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**ENVIRONMENTAL MANAGEMENT**

**0680/42**

Paper 4

**October/November 2017**

MARK SCHEME

Maximum Mark: 60

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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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This document consists of **6** printed pages.

Question	Answer	Marks
1(a)(i)	849 000;	1
1(a)(ii)	13.1(%);; <i>(if answer incorrect, allow one mark for 849 000 / 6.5 [1]);</i>	2
1(a)(iii)	Knox, Sumner, Sullivan, Cumberland, Lauderdale; counties correctly paired with their population (441 000, 166 000, 157 000, 57 000, 28 000);	2
1(b)(i)	190; 118;	2
1(b)(ii)	<i>sulfate</i> 315 (ppm); <i>selenium</i> 60 (ppm);	2
1(b)(iii)	<i>stream B</i> ;	1
1(b)(iv)	as pH increases pollutants decrease / eq;	1
1(b)(v)	(stream) <b>A</b> ;  <i>because:</i> lowest pH; highest value of, sulfate / aluminium / iron / manganese / selenium; AVP, e.g. calculated percentage compared to other streams or total ppm compared;	3
1(c)	<i>any three from:</i> selenium absorbed from water into plants / eq; then passed up the food chain; on to consumers; and top consumers; selenium cannot be excreted; so accumulates at each stage / bioaccumulates; so concentration, toxic / lethal to fish;	3

Question	Answer	Marks
1(d)(i)	<i>any two from:</i> as a control experiment; so the data could be compared to polluted streams; so the degree / amount of pollution could be known;	<b>2</b>
1(d)(ii)	<i>allow answers in range of 0.80–0.90 (m<sup>2</sup>);;</i> <i>(if answer incorrect, allow one mark for (count up squares) x scale [1]);</i>	<b>2</b>
1(d)(iii)	<b>B;</b> <b>A;</b>	<b>2</b>
1(d)(iv)	<i>any five from:</i> measure a, known / stated distance along stream; mark each end with a post; drop the float in upstream; start timer as it passes first marker; stop timer when it passes second marker; record time; repeat (at least twice more); distance   time = speed / velocity;	<b>5</b>
1(d)(v)	<i>allow answers in range of 0.144–0.162;;</i> <i>(if answer incorrect, allow one mark for candidates answer to (d)(ii) · 0.18 [1]);</i>	<b>2</b>
1(e)	<i>any two advantages with one disadvantage OR any two disadvantages with one advantage:</i>  <i>advantage:</i> limestone is cheap; easy / quick; prevents death of organisms;  <i>disadvantage:</i> changes shape of stream / could cause flooding / eq; not a long term solution / needs to be repeated / requires labour / eq; alters, food chains / food webs / habitat; it does not remove pollutants / eq;	<b>3</b>

Question	Answer	Marks
1(f)(i)	<p><i>any two advantages with one disadvantage OR any two disadvantages with one advantage:</i></p> <p><i>advantage:</i>  a long term solution;  does not add any chemicals;  only uses natural processes / eq;  no repeat treatments needed;  few pollutants enter stream;</p> <p><i>disadvantage:</i>  high initial cost;  damage to area in building / eq;  only suitable for some streams / ref to topography;  AVP, e.g. bacteria work best, at high temperatures / only during part of the year;</p>	<b>3</b>
1(f)(ii)	<p><i>months</i> May, June, July, August, September;</p> <p><i>reasons:</i>  highest temperature means increased action of bacteria;  (increased) enzyme activity;  still plenty of water in wetland / eq so bacteria can live / eq;</p>	<b>3</b>
1(f)(iii)	<p><i>any three from:</i>  to check, that the system worked / pollution levels / eq;  at highest rainfall (May) / beginning of the hot season;  and lowest rainfall (Oct) / end of the hot season;  to compare results for each year / between May and October;  find out if water is safe to use;</p>	<b>3</b>

Question	Answer	Marks
2(a)(i)	coal output (steadily) decreased / use of figures to illustrate the fall in production, e.g. 2.3 to 1.1 / drop of 1.2;	1
2(a)(ii)	<i>any one from:</i> less coal available (to be mined) / eq; fall in demand / price; change to renewable sources; AVP;	1
2(b)(i)	orientation with linear scale;  <i>axes labelled:</i> number of miners employed; year;  plots correct;	4
2(b)(ii)	<i>allow answers in range of 200–340;</i>	1
2(b)(iii)	<i>any two from:</i> more machinery used; less coal to mine; less mines operating; miners move to other jobs, qualified;	2
2(c)	<i>any five from:</i> loss of natural landscape; deforestation; loss of habitats; loss of biodiversity; more erosion by wind; more erosion by water; increase risk of landslides; pollution / turbidity, of streams; pollution of groundwater; air pollution; dust reduces, plant growth / photosynthesis;	5

Question	Answer	Marks
2(d)	<p><i>any four from:</i></p> <p><b>YES:</b>  too much damage being done / high cost of restoration;  people do not support it / no new licences;  very few jobs;  involves high cost of (long distance) transport;  better things to spend state money on;  most of the coal reserves have already been extracted;  low quality coal not for burning;  people want to use renewable energy sources;  AVP;</p> <p><b>NO:</b>  valuable export;  foreign exchange;  earns money for the, state / country;  provides jobs;  subsidies keep mining going;  fossil fuels still needed for, energy / industrial use;  AVP;</p>	<b>4</b>