

Question		E	Answers	Marks	Additional Guidance																														
1	(a)		wings ; beak ; feathers / plumage ; scales on, legs / feet ;	[3]	ignore adjectives such as grey / long / sharp																														
	(b)	(i)	quantitative (feature) ; range between two extremes ; ref. to (many) intermediates ; not in distinct groups ; influenced by the environment (and genotype) ;	[2]	A answer in context of wing length																														
		(ii)	length of <i>anything suitable</i> (body) mass ; age ;	[max 1]	A height R any discontinuous variable, e.g. colour A weight R size / size of A height																														
	(c)	(i)	1 largest number of / most, birds trapped ; 2 oldest (mean age for) birds trapped ; 3 comparative data quote for numbers ; <i>accept fraction / percentage / proportion of total</i> 4 comparative data quote for age ; R 'greater life expectancy'	[max 4]	<i>assume answer is about birds trapped unless stated otherwise</i> <table border="1"> <thead> <tr> <th>wing length at ringing / mm</th> <th>number of birds trapped</th> <th>mean age at trapping / days</th> </tr> </thead> <tbody> <tr> <td>less than 63</td> <td>24</td> <td>253</td> </tr> <tr> <td>64</td> <td>72</td> <td>256</td> </tr> <tr> <td>65</td> <td>1</td> <td>297</td> </tr> <tr> <td>66</td> <td>1</td> <td>346</td> </tr> <tr> <td>67</td> <td>1</td> <td>349</td> </tr> <tr> <td>68</td> <td>1</td> <td>270</td> </tr> <tr> <td>69</td> <td>66</td> <td>237</td> </tr> <tr> <td>more than 70</td> <td>23</td> <td>199</td> </tr> <tr> <td></td> <td>total = 771</td> <td></td> </tr> </tbody> </table>	wing length at ringing / mm	number of birds trapped	mean age at trapping / days	less than 63	24	253	64	72	256	65	1	297	66	1	346	67	1	349	68	1	270	69	66	237	more than 70	23	199		total = 771	
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1		(ii)		<p>1 number of young birds of each wing length ;</p> <p>2 wing lengths of birds that died ;</p> <p>3 length of life / length of life after trapping ;</p> <p>4 results for birds in West Africa ;</p> <p>5 effects of migration ;</p> <p>6 wing lengths of birds that breed ;</p> <p>7 number of times each bird is trapped ;</p> <p>8 effect of trapping on behaviour ;</p> <p>9 larger sample ;</p> <p>10 other locations in, Sweden / anywhere in Europe ;</p> <p>11 AVP ;</p> <p>12 AVP ;</p>	[max 3]	<p><i>look for types of evidence, not assertions</i></p> <p>R wing length of newly hatched birds</p> <p>R 'study should be repeated'</p> <p>e.g. number of eggs laid by birds of each wing length / to which birds fly furthest / test which birds best at catching food</p>
		(d)		<p>birds with wing length 66–67, survive / live longer ;</p> <p>breed / reproduce / have offspring ;</p> <p>pass on their allele(s) for wing length ;</p> <p>birds with smaller and larger wings, die ;</p> <p>do not reproduce (as successfully) ;</p>	[max 4]	<p>A gene(s) <i>wing length may be implied</i></p> <p>A 'the others'</p>
					[Total: 17]	

Question	scheme		Guidance
2 (a) (i)	<p><i>any two suitable examples</i></p> <p>flood ; tsunami / tidal wave ; monsoon ; volcanic eruption ; A volcano(es) earthquake ; typhoon / hurricane / storm / cyclone ; fire ; drought ; crop / animal, disease ; R disease unqualified plague of pests of, crops / animals ; (e.g. locusts) AVP ;</p>	[max 2]	R snowstorms / tornadoes / landslides / avalanches / mudslides
(ii)	<p>drought ; soil erosion ; desertification ; salinity of soils ; global warming ; rise in sea levels ; AVP ;</p>	[max 1]	R volcanoes / volcanic eruptions R famine R drying up of land
(b)	<p>1 overall increase (over the time period of Fig. 6.1) ; 2 natural disasters, fluctuates / described / irregular ; 3 human induced, increase ; 4 comparative data quote for named cause <i>or for</i> total causes ;</p> <p>5 sudden onset increase / ora ; 6 economic factors increase / ora ; 7 comparative data quote for same cause ;</p>	[max 5]	<p>2 increase + decrease is minimum</p> <p>4 with year and number of shortages for each quote</p> <p>7 as for 4</p>

