

Question	E	Answers	Marks	Additional Guidance
			<b>[Total: 11]</b>	
1 (a)		line at 1 until end of May ; exponential increase from June to 100 000 at beginning of July ; <b>A</b> a straight line decrease at end of August to around 10 000 ; remains about 10 000 until beginning of November ;	[max 3]	if points are plotted, but no line or block graph used = max 1
(b)		eaten by, predator / fish ; not enough food ; too cold ; pollution ; AVP ;	[max 2]	<b>A</b> eutrophication
(c)	1 2 3 4 5 6 7 8 9 10 11 12	<i>accept ref. to <u>limiting factor</u>(s) once in the answer ;</i>  <i>lag phase (March April May)</i> slow reproduction rate / BR = DR ; no food / too cold / AW ;  <i>exponential / log, phase (June)</i> reproduction rate increases / BR > DR ; increase in temperature ; food available ;  <i>steady / stationary / AW, phase (September October November)</i> reproduction rate slows / BR = DR ; decline phase ; (reached) carrying capacity / AW ; DR > BR ; predation ; less food / competition for food;	[max 4]	I refs. to numbers and descriptions rather than explanations  for MP2 – 12 must be clear which period of the graph or phase is being described

2 (a)	carbon ; hydrogen ; oxygen ; nitrogen ; sulfur ; <div style="text-align: right;">[4 max]</div>	R CHONS
(b)	1 N / nitrogen, fixation ; 2 bacteria / <i>Rhizobium</i> ; <b>R</b> 'nodules are bacteria'  3 convert, nitrogen / $N_2$ / AW, into, ammonia / $NH_3$ / ammonium / $NH_4^+$ / amino acid(s) ;  4 plants use (fixed) nitrogen to make, amino acids / proteins / AW ; [3 max]	N-fixing bacteria = 2 mar  <b>R</b> to nitrite / nitrate  <b>A</b> plants use $NH_3$ / $NH_4^+$
(c)	1 (dead plants) eaten by, animals / detritivores / scavengers ; 2 e.g. earthworms / termites / AW ; 3 ref. their faeces / increase in surface area ;  4 decay / decomposition ; <b>A</b> decomposers 5 by, bacteria / fungi / saprophytes / saprotrophs ;  6 break down proteins to amino acids ;  7 deamination ; 8 ammonia / $NH_3$ / $NH_4$ ; } 9 ammonia to <u>nitrite</u> ; } 10 <u>nitrite</u> to nitrate ; <b>A</b> one mark for ammonia to nitrate 11 nitrification / nitrifying bacteria ; 12 <i>Nitrosomonas</i> / <i>Nitrobacter</i> in correct context of nitrification ; [6 max]	MP3 must be related to MP1 or 2  <b>A</b> even if linked to incorrect organism <b>R</b> if wrong type of bacteria (e.g. N-fixing)  <b>A</b> if in context of MP1 or 2 but do not award twice  protein → ammonia / AW = 1 mark if 6, 7, 8 not given  <b>R</b> 'nitride' unless qualified by $NO_2$ <b>R</b> nitrate unqualified by nitrite or ammonia

2 (d)	<p>1 light intensity ;  <b>A</b> limited sunlight / lack + of sunlight / sunshine</p> <p>2 light duration ; <b>A</b> day length</p> <p>3 water / moisture availability ; <b>A</b> drought / flood / humidity / soil water</p> <p>4 carbon dioxide, availability / concentration / tension / level ;</p> <p>5 temperature ;</p> <p>6 competition / overcrowding / space / weeds ;</p> <p>7 grazing / herbivores / predation / primary consumers ;</p> <p>8 pests ;</p> <p>9 parasites / disease ;</p> <p>10 use of (inappropriate) herbicides / nearby use of herbicides ;  <b>A</b> drift of herbicides / weed killers</p> <p>11 pollution / sulphur dioxide / acid rain ;</p> <p>12 soil pH / depth of soil / type of soil / poor soil / oxygen in the soil ;</p> <p>13 wind speed ;</p> <p>14 salt concentration of soil ;</p> <p style="text-align: right;">[3 max]</p>	<p><b>R</b> heat / warmth</p> <p><b>R</b> oxygen unqualified</p>
(e)	<p><i>accept ora with population starting to increase about day 40</i></p> <p>1 small population to start with ;</p> <p>2 takes time for eggs to hatch ;</p> <p>3 not enough food / soya bean plants not grown enough / AW ;</p> <p>4 aphids, not sexually mature / cannot breed / finding mates ;</p> <p>5 too cold / too wet / AW (another appropriate weather condition) ;</p> <p>6 ref. to, predators / ladybirds ;</p> <p>7 ref. to, parasites / disease ;</p> <p>8 ref. to, pesticides / insecticides ;</p> <p>9 no immigration ;</p> <p>10 competition (between aphids, with another pest) ;</p> <p>11 AVP ;</p> <p style="text-align: right;">[3 max]</p>	<p><i>do not expect knowledge of aphid biology</i>  <i>I names of phases (lag, log)</i>  <i>I 'adjusting to surroundings'</i>            refs. to soya must refer to food for aphids  <b>A</b> few soya plants / competition for food / soya grows slowly</p> <p><b>R</b> unfavourable conditions unqualified</p> <p>(e.g. correct ref. biotic and abiotic factors)</p>
<b>[Total: 19]</b>		

