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Cambridge International General Certificate of Secondary Education

MARK SCHEME for the March 2015 series

0610 BIOLOGY

0610/32 Paper 3 (Extended Theory), maximum raw mark 80

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Abbreviations used in the Mark Scheme

- **;** separates marking points
- / separates alternatives within a marking point
- **R** reject
- **ignore** mark as if this material was not present
- **A** accept (a less than ideal answer which should be marked correct)
- AW alternative wording (accept other ways of expressing the same idea)
- underline words underlined (or grammatical variants of them) must be present
- wiggly underline the idea conveyed by the word(s) underlined must be present in the answer
- max indicates the maximum number of marks that can be awarded
- mark independently the second mark may be given even if the first mark is wrong
- ecf credit a correct statement that follows a previous wrong response
- (n)ecf (no) error carried forward
- ( ) the word / phrase in brackets is not required, but sets the context
- **ora** or reverse argument
- AVP any valid point

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Question	Expected answers	Mark	Additional Guidance
1 (a) (i)	**A** palisade / mesophyll (layer/cells) ; **B** guard (cell) ;	[2]	
(ii)	(palisade cells) contain many chloroplasts / lots of chloroplasts ; are tightly packed ; are located near the top of the leaf ; arranged 'on end' / vertically / lengthways / columnar ;	[max 2]	**ignore** large vacuole / large surface area
(b) (i)	through stomata ; by diffusion ; from an area of high concentration to an area of low concentration ; guard cells bend / become turgid ;	[3]	**A** down a concentration gradient
(ii)	glucose and oxygen ;	[1]	

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Question	Expected answers	Mark	Additional Guidance
(c)	**1** submerged leaves are divided ; **2** providing large area for, photosynthesis / absorption ; OR **3** leaves have large surface area ; **4** to float ; OR **5** (floating leaves so) little xylem / little lignin ; **6** water provides support ; OR **7** little / no roots / root hairs ; **8** roots for anchorage only / no need for roots to absorb water or mineral ions ; OR **9** little / no, cuticle ; **10** no need to conserve water ; OR **11** stomata only on upper surface ; **12** only upper surface exposed to air / to allow diffusion of gases ; OR **13** lots of air spaces (between cells) ; **14** for flotation / buoyancy ; OR **15** floating leaves ; **16** to allow, diffusion / AW of (named) gas(es) ; OR **17** aerial roots ; **18** to allow roots to receive oxygen ;	**[max 2]**	Accept any adaptation but explanation must be linked to the correct adaptation **A** short roots
2 (a) (i)	both alleles are expressed ; neither allele is dominant / recessive to the other ; the phenotype of the heterozygote is intermediate ;	**[max 2]**	**A** answers in terms of any correct example **ignore** incomplete dominance **A** both alleles are half dominant / equally dominant

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Question	Expected answers	Mark	Additional Guidance
(ii)	correct gametes ; C^B , C^W + C^B , C^W ; correct offspring genotypes ; C^BC^B, C^BC^W, C^BC^W, C^WC^W ; correct offspring phenotypes ; brown, roan, roan, white ; correct ratio / percentage ; 1 brown : 2 roan : 1 white ;	[4]	**A** C^BC^B, C^BC^W, C^WC^W in any order **ignore** 1:2:1 without reference to phenotypes
(b) (i)	cows with best milk yield chosen ; bull linked to cows with high milk yield chosen ; these are mated / artificial insemination used / AI used ; offspring checked / chosen for improved milk yield ; these cows are then used to breed the next generation / AW / process repeated ;	[max 3]	
(ii)	resistance to disease ; good temperament ; milk quality / example ; rapid / fast growth / development ; meat quality / increase in meat quantity ; AVP ;	[max 1]	**A** improved taste / improved nutritional content
(c)	**1** consumer concerns about hormones in the milk ; **2** possible effects on human health / allergies / side effects ; **3** reference to animal welfare / health of cattle ; **4** concerns about lack of consumer choice / unable to avoid consuming milk produced from cows which have been injected with BST ; **5** unnecessary when there is no shortage of milk / already an overproduction of milk ; **6** AVP ;	[max 3]	
3 (a)	carbon dioxide ; urea ;	[2]	

