

MARKING INSTRUCTIONS FOR HIGHER UNIT 3 QUESTION BOOKLET

Topic 3.1a - Food supply, plant growth and productivity

Question	Expected Answer(s)	Max Mark	Additional Guidance
1.	C	1	
2.	Energy lost at each level / stage of a food chain OR Energy is lost between trophic level(s)	1	NOT - crop plants produce more food/energy per unit area than cattle

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Topic 3.1b Plant growth and Productivity

Question	Expected Answer(s)	Max Mark	Additional Guidance
1.	A	1	
2.	D	1	
3.	C	1	
4.	D	1	
5.	D	1	
6.	B	1	
7.	D	1	
8.	D	1	
9.	B	1	

Question	Expected Answer(s)	Max Mark	Additional Guidance
10. a	Rate of photosynthesis	1	
b	Use a water bath	1	
c	Easier to separate algae from solution OR Easier to control algae concentration	1	
d	Repeat at each distance/ light intensity	1	
e	Axes and labels Plotting and joining using a ruler 1 mark each	2	
f	As light intensity increases the rate increases =1 AND At higher light intensities the rate remains constant =1	2	

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Question		Expected Answer(s)	Max Mark	Additional Guidance
11.	a i	Enzyme X: RuBisCo =1 Substance: G3P / Glyceraldehyde-3-phosphate =1	2	
	a ii	Glucose: for respiration/ATP (production)/cellulose formation/starch formation/ other biosynthetic pathways/ processes =1 RuBP: for continuation of the cycle/to allow cycle to occur/ repeat OR To make G3P / intermediate substance =1	2	
	b i	ATP: increases =1 NADPH: increases =1	2	

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Question		Expected Answer(s)	Max Mark	Additional Guidance
12.	a i	Transmitted/transmission. OR reflection/reflected	1	
	a ii	Excites electrons (in the pigment/molecule). OR Promotes electrons to a high(er) energy state. OR Produce high(er) energy electrons.	1	
	a iii	Broadens absorption/action spectrum. OR Absorbs more/wider range/variety of wavelengths/ colours (of light). OR Allows photosynthesis to happen over more/wider range of wavelength/colours (of light).	1	NOT- absorbs more light NOT- absorbs wider range of light. NOT - absorbs different wavelengths.
	b	(Photolysis of) water/ H ² O	1	
	c	Passes hydrogen to/reduces 3PG/3phosphoglycerate. OR Passes hydrogen to form G3P/glyceraldehyde-3-phosphate. OR Reduces intermediate/compound to form G3P/glyceraldehyde-3-phosphate.	1	

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Topic 3.2 - Plant and Animal Breeding

Question	Expected Answer(s)	Max Mark	Additional Guidance
1.	A	1	
2.	D	1	
3.	C	1	
4.	D	1	

Question	Expected Answer(s)	Max Mark	Additional Guidance
5. a	15	1	
b	413.44	1	
c	Milk yield / fat content increased by crossbreeding Protein content decreased by crossbreeding	1	
d	Inbreeding depression	1	
e i	F2 has variety of genotypes	1	
e ii	Selection or backcrossing	1	

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Question	Expected Answer(s)	Max Mark	Additional Guidance
6.	<p>Procedure: randomisation of plots/treatments = 1</p> <p>Explanation: reduces/eliminates bias =1</p> <p>OR</p> <p>Procedure: replication/number of replicates</p> <p>Explanation: to take account of variability/reduce the effect of atypical results</p> <p>OR</p> <p>Procedure: selection of treatments/inclusion of both GM and non GM crops</p> <p>Explanation: to make/ensure a (fair) comparison</p>	2	