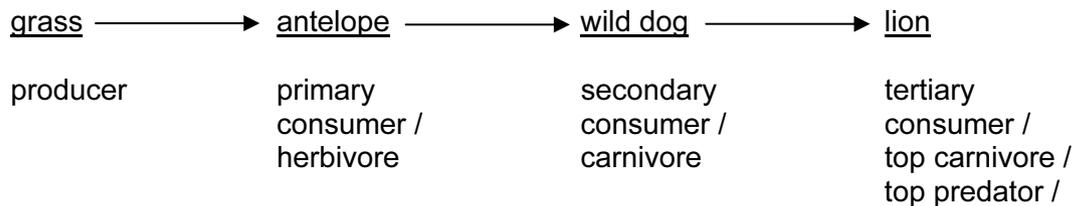
3 (a) (i) eats / consumes / feeds on, animals / meat / flesh ; [1]

(ii) fur / hair / whiskers / vibrissae ;  
external ear(s) / pinna(e) ;  
mammary glands / breasts / nipple / glands that produce milk / AW ;  
R milk unqualified by external structure [max 1]

(b) (i) disease / parasite(s) / (named) pathogen(s) ;  
hunting (by farmers) ; R poaching  
shortage of, food / antelopes ; A idea of fewer  
shortage of water / drought ;  
predation (by lions) ; A more lions  
loss of habitat / AW e.g. territory ; R space unqualified  
change of climate / AW ;  
pollution ;  
AVP ; e.g. shortage of mates / small populations do not breed as much  
R competition unqualified [max 2]

(ii) extinction / become endangered / become rare / inbreeding ; [1]

(c)



1 mark for minimum of two arrows in correct direction ;  
1 mark for all organisms named and all in correct order as a chain ;  
*ignore sun / decomposers / parasites*  
2 marks for labelling the trophic levels –  
*either* producer, primary, secondary + tertiary consumer  
*or* 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> ;;  
*if one or two labels incorrect award 1 mark* [4]

- 3 (d) (i) maintenance / protection / preservation / 'caring for' / 'looking after',  
of, habitat / ecosystem / community / species / (named) organisms / resources;

'making a habitat' = 1 mark

**One of the following for a max 1 mark**

for future generations / prevent extinction ;  
encourage breeding (in wild or in captivity) ;  
ref to, biodiversity / genetic resources / AW ;

[max 2]

- (ii) prevent destruction of, grassland / habitat ; **A** preserve  
(nature) reserve / wild life park / AW ;  
rangers / wardens ;  
ensure good supply of, food / antelopes / prey / AW ;  
legislation / AW ; e.g. refs to poaching / wild life trade  
control of, predators / lions ;  
**A** 'kill lions' / 'drive lions away' / 'provide food for lions'  
education of local population ;  
captive *breeding* / *breed* in a zoo / *breeding* programme ;  
reintroduction to the wild ;  
AVP ; e.g. further detail of any of the above points

[max 3]

- (e) ignore refs to nitrogen fixation / denitrification  
marking points 7 + 8 must be in the correct context

- 1 (eaten / digested by) (named) scavenger(s) / hyaenas / vultures ;
- 2 excretion / urine / egestion / faeces / AW ;
- 3 dung beetles / detritivores / maggots ;
- 4 decay / decomposition / rotting, by, bacteria / fungi / named decomposer ;
- 5 protein → amino acids ;
- 6 deamination / amino acids → ammonia ; } **A** protein → ammonia
- 7 ammonia → nitrite ; }
- 8 nitrite → nitrate ; } **A** ammonia → nitrate
- 9 nitrification / nitrifying bacteria ;
- 10 *Nitrosomonas* / *Nitrobacter* in correct context of nitrification ;
- 11 plants absorb, nitrate / ammonia ;

'decomposition by nitrifying bacteria' = 0

[max 5]

**[Total: 19]**