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Question	Expected answers	Mark	Additional Guidance
(b)	0 / 0.0 (gdm^{-3}) ; proteins too big, to pass through the capillary wall (in glomerulus) / to be filtered (from the blood) / out of the glomerulus ;	**[2]**	
(c)	**1** blood flows into the (dialysis) machine / blood is returned to the patient ; **2** blood passes over a dialysis membrane / countercurrent flow described ; **3** the dialysis membrane separates the person's blood and the dialysis fluid ; **4** dialysis fluid contains, glucose / salts / no urea ; **5** movement (across membrane) by diffusion / down a concentration gradient ; **6** urea leaves the blood / enters the dialysis fluid ; **7** dialysis fluid is refreshed ; **8** excess / some salt, leaves the blood / enters the dialysis fluid ; **9** excess / some water, leaves the blood / enters the dialysis fluid ; **10** glucose / salts in dialysis fluid same concentration as (should be) in blood ; **11** no net loss of glucose ;	**[max 5]**	
(d)	*advantage* no need to visit hospital ; no need for dialysis / time not taken up with dialysis ; no need for a restricted diet ; no long term discomfort / pain ; improved quality of life / lead a normal life ; *disadvantage* rejection of kidney ; difficult to find suitable donor ; risk associated with operation ; need to take immunosuppressant drugs ;	**[2]**	max 1 for advantage and max 1 for disadvantage

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Question	Expected answers	Mark	Additional Guidance
(e) (i)	breaks down / AW, dead / damaged red blood cells ; stores (named) vitamins / (named) minerals ; breaks down amino acids into ammonia / deamination ; makes urea ; stores glycogen ; converts glucose to glycogen / **ora** ; produces bile (salts / pigments) ; makes cholesterol ; makes (named) protein ; maintains glucose concentration in blood ; breaks down toxins ; AVP ;	**[max 1]**	
(ii)	cirrhosis (of liver) / (chronic) liver disease / kidney failure / liver failure ; cancer of the liver ; brain damage ; stomach ulcers ; heart disease / high blood pressure ; oral cancer / mouth cancer / throat cancer / AW ; pancreatitis ; reduced fertility ; depression / AW ; addiction / dependence ; heart failure/stroke/heart attack ;	**[max 2]**	
(iii)	violent crime / domestic violence ; road accidents / drink driving ; (petty) crime / vandalism ; family breakdown / divorce / relationship breakdown ; impaired performance at work / unemployment / difficulty getting a job ; AVP ;	**[max 1]**	

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Question	Expected answers	Mark	Additional Guidance
4 (a)	**A** extended / elongated, lower mandible ; lower mandible longer than upper mandible **ora**/ AW ; rounded caudal fin ; **B** thin / narrow / elongated, fin(s) ; combined dorsal and caudal fin ; **C** spotted fin(s) ; more than one dorsal fin ; **D** elongated / long(er), upper mandible ; forked caudal fin / AW ; extra fin, on side / bottom ;	**[max 4]**	max 1 mark for each fish **A** long dorsal fin **A** reduced / modified fins **A** extra fin on back **R** nose
(b) (i)	sulfur dioxide ; nitrogen oxide(s) ;	**[max 1]**	
(ii)	**1** increase in pH to 7.0 increases the number of species of fish ; **2** most species of fish were present at <u>pH 7.0 and 7.5</u> ; **3** least species of fish were present at pH 4.0 ; **4** increase in pH above 7.5 decreases the number of species of fish ; **5** small changes in number of species of fish between pH 6.5 – pH 8.0 ; **6** large change in the number of species of fish between pH 4.0 – pH6.5 ; **7** acidic lakes have fewer fish species than pH neutral / alkaline lakes **ora**; **8** reference to mean number of fish species at a particular pH ;	**[max 3]**	