Question	scheme		Guidance
2 (c)	1 land needed for, building / urbanisation / AW ; 2 (so) not enough land to grow crops ; 3 increase in food production damages land ; 4 salination ; 5 desertification / erosion ; 6 overgrazing ; 7 not enough water ; 8 <i>idea that</i> increase in demand for food makes food too expensive for poorer people to buy ; 9 richer nations take more of food / food crops exported (for foreign currency) / agricultural land used for, cash crops / non food crops ; 10 difficult to distribute food ; 11 increased competition / conflict, if food production stays the same while population increase ; 12 AVP ; e.g. food production does not keep up with population growth, increase population leads to increase pollution	[max 3]	3 A overcultivation 7 disruption to water supply <i>or</i> e.g. such as dams
(d)	1 suitable named crop plant or domesticated animal ; 2 suitable feature to improve ; 3 select individuals for breeding ; 4 select offspring that show improvement ; 5 use these for future breeding / AW ; A 'repeat the process'	[max 4]	R genetic modification R 'cows bred together' A cattle with high milk yield are bred together / high yielding corn are bred together = 3 marks R cow for milk x bull for meat
(e)	transfer of, a gene / an allele, from one species to another ; A 'type of organism' or 'from one variety to another'	[1]	
[Total: 16]			

- 3 (a) osmosis ;
water, diffuses / moves, down water potential gradient ; **A** high to low water potential
R high water potential gradient to a low water potential gradient through partially permeable membrane ; **A** selectively / semi-salts / sugars / solutes, in root hair cell (to lower water potential) ; [max]
- (b) 20.0 ; **A** 20 *accept if not in table* [1]
- (c) (rate of water) uptake increases / AW ;
positive correlation / exponential / not linear / AW ; **R** directionally proportional
comparative use of figures with units ;
e.g. 0.4 mm min^{-1} at 0 m s^{-1} / no wind, 20 mm min^{-1} at 8 m s^{-1} **A** increase by $\times 50$ [2 max]
- (d) temperature ; **R** heat
humidity ;
light intensity ; **R** amount / levels, of light [2 max]
- (e) 1 (raw material for) photosynthesis / forming glucose or carbohydrate ;
2 turgidity / support ;
3 transport of, solutes / named solute / food substances ;
4 forming vacuoles / growth / (cell) expansion ;
5 taking part in chemical reaction(s) ; e.g. hydrolysis / breaking down food substance
6 medium for chemical reactions / AW ;
7 AVP ; e.g. activating enzymes

R 'to keep hydrated' / solvent unqualified [2 max]
- (f) 1 loss of water (vapour) through stomata (in leaves) ;
2 evaporation, from surfaces of (mesophyll) cells / into air spaces (in leaf) ;
3 loss of water from leaf (cells) lowers water potential ;
4 water moves into leaf (from xylem) ;
5 (this) pulls on / creates tension (in water column in xylem) ;
6 cohesion of water molecules / AW ; **A** 'stick together', ref to polar

R root pressure / adhesion / capillarity [4 max]

3 (g) note question says **structural** adaptations

leaves, small / reduced to spines / are needles ; **A** small surface area
no leaves ;
curled / rolled, leaves ;
hairs on the, leaves / stems ;
thick (waxy) cuticle ; **R** 'skin' / waxy cuticle unqualified
sunken stomata / AW ;
few stomata ;
fleshy / succulent, leaves / stems ; **A** described as reserves / stores of water
small surface area: volume ratio ;
deep roots ;
long / extensive, shallow roots ; **A** long roots near the surface

AVP ; e.g. photosynthesis i
AVP ;

ignore stomata close during the day

[3 max]

[Total: 17]