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MARK SCHEME

Maximum Mark: 60

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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 $849\ 000 \div 6.5$ [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) A ; <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;	2
1(d)(ii)	<i>allow answers in range of 0.80–0.90 (m²);;</i> <i>(if answer incorrect, allow one mark for (count up squares) x scale [1]);</i>	2
1(d)(iii)	B; A;	2
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;	5
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>	2
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;	3

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>	3
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>	3
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>	3

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>YES: 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>NO: 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>	4