OCR
Oxford Cambridge and RSA

GCSE

Biology B

Unit **B731/02**: Modules B1, B2, B3 (Higher Tier)

General Certificate of Secondary Education

Mark Scheme for June 2014

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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.

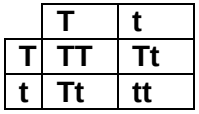
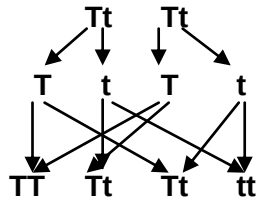
OCR will not enter into any discussion or correspondence in connection with this mark scheme.

Annotations used in scoris

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

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 i	amino acids (1)	1	
ii	EAR = 7.2 (g) (1)	1	**allow** 0.0072 kg **allow** 7.20 (g)
iii	15 year olds body mass is larger (1) EAR is calculated using body mass (not age) (1)	2	**allow** 15 year olds are bigger / heavier ORA **allow** idea of growth spurts/adolescence/puberty(needing more protein) **ignore** just growth / growth stages **allow** weight for mass
b	parent genotypes/gametes (1) offspring genotypes (1) 0.25 / 25% / ¼ / 1 in 4 / 1 to 3 of having beta thalassaemia (1)	3	 Correct diagram = 2  **If no marks awarded allowed ecf for max 1 mark for either offspring genotypes or ratio** **allow** alternative letter code
	Total	**7**	

Question	Answer	Marks	Guidance
2 a i	mosquitoes suck **infected** blood/blood from someone with malaria (1) pass plasmodium into (new) individual/human/host (1)	2	**Ignore** bacteria or virus **ignore** reference to merely biting but **allow** feeding/drinking **infected** blood **ignore** references to vector unless qualified **allow** pathogen / protozoan / parasite for plasmodium **ignore** malaria is transferred **allow** mosquitos suck blood with plasmodium and pass on to another human (2)
ii	mosquitoes breed in water / (female) mosquito lays eggs in water (1) ora and spraying insecticide kills mosquito/larvae/eggs/ offspring (1)	2	**ignore** insecticide kills plasmodium/pathogen **ignore** it stops the eggs being laid in the water **ignore** insects unqualified
b	heat stroke (1) dehydration (1)	2	**ignore** just 'stroke' **allow** hyperthermia **allow** insufficient water to remove toxins **allow** higher level answers e.g. damage to enzymes / stops enzymes working / denatures enzymes (1) **allow** preventing chemical reactions happening (1) **ignore** kills enzymes **ignore** burn or body becomes too hot or overheats **ignore** damage to any body part e.g. organ failure
	Total	**6**	

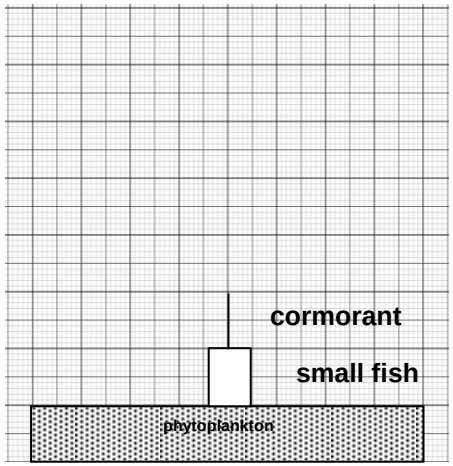
Question	Answer	Marks	Guidance
3 a	Type 1 **and** a correct reason Type 1 is insulin dependent/early onset/juvenile (1) Type 1 doesn't produce any/enough insulin (1) Type 2 can be controlled with diet only (1)	1	Type 2 / Type A / Type B = 0 **allow** Type 1 **has to be** controlled by injecting insulin / she **needs** insulin **ignore** she injects insulin (in the stem of the question) / she uses insulin **allow** pancreas doesn't work **allow** Type 2 is late onset / associated with obesity Jessica is neither / Type 2 not insulin dependent
b	insulin dose would be less /decreases (1) because she would use up **blood** sugar / glucose (1)	2	 **ignore** sugar / glucose unless clearly linked to blood
	Total	**3**	