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Question	Expected answers	Mark	Additional Guidance
(iii)	reduces the pH of rivers / lakes / soils ; (low pH) kills / harms, fish / invertebrates ; (low pH) causes aluminium compounds to become soluble ; aluminium compounds toxic to aquatic life ; kills / harms, trees / lichens / plants ; mineral / s / ions / salts, washed out of soil ; damages limestone, buildings / statues / rock ;	[max 2]	
5 (a) (i)	production of genetically identical offspring ; from one parent ; no gametes / (only) mitosis ;	[max 2]	
(ii)	*advantage* fast ; colonise new areas quickly ; if the parent is well adapted to the environment the offspring will be also / AW ; only one individual needed ; *disadvantage* little / no, variation ; disease / change in environmental conditions, likely to kill all organisms / AW ; limited ability to adapt to environmental changes / AW ; no dispersal, so competition (with parent / others) likely ;	[max 2]	max 1 from advantage and 1 from disadvantage
(b) (i)	increase in, size / length / mass / volume / AW ; increase in cell number ;	[max 2]	increase in dry mass = 2 marks **A** reference to cell division / mitosis / reproduction of cells / tissues
(ii)	sucrose transported (to underground stems) ; through phloem / translocation ; sucrose converted to starch ; stem swells ; AVP ;	[max 3]	**A** sucrose stored as starch

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Question	Expected answers	Mark	Additional Guidance
(c) (i)	– (negative); 25 — 40 ;	[2]	1 mark for a number in range from 25 – 40 inclusive.
(ii)	*Accept the following 3 marking points written anywhere in response:* **1** correct reference to osmosis ; **2** cell membrane is, partially / semi / selectively permeable ; **3** reference to movement of water down a water potential gradient ; *between 0.0 mol dm^{-3}–0.4 mol dm^{-3}* **4** water moves into the potato ; **5** potato has a lower water potential than surroundings / **ora** ; **6** increasing the potato's mass ; *at 0.4 mol dm^{-3}* **7** potato has the same water potential as the surroundings ; **8** there is no net movement of water ; *between 0.4 mol dm^{-3} – 1.0 mol dm^{-3}* **9** potato has a higher water potential than the surroundings **ora;** **10** water moves out of the potato ; **11** decreasing the potato's mass ;	[max 5]	marking points 1, 2 and 3 need to be in correct context **A** there is no water potential gradient at 0.4 mol dm^{-3}
(d) (i)	long filaments ; anthers / stamens, hang outside / anthers / stamens, easily exposed to the wind ; anthers loosely attached to the filaments ; small / light, pollen ; large / feathery / hairy, stigma ; stigma / style, hangs outside ; no / reduced, petals ;	[max 2]	
(ii)	self-pollination is within the same, plant / flower ; cross-pollination is between different plants ;	[max 1]	

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Question	Expected answers	Mark	Additional Guidance
(iii)	more chances of fertilisation ; no need for pollinators ; useful if plants are, geographically isolated / on their own / AW ; if well suited to the environment the traits are kept / AW ; less energy required for reproduction / less wastage of pollen ; AVP ;	[max 1]	
6 (a) (i)	selective breeding qualified with feature e.g. increase in crop yield ; agricultural machinery, to work larger fields / AW ; fertilisers, to increase plant growth / provide mineral ions / salts / (named) nutrient ; pesticides / insecticides to kill pests to prevent crop destruction ; herbicides to kills weeds to reduce competition ; fungicides, to kill fungi to stop disease / reduce crop destruction ; genetic engineering qualified with a correct feature ; use of antibiotics to increase yield (in livestock) ; AVP ;	[max 2]	must have correct explanation for the second 'explanation' mark
(ii)	better / AW, medical care / medicine / drugs / antibiotics ; clean / treated, water ; drainage / sewage treatment / sanitation ; vaccination ; improved housing conditions ; improved food, storage / transport / availability ;	[max 1]	
(b)	**1** shorter food chain / plants at first trophic level / plants are producers / animals are at a higher trophic level ; **2** energy lost, at each trophic level / along food chain ; **3** energy from plants goes (directly) to humans instead of via animals ; **4** animals / named animal, use up energy so less available ; **5** example of energy loss from animals in food chain ;	[max 3]	

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Question	Expected answers	Mark	Additional Guidance
(c)	**1** soil erosion ; **2** flooding ; **3** landslides ; **4** leaching / loss of nutrients ; **5** drought ; **6** desertification ; **7** increase in, frequency / severity of storms ; **8** loss of habitat ; **9** extinction / endangerment of species / loss of biodiversity ; **10** disruption of, food chains / food webs ; **11** burning of trees increases carbon dioxide in the atmosphere ; **12** decreased photosynthesis so, increased carbon dioxide / decreased oxygen, in atmosphere ;	**[max 4]**	

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