RECOGNISING ACHIEVEMENT

GCSE

Biology B

General Certificate of Secondary Education

Unit **B731/01**: Modules B1, B2, B3 (Foundation Tier)

Mark Scheme for June 2013

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

For answers marked by levels of response:

a. **Read through the whole answer from start to finish**

b. **Decide the level** that **best fits** the answer – match the quality of the answer to the closest level descriptor

c. **To determine the mark within the level**, consider the following:

Descriptor	Award mark
A good match to the level descriptor	The higher mark in the level
Just matches the level descriptor	The lower mark in the level

d. Use the **L1**, **L2**, **L3** annotations in Scoris to show your decision; do not use ticks.

Quality of Written Communication skills assessed in 6-mark extended writing questions include:

- appropriate use of correct scientific terms
- spelling, punctuation and grammar
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

Annotations

Annotation	Meaning
	correct response
	incorrect response
	benefit of the doubt
	benefit of the doubt **not** given
	error carried forward
	information omitted
	ignore
	reject
	contradiction
	Level 1
	Level 2
	Level 3

Abbreviations, annotations and conventions used in the detailed Mark Scheme.

/	=	alternative and acceptable answers for the same marking point
(1)	=	separates marking points
allow	=	answers that can be accepted
not	=	answers which are not worthy of credit
reject	=	answers which are not worthy of credit
ignore	=	statements which are irrelevant
( )	=	words which are not essential to gain credit
__	=	underlined words must be present in answer to score a mark (although not correctly spelt unless otherwise stated)
ecf	=	error carried forward
AW	=	alternative wording
ora	=	or reverse argument

Question			Answer	Marks	Guidance
1	(a)		protozoa (1)	1	
	(b)		idea that more areas will have malaria cases (1) BUT idea that areas further away from the equator will have malaria cases (2)	2	**allow** more people will get malaria **ignore** spread of mosquitoes (in question)
	(c)		vaccination / immunisation (1)	1	**allow** vaccine **allow** named example e.g. MMR vaccine (**but ignore** just e.g. MMR) **ignore** antibodies **ignore** jabs
			Total	**4**	

Question			Answer	Marks	Guidance
2	(a)		stimulus (1)	1	mark answer line first. If no answer on line look for indication in list e.g. a ring around
	(b)		depressant (1)	1	mark answer line first. If no answer on line look for indication in list e.g. a ring around
	(c)		**any two from:** to see if it works / reduces pain (1) to see if it is safe / to look for side effects / RA e.g. make sure it's not harmful (1) to work out (best/correct) dosage (1)	2	**ignore** humans may react differently (from fish) **ignore** to see what effect it has but **allow** e.g. to see if it has negative effects
			Total	**4**	

Question			Answer	Marks	Guidance
3	(a)		total protein eaten = 51(g) (1) EAR = 36(g) (1) correct deduction ie no, she is eating more than enough protein / too much protein (1)	3	**allow ecf** i.e two marks if there is a correct deduction but an error in either the calculation of EAR **or** protein eaten **allow** one mark if there is a correct deduction but an error in both the calculation of EAR **and** protein eaten no mark for deduction without figures for both protein and EAR to back it up **allow** yes, she is getting more than enough no mark for just 'no' but allow if a comparison is implied, e.g no, she needs 36 but is getting 51 = 3 marks
	(b)		she is growing (more / faster) / making more cells (1)	1	assume unqualified answers refer to Sue
	(c)		recognition that needs an alternative supply of **protein** / needs protein supplements (1) an example of such a source e.g dairy products / milk / cheese / eggs / tofu / beans / pulses / nuts / lentils / Quorn™ / avocado / broccoli / spinach / peas / asparagus / greens / (1)	2	**allow** recognition that meat is a good supply of protein **allow** fish **ignore** vegetables / fruit / plants / just 'meat substitute'/ 'vegetarian meat' **allow** protein shakes / protein drinks / myco-protein (2) **allow** need alternative source of iron / vitamin B6 / vitamin B12 (1) and example of such a source (1) **ignore** reference to other vitamins and minerals
			Total	**6**	

Question			Answer	Marks	Guidance
4	(a)		to lose heat / keep cool (1)	1	**allow** for temperature regulation
	(b)	(i)	**any two from:** in the nucleus (1) on/in the chromosomes (1) in the DNA (1)	2	**allow** mitochondria (1)
		(ii)	it is a non-infectious (disease) (1) not caused by a pathogen / is caused by a gene (1)	2	**allow** non-contagious / can not be caught **allow** it is inherited **ignore** it's genetic (in question)
			Total	**5**	

