

CAMBRIDGE INTERNATIONAL EXAMINATIONS**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)	<u>both alleles</u> are expressed ; neither <u>allele</u> 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)	<u>correct gametes</u> ; $C^B, C^W + C^B, C^W$; <u>correct offspring genotypes</u> ; $C^B C^B, C^B C^W, C^B C^W, C^W C^W$; <u>correct offspring phenotypes</u> ; brown, roan, roan, white ; <u>correct ratio/percentage</u> ; 1 brown : 2 roan : 1 white ;	[4]	A $C^B C^B, C^B C^W, C^W C^W$ 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)	<i>advantage</i> 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 ; <i>disadvantage</i> 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 – pH 6.5 ; 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 <u>genetically</u> identical offspring ; from one parent ; no gametes / (only) mitosis ;	[max 2]	
(ii)	<i>advantage</i> fast ; colonise new areas quickly ; if the parent is well adapted to the environment the offspring will be also / AW ; only one individual needed ; <i>disadvantage</i> 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 <u>cell</u> 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)	<i>Accept the following 3 marking points written anywhere in response:</i> 1 correct reference to <u>osmosis</u> ; 2 cell membrane is, <u>partially/semi/selectively permeable</u> ; 3 reference to movement of water down a water potential gradient ; <i>between 0.0 mol dm^{-3}–0.4 mol dm^{-3}</i> 4 water moves into the potato ; 5 potato has a lower water potential than surroundings/ ora ; 6 increasing the potato's mass ; <i>at 0.4 mol dm^{-3}</i> 7 potato has the same water potential as the surroundings ; 8 there is no net movement of water ; <i>between 0.4 mol dm^{-3} – 1.0 mol dm^{-3}</i> 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 <u>filaments</u> ; anthers/stamens, hang outside / anthers / stamens, easily exposed to the wind ; <u>anthers</u> 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 kill 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]	