy. Recycling of water is important for countries facing water poverty. Some countries have sufficient water due to high rainfall and/or low population.</p>	<b>6</b>