Question			Answer	Marks	Guidance
5			**Level 3 (5–6 marks)** Answer includes reference to heart disease AND diabetes. The link between **type 2** diabetes and failure to respond to insulin AND between high blood pressure / cholesterol and heart disease is made. At least one calculation indicates the number of people that might be involved. Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** Answer includes reference to heart disease OR diabetes. There is some attempt to link diabetes with failure to respond to insulin OR to link heart disease with high blood pressure / cholesterol Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** Answer includes some reference to heart disease OR diabetes. Quality of written communication impedes communication of the science at this level. **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to C** **Relevant points include:** • high blood pressure is linked to an increase risk of heart disease • high blood cholesterol is linked to an increase risk of heart disease • failure to respond to insulin indicates type2 diabetes • too much cholesterol in the blood can form plaques in the walls or arteries • 30 000 people in Singapore have all three conditions (or similar calculation). **allow** higher level answers involving blood pressure and strokes / kidney damage and the consequences of plaque formation in the coronary arteries Level 3 – full answer but no/wrong calculation then max 5 marks **allow** level 1 (2 marks max) for correct calculation with no reference to heart disease/diabetes if refer only to heart attacks instead of heart disease then allow 1 mark (level 1) or 3 marks (level 2) Use L1, L2, L3 annotations in scoris. Do not use ticks.
			Total	**6**	

Question			Answer	Marks	Guidance
6	(a)	(i)	the position of an organism in a food chain/web (1)	1	**allow** where an animal or plant is in a food chain/web **allow** feeding level
		(ii)	water / shelter / places to breed (1)	1	**ignore** food **ignore** space / ground / habitat **ignore** mates
		(iii)	(population would decrease) because the beetle has lost one food source / AW (1) so will feed more on the earwigs (1)	2	**ignore** beetle has **no** food **allow** (would increase) because there would be less competition for food (1) as the millipedes won't be eating it (1) no marks for just increase/decrease **ignore** 'all are eaten' / 'all die off' statements
	(b)	(i)	dead leaves mean = 32 (2) **but** 96 / 3 (1)	2	correct answer, no working = 2 **allow** 1 mark if clearly show division by 3 to get the mean
		(ii)	a normal shaped pyramid of numbers is produced ✓ an upside down pyramid of numbers is produced ☐ dead leaves do not contain energy from the Sun ☐ energy flow from the Sun supports this food chain ✓ energy from the Sun will not flow any further than the snail ☐	2	if more than two ticks each incorrect tick loses 1 mark down to zero

Question			Answer	Marks	Guidance
	(c)	(i)	bacteria / fungi (1)	1	**allow** saprophytes / decomposers / microbes **ignore** detritivores / germs
		(ii)	78% (1)	1	
			Total	**10**	

Question			Answer	Marks	Guidance
7	(a)		mayfly larva (1) caddis fly larva (1)	2	
	(b)		hooks: help it anchor / not get swept away (1) flattened body: allows it to shelter under stones / not get swept away (1)	2	**allow** hooks so it can catch food easier **allow** flattened body allows it under stones to hide from predators must link to adaptation, except 'stops it getting swept away' = 1

Question			Answer	Marks	Guidance
	(c)		**Level 3 (5–6 marks)** Identifies absence of mayfly larvae AND high levels of rat tail maggots / sludgeworms AND links this to high pollution downstream from factory and concludes the Council should be concerned about the factory as there are other parts of the stream that are not polluted. Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** Identifies absence of mayfly larvae AND high levels of rat tail maggots / sludgeworms downstream from factory. Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** Identifies absence of mayfly larvae OR high levels of rat tail maggots / sludgeworms downstream from factory. Quality of written communication impedes communication of the science at this level. **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to C** **Relevant points include:** consider following point with reference: • mayfly larvae only live in unpolluted water high in oxygen content • rat-tail maggots can survive very low oxygen content • **allow** there are mayfly in unpolluted areas so downstream of factory must be polluted • **allow** higher level responses to Biochemical Oxygen Demand (BOD) being very high in polluted water • **ignore** factory poisons the stream. No marks if no reference to any of the organisms Use L1, L2, L3 annotations in scoris. Do not use ticks.
			Total	**10**	

Question			Answer	Marks	Guidance
8	(a)	(i)	4 (1)	1	**allow** quadrupled / 400% **not** 0.75
		(ii)	August to September: an increase in food causes an increase in whales (1) September to October: an decrease in food causes a decrease in whales / whales to leave area (1)	2	if no other marks awarded **allow** 1 mark for correctly linking food supply with number of whales, e.g. when there is more food there are more whales no marks for simply describing change in whale numbers with no explanation
	(b)		**any two from:** less food (1) hunting (1) pollution / AW (1) whales have not adapted / not been able to change (1)	2	 **allow** poorly adapted to changed environment
			Total	**5**	