Question	Expected Answer(s)	Max Mark	Additional Guidance
7. a i	<ol style="list-style-type: none"> 1. From 0 - 60 kg per hectare increase from 3 - 8.4 tonnes per hectare 2. 2. Remains at 8.4 between 60 and 80 3. 3. Between 80 and 100 decreases from 8.4 - 7.9/7.8 	2	<p>1 mark for each correct response to a maximum of 2 marks</p> <p>Full units only needed once for both variables</p> <p>Differences acceptable eg increase of 5.4 tonnes per hectare from 3</p> <p>Correct values for 2 statements but no units = 1 mark</p>
a ii	208-216	1	
a iii	840	1	
b i	The use of 10/a large number of cattle (in each group)	1	NOT - calculate an average alone
b ii	0.6	1	
b iii	20	1	
	Increasing the phosphate/fertiliser level increases the growth rate	1	

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Question	Expected Answer(s)	Max Mark	Additional Guidance
8. a i	Colchicine concentration	1	NOT – colchicine alone NOT – concentration alone
a ii	50 plants/seeds <u>at each concentration</u>	1	NOT – many plants at each concentration NOT – repeated and average calculated NOT – 50 plants used alone NOT – 50 plants and average collected
b i	8	1	
b ii	3:7	1	
c	More photosynthesis =1 More energy for growth/ seed production =1	2	

Question	Expected Answer(s)	Max Mark	Additional Guidance
9. a	14250	1	
b i	Test (cross)	1	NOT - backcross
b ii	(Some/half would be) low gluten and (some/half would be) ultra low gluten.	1	
c	Deleterious/harmful/ disadvantageous alleles would be eliminated/removed by natural selection.	1	
d i	Number of grains.	1	NOT - amount of grains.
d ii	Cultivar- Sloop Justification- Starch content of grains is higher/highest (so may produce more sugar). Cultivar- ULG2 Justification- Amylase activity is higher/highest.	1	NOT - starch content is high. NOT - amylase activity is high.

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Topic 3.3 - Crop protection

Question	Expected Answer(s)	Max Mark	Additional Guidance
1.	B	1	
2.	C	1	
3.	A	1	
4.	D	1	

Question	Expected Answer(s)	Max Mark	Additional Guidance
5. a	Biological (control)	1	
b	Harlequin ladybird has spread (rapidly) AND native populations/ladybirds are decreasing (and may be eliminated)	1	
c	May have alternative prey/food source/niche/resources OR Not competing with the Harlequin ladybird OR Less competition with other native species OR Not preyed upon by Harlequin ladybirds	1	
d	Free from its usual predators/parasites/pathogens /disease/competitors	1	

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Question		Expected Answer(s)	Max Mark	Additional Guidance
6.	a i	<p>Reduced/no photosynthesis. OR Leaves are needed for photosynthesis. =1</p> <p>Less energy/ glucose/ carbohydrate/ respiration for growth. =1</p> <p>OR</p> <p>Caterpillars are vectors for disease /spread disease to plants. =1</p> <p>Disease reduces growth. =1</p>	1	

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Question	Expected Answer(s)	Max Mark	Additional Guidance
a ii	<p>Chemicals-</p> <p>kill/harm other species/decrease biodiversity</p> <p>OR</p> <p>biomagnify/ bioaccumulate</p> <p>OR</p> <p>accumulate/build up in organism/food chain/ environment/ecosystem</p> <p>OR magnify up the food chain</p> <p>OR</p> <p>persist in the environment / ecosystem</p> <p>OR</p> <p>create resistant populations/pests</p> <p>OR</p> <p>on the crop can be harmful to health.</p> <p>(Or converse of any of the above written in terms of biological control/it) eg 'biological control/it does not kill other species'.</p> <p>OR</p> <p>Biological control only kills/ targets caterpillars/ one species.</p>	1	
b i	15	1	
b ii	<p>The original and modified Bt toxins used together kill more caterpillars than either alone.</p> <p>OR</p> <p>Modified Bt toxin kills 65(%) of caterpillars compared to 15(%) in Bt toxin but taken together they kill 80(%).</p>	1	<p>NOT- modified Bt toxin kills more than Bt toxin.</p> <p>NOT- modified kills 65% of caterpillars compared to 15% in modified.</p>

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Topic 3.4 - Animal Welfare

Question	Expected Answer(s)	Max Mark	Additional Guidance
1.	D	1	
2.	D	1	
3.	B	1	

Question	Expected Answer(s)	Max Mark	Additional Guidance
4. a i	7	1	
a ii	16	1	
b	They kill/catch/take down larger/more prey. OR Increased hunting success.	1	NOT- hunt/tackle larger prey. NOT- kill large prey. NOT- use less energy. NOT- get more food.
c	Increases/ensures/allows the survival of shared genes/DNA. OR So that shared genes are passed on to the next generation.	1	NOT - kin selection only.