Question	Answer	Marks	Guidance
4	**[Level 3]** Identifies Kevin's **and** Jeanette's cause **and** correction **and** at least one reason for and one against surgery. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Identifies Kevin's **or** Jeanette's cause **or** correction **and** at least one reason for and one against surgery. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Identifies Kevin's **or** Jeanette's condition **or** cause **or** correction **or** at least one reason for **or** one against surgery. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to A.** **Indicative scientific points at level 1, 2 and 3 may include:** **Cause** • Kevin as eyeball too long or lens too fat/too refractive/not thin enough. • Jeanette eyeball too short or lens too thin/not refractive enough/not fat enough. **Correction** • Kevin needs concave / diverging lens for correction. • Jeanette needs convex/ converging lens. **Reasons for** • benefits outweigh surgery risks • work not hindered • may be sportsperson • weather problems of glasses • makes appearance better • no need to wear glasses • long-lasting remedy **Reasons against** • Valid reason for not having surgery e.g. risk of going wrong / fear/pain of operation • cost of surgery compared to glasses • may still need glasses later in life when eyes worsen **Indicative scientific points at level 1 may include:** **Condition** • Kevin is short-sighted / can only see near objects in focus • Jeanette is long-sighted / can only see distant objects in focus **Use the L1, L2, L3 annotations in Scoris. Do not use ticks**.
	Total	**6**	

Question	Answer	Marks	Guidance
5 a	(auxin) made in tip **and** because when tip is covered / missing then no growth towards the **light** / bending towards the **light** (1)	1	 **allow ora** eg no tip exposed to light then no curvature must be sure response is **to light** **allow** there is no positive phototropism when tip is covered
b	no response with mica as mica prevents diffusion / response with gelatin as gelatin allows diffusion (1)	1	**allow** by diffusion as when diffusion is prevented it doesn't grow (towards the light)
c	idea of more auxin on shaded / right side and (more cell) elongation on shaded / right side (1)	1	**ora** **allow** auxin moves to shaded / right side because elongation greatest on shaded side **ignore** auxin destroyed by light response must indicate an unequal distribution of auxin in response to light
	Total	**3**	

Question	Answer	Marks	Guidance
6 a i	family ☐ genus ☐ kingdom ☐ order ☐ phylum ☐ species ☑	1	more than one answer = 0 **allow** other unambiguous answers, e.g. X in box, underlining, circle
ii	variety of life is a continuous spectrum AW (1)	1	**allow** different living things look very similar/have similar characteristics **allow** they have features that fit into more than one group **allow** they can't see the genetic code/DNA **allow** they can't see if they produce fertile offspring **allow** animals could look different but still belong to the same group due to common ancestors
b	natural systems are based on evolutionary relationships / (large number of) common characteristics (1) and artificial systems are based on one/a few/limited number of characteristics (1)	2	**must be clear which type of system they are referring to** **allow** natural based on ancestors / archaeological evidence / record in the rocks / physiology / biochemistry / reproduction / DNA **allow** artificial systems only based on what can be seen /physical features or behaviours e.g. flight or no flight
	Total	**4**	

Question	Answer	Marks	Guidance
7 a i	CFCs (1) aerosols / refrigeration (1)	2	if mention global warming / greenhouse gases max 1 mark **allow** (ozone) is broken down to oxygen / reacts to form oxygen (1)
ii	South America (1) (people will be more) exposed to UV radiation / (more at risk from skin) cancer (1)	2	 **allow** mutation / DNA damage as alternative to cancer
b	**[Level 3]** Identifies the names of both types of competition **and** shrinking ice caps means **competition is greater** between polar bears **in a smaller territory/area**. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Identifies the names of both types of competition **or** shrinking ice caps means **competition is greater** between polar bears **in a smaller territory/area**. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Identifies one type of competition **or** idea of **more** of polar bears **on smaller ice caps/in a smaller area.** Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to A*.** **Indicative scientific points at level 2 and 3 may include:** • competition between polar bears in a smaller territory greater. • competition between polar bears is intraspecific. • competition between polar bears and killer whales is interspecific. **Indicative scientific points at level 1 may include:** • competition between polar bears is intraspecific / within a species • competition between polar bears and killer whales interspecific / between species • idea of less land for polar bears • idea of competition between polar bears is on land and between polar bears and killer whales is in water **Use the L1, L2, L3 annotations in Scoris. Do not use ticks.**
	Total	**10**	

Question	Answer	Marks	Guidance
8 a i	 correct size bars (1) correct labels (1)	2	**ignore** asymmetry small fish = 8 small squares (16mm) wide by 5 small squares (10mm) high +/- ½ mm square cormorant = between a single line and max of 1 square wide (2mm) by 5 small squares (10mm) high or 4 small squares +/- ½ mm square
ii	humans are involved in other food chains / more than one trophic level (1) taking dry mass of humans / whales would be very difficult (1)	2	**allow** humans eat other things / have a varied diet **allow** can't dry out a human **allow** not allowed to kill whales / humans **allow** difficulty to catch / weigh whales
b	numbers were very low (1) protection has allowed numbers to recover (1) numbers are now high enough so no longer endangered (1)	3	**allow** between 1940 and 1980's numbers were at critical level / risk of extinction **allow** pre 1940 hunting/poisoned/habitats destroyed **allow** examples of protection e.g. banning poaching/captive breeding allowed the numbers to recover **allow** between 2000 and 2007 numbers no longer at critical level / risk of extinction **allow** disease / disaster could wipe out small population (1) **allow** reduced gene pool when population is low (1) **ora**
	Total	**7**	