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>9</td><td>(a)</td><td></td><td>fertilisation (1)</td><td>1</td><td>mark answer line first. If no answer on line look for indication in list e.g. a ring around</td></tr>
<tr><td></td><td>(b)</td><td></td><td><table><tr><th></th><th>Haploid</th><th>Diploid</th></tr><tr><td>egg cell</td><td>✓</td><td></td></tr><tr><td>sperm cell</td><td>✓</td><td></td></tr><tr><td>zygote</td><td></td><td>✓</td></tr><tr><td>cells in embryo</td><td></td><td>✓</td></tr><tr><td>cells in twin embryos</td><td></td><td>✓</td></tr></table>all correct (2)
at least three correct (1)</td><td>2</td><td>more than one tick per line negates a correct tick</td></tr>
<tr><td></td><td>(c)</td><td></td><td>mitosis (1)</td><td>1</td><td>mark phonetically (look for a ‘t’)</td></tr>
<tr><td></td><td>(d)</td><td>(i)</td><td>pump (1)
blood (1)</td><td>2</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>cells become specialised (1)</td><td>1</td><td>allow cells become different / develop into different tissues
allow cells change</td></tr>
<tr><td></td><td>(e)</td><td></td><td>came from same egg and sperm (cells) / same fertilised egg / same embryo / same zygote (1)
are clones / have same DNA / have same genes / are genetically identical (1)</td><td>2</td><td>not have similar genes / DNA</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>9</td><td></td></tr>
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Question			Answer	Marks	Guidance
10	(a)		Abi (1) boys grow to 177 /177.5/ 178 (cm) and girls grow to 164(cm) (1)	2	**allow** answer for boys in range 177-178 **allow** boys have grown 13-14 (cm) taller than the girls (at age 20)
	(b)		girls – (yes) because graph has levelled off / stopped growing at 17/18 (years) (1) boys – (no) because graph has not levelled off / is still rising (1)	2	**ignore** girls – (yes) because there is a straight line **allow** (boys / girls:) can not tell because have no data beyond 20 years (1) **allow** idea that some have / some have not because graphs show average data (1)

Question	Answer	Marks	Guidance
(c)	**max four from:** structural proteins (1) to build new **tissue** / named tissue e.g. skin (1) hormones (1) to **control** growth / control body processes / control named process e.g. puberty (1) carrier molecules / eg haemoglobin (1) to **transport** materials (needed for growth) (1) enzymes / catalysts (1) to control chemical reactions (involved in growth) (1)	4	can only get both marks for each type of protein if points clearly linked 'job' mark is dependent on 'type' mark max 2 for types of proteins given with no link to growth **allow** named enzymes or named reactions eg enzymes (1) that control respiration (1) **allow** specific examples eg insulin (1) to control blood sugar (1) collagen (1) to make skin (1) antibodies (1) to fight disease (1) clotting factor (1) to seal wounds (1) melanin (1) protect skin from UV (1) keratin (1) to make skin/hair (1) haemoglobin (1) carry oxygen (1) two specific examples of the same type can still gain full marks e.g protease to break down protein, carbohydrase to break down carbohydrates = 4 **ignore** hormones that are not proteins: progesterone / oestrogens / testosterone
	Total	**8**	

Question			Answer	Marks	Guidance
11	(a)		**Level 3 (5–6 marks)** A description of selecting / choosing to breed dogs with the biggest heads and flattest faces, and the idea of repeating this over many generations. Quality of written communication does not impede communication of the science at this level. **Level 2 (3–4 marks)** The idea of selecting / choosing to breed dogs with the biggest heads and flattest faces – ie the feature being selected for is identified. Quality of written communication partly impedes communication of the science at this level. **Level 1 (1–2 marks)** The idea of selecting / choosing the best dogs to breed. Quality of written communication impedes communication of the science at this level. **Level 0 (0 marks)** Insufficient or irrelevant science. Answer not worthy of credit.	6	**This question is targeted at grades up to E** **Relevant points include:** • select dogs with the biggest heads and flattest faces • breed these together • from the offspring select those with the biggest heads and flattest faces • repeat this over many generations. To gain full marks, answer must refer explicitly to selecting for the biggest heads and flattest faces. Generic descriptions of selective breeding with no reference to larger head / flatter face score level 1 (max 2 marks) Use L1, L2, L3 annotations in scoris. Do not use ticks.

Question			Answer	Marks	Guidance
	(b)		**any two from:** (reason for banning breeding:) unnatural / unethical / cruel to animals (1) (reason against banning breeding:) breeders should be able to do so if they wish / people like bulldogs (1) health problems can be treated / caesarean operations are routine (1) idea that breeding could be used to get rid of harmful features (1)	2	**ignore** have health problems (in question) **allow** any two arguments, ie can have two for or two against **ignore** not fair **allow** higher level answers referring to inbreeding (1)
			Total	**8**	

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