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Topic 3.5 - Symbiosis

Question	Expected Answer(s)	Max Mark	Additional Guidance
1.	A	1	
2.	D	1	

Question	Expected Answer(s)	Max Mark	Additional Guidance
3. a	Parasite/it/Schistosoma gets energy/gets nutrients/benefits/gains AND host/human is harmed (by loss of resources)	1	
b	Secondary host: (fresh water) snails =1 Benefit: allows development into free swimming parasite =1 OR allows them/immature parasites to complete life cycle	2	
c	Prevent urine/faeces/eggs from entering (fresh) water OR stop people entering the affected water OR control the population of fresh water snails OR medication given to kill the eggs/mature parasite/parasite in humans	1	

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Question		Expected Answer(s)	Max Mark	Additional Guidance
4.	a i	(female) mosquito	1	NOT - mosquito saliva NOT - male mosquito
	a ii	Females/they need the blood for egg production OR males don't produce eggs so don't need blood	1	NOT - females need blood for eggs alone NOT - females need blood to carry eggs
	b	(The host is harmed) by losing energy/ nutrients/food OR (Host harmed as)parasite feeds off it/ gains nutrients from it	1	NOT - host loses resources NOT - destroys liver/ red blood cells
	c	Method 1: Mosquito... discouraged/stopped from... biting/feeding/fewer people bitten AND it cannot spread parasite/disease/ virus/bacteria OR Method 2: There are ...no/fewer...(parasites to transmit to the human/mosquito	1	

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Topic 3.6 -Animal Behaviour

Question	Expected Answer(s)	Max Mark	Additional Guidance
1.	B	1	
2.	C	1	
3.	A	1	
4.	B	1	
5.	A	1	

Question	Expected Answer(s)	Max Mark	Additional Guidance
6. a	worker bees are related to queen's offspring =1 so worker bees share genes with queen's offspring =1	2	
b i	increase from 4.2 million (in 1980) to 4.4 million (in 1985) then decrease to 2.8 million (in 1995)	1	
b ii	2:1	1	

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Topic 3.7/3.8 - Mass Extinction and Threats to Biodiversity

Question	Expected Answer(s)	Max Mark	Additional Guidance
1.	B	1	

c	Expected Answer(s)	Max Mark	Additional Guidance
2. a i	Number/frequency of alleles in a population	1	
a ii	Small populations may lose the genetic variation necessary to enable evolutionary responses to environmental change or the loss of genetic diversity can lead to inbreeding which results in poor reproductive rates	1	
b	Edge species may invade the interior of the habitat and compete with interior species	1	
c i	Area of natural habitat linking fragments	1	
c ii	individual members of the locally extinct species can move into the fragment and recolonise	1	

Question	Expected Answer(s)	Max Mark	Additional Guidance
3. a	Invasive	1	
b	Light or water or minerals or nutrients	1	
c i	may eat native plants or may become invasive	1	
c ii	test effect on native species in an enclosed area	1	

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c		Expected Answer(s)	Max Mark	Additional Guidance
4.	a i	110	1	
	a ii	3100	1	
	a iii	325	1	
	b	Zebra mussel population increased and unionid decreased	1	One species must be names Order not important NOT - description of 2003 numbers alone
	c	Unionid/native population drops (from 140) to zero/killed off/ eliminated	1	NOT - Unionid decreases
	d	New environment may be free from/ have less/have no... predators OR parasite/disease OR pathogens OR competitors (which would limit its population in its native habitat)	1	
	e	Number/abundance AND frequency of alleles in a population/ gene pool/species	1	NOT - ecosystem / community