Question	Answer	Marks	Guidance
9 a	contains antifreeze protein / chemical (1)	1	**ignore** all behavioural responses **ignore** thick shell
b	Leg B (1) **and any two from** blood vessels close together (1) (more) heat transfer between vessels / heat transfer from blood flow into foot to blood flow out of foot (1) blood vessels further/away from leg surface/less blood near surface (1) counter current (1)	3	 **ignore** arteries/veins if used singularly **allow** blood entering the foot flows close to the blood leaving the foot / AW **allow** blood returning to the body gets warmed up **if Leg A or C given** **allow** counter current (1) **ignore** blood transfer between blood vessels
	Total	**4**	

Question	Answer	Marks	Guidance
10 a	T = 27 (%) C = 23 (%) G = 23 (%) all correct = 2 one or two correct = 1	2	
b	idea of base pairing (1) BUT A pairs with T **and** C pairs with G (2)	2	**allow** the bases are complementary **allow** A pairs with T = 1 or C pairs with G = 1 **allow** bases pair - A links with T **and** C links with G = 2
c i	Idea that Watson and Crick / they could not have produced their model without Chargaff's / his discovery / AW (1)	1	**allow** without Chargaff's information they could not advance their work **ignore** he discovered the bases / base pairings **ignore** he helped them with the structure but **allow** he discovered the base pairings that helped them discover the structure
ii	Watson and Crick were the ones who came up with the structure of DNA / Chargaff did not come up with the structure of DNA / AW (1)	1	**allow** he was not in the group that came up with the final discovery
	Total	**6**	

Question	Answer	Marks	Guidance
11 a i	37.5 (^{o}C) (1)	1	**allow** answer in range 35-40 (^{o}C) **allow** single number, e.g. 37 (^{o}C) or range, e.g. 37-38 (^{o}C)
ii	(as temperature increases) time gets longer / rate gets slower (1) reaction stops / protein no longer broken down / AW (1) enzyme / pepsin denatures (at high temperatures) (1)	3	**allow** time increases **allow** any specific time greater than 6 **allow** time would be infinite / tube would not go colourless/ no reaction / the reaction won't work **ignore** it would not work if referring to enzyme only and not reaction **allow** description of denaturing in terms of changing shape of active site **ignore** protein is denatured
b i	The volume of carbon dioxide is less than the volume of oxygen / 2nd box (1)	1	more than one answer = 0 **allow** other unambiguous answers, e.g. X in box, underlining, circle
ii	**max three from** structural (1) e.g. collagen / keratin (1) hormones (1) e.g. insulin (1) carrier molecules (1) e.g. haemoglobin (1) enzymes / biological catalyst (1) e.g. amylase (1)	3	only award marks for examples if have already gained the function mark **ignore** pepsin **allow** antibodies (1) receptors (1) muscles / growth / repair (1)
	Total	**8**	

Question	Answer	Marks	Guidance
12 a	mitosis (1)	1	**allow** phonetic spelling
b	**[Level 3]** A correctly sequenced description of cloning technique including all 4 indicative points. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** A correctly sequenced partial description of cloning technique including 3 indicative points. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** A partial description of cloning technique including 2 indicative points. Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to A*** **Indicative scientific points may include:** • **nucleus** removed from an egg cell/enucleated egg (**ignore** DNA / genetic material) • **nucleus** from the udder / body cell is inserted into the egg cell **BUT** egg cell nucleus **replaced** with the nucleus from an udder / body cell (covers the first 2 indicative scientific points) (**allow** a correct example of a named body cell, **ignore** unqualified cell eg adult cell) • (egg cell) given an electric shock **to make it divide** / **multiply** (**ignore** just grow) • embryo /Dolly is genetically identical to / a clone of the sheep from which the udder/body cell came from or udder/body cell taken from the sheep they want to clone **Use the L1, L2, L3 annotations in Scoris; do not use ticks.**
	Total	**7**	

Question	Answer	Marks	Guidance
13 a	increase / maintain rate of flow of **blood** (1) increase / maintain transport of materials around body (1)	2	**allow** increase speed of blood / make blood flow faster **allow** "it" for blood **ignore** so the heart still pumps **allow** named examples e.g. oxygen / food **allow** prevent renal failure **ignore** organ failure/ lack of blood to organs **ignore** just 'increases blood volume' **allow** other examples of the consequences of low blood pressure e.g. unconsciousness / fainting (1) **allow** transport of more oxygenated blood faster (2) **ora** for all responses
b	lack of/ less red blood cells / haemoglobin (1) lack of / less oxygen causes anaerobic respiration (1)	2	**ora**
	Total	**4**	

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