

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

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Question	Expected answers	Mark	Additional Guidance
(ii)	<p><u>correct gametes</u> ; $C^B, C^W + C^B, C^W$;</p> <p><u>correct offspring genotypes</u> ; $C^B C^B, C^B C^W, C^B C^W, C^W C^W$;</p> <p><u>correct offspring phenotypes</u> ; brown, roan, roan, white ;</p> <p><u>correct ratio / percentage</u> ; 1 brown : 2 roan : 1 white ;</p>	[4]	<p>A $C^B C^B, C^B C^W, C^W C^W$ in any order</p> <p>ignore 1:2:1 without reference to phenotypes</p>
(b) (i)	<p>cows with best milk yield chosen ;</p> <p>bull linked to cows with high milk yield chosen ;</p> <p>these are mated / artificial insemination used / AI used ;</p> <p>offspring checked / chosen for improved milk yield ;</p> <p>these cows are then used to breed the next generation / AW / process repeated ;</p>	[max 3]	
(ii)	<p>resistance to disease ;</p> <p>good temperament ;</p> <p>milk quality / example ;</p> <p>rapid / fast growth / development ;</p> <p>meat quality / increase in meat quantity ; AVP ;</p>	[max 1]	A improved taste / improved nutritional content
(c)	<p>1 consumer concerns about hormones in the milk ;</p> <p>2 possible effects on human health / allergies / side effects ;</p> <p>3 reference to animal welfare / health of cattle ;</p> <p>4 concerns about lack of consumer choice / unable to avoid consuming milk produced from cows which have been injected with BST ;</p> <p>5 unnecessary when there is no shortage of milk / already an overproduction of milk ;</p> <p>6 AVP ;</p>	[max 3]	
3 (a)	<p>carbon dioxide ;</p> <p>urea ;</p>	[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)	<ol style="list-style-type: none"> 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)	<p><i>advantage</i></p> <p>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 ;</p> <p><i>disadvantage</i></p> <p>rejection of kidney ; difficult to find suitable donor ; risk associated with operation ; need to take immunosuppressant drugs ;</p>	[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)	<p>A extended / elongated, lower mandible ; lower mandible longer than upper mandible ora/ AW ; rounded caudal fin ;</p> <p>B thin / narrow / elongated, fin(s) ; combined dorsal and caudal fin ;</p> <p>C spotted fin(s) ; more than one dorsal fin ;</p> <p>D elongated / long(er), upper mandible ; forked caudal fin / AW ; extra fin, on side / bottom ;</p>	[max 4]	<p>max 1 mark for each fish A long dorsal fin</p> <p>A reduced / modified fins</p> <p>A extra fin on back</p> <p>R nose</p>
(b) (i)	sulfur dioxide ; nitrogen oxide(s) ;	[max 1]	
(ii)	<p>1 increase in pH to 7.0 increases the number of species of fish ;</p> <p>2 most species of fish were present at <u>pH 7.0 and 7.5</u> ;</p> <p>3 least species of fish were present at pH 4.0 ;</p> <p>4 increase in pH above 7.5 decreases the number of species of fish ;</p> <p>5 small changes in number of species of fish between pH 6.5 – pH 8.0 ;</p> <p>6 large change in the number of species of fish between pH 4.0 – pH6.5 ;</p> <p>7 acidic lakes have fewer fish species than pH neutral / alkaline lakes ora;</p> <p>8 reference to mean number of fish species at a particular pH ;</p>	[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)	<p>Accept the following 3 marking points written anywhere in response:</p> <p>1 correct reference to <u>osmosis</u> ;</p> <p>2 cell membrane is, <u>partially/semi/selectively permeable</u> ;</p> <p>3 reference to movement of water down a water potential gradient ;</p> <p><i>between 0.0 mol dm⁻³–0.4 mol dm⁻³</i></p> <p>4 water moves into the potato ;</p> <p>5 potato has a lower water potential than surroundings/ ora ;</p> <p>6 increasing the potato’s mass ;</p> <p><i>at 0.4 mol dm⁻³</i></p> <p>7 potato has the same water potential as the surroundings ;</p> <p>8 there is no net movement of water ;</p> <p><i>between 0.4 mol dm⁻³ – 1.0 mol dm⁻³</i></p> <p>9 potato has a higher water potential than the surroundings ora;</p> <p>10 water moves out of the potato ;</p> <p>11 decreasing the potato’s mass ;</p>	[max 5]	<p>marking points 1, 2 and 3 need to be in correct context</p> <p>A there is no water potential gradient at 0.4 mol dm⁻³</p>
(d) (i)	<p>long <u>filaments</u> ;</p> <p>anthers/stamens, hang outside / anthers / stamens, easily exposed to the wind ;</p> <p><u>anthers</u> loosely attached to the filaments ;</p> <p>small/light, pollen ;</p> <p>large/feathery/hairy, stigma ;</p> <p>stigma/style, hangs outside ;</p> <p>no/reduced, petals ;</p>	[max 2]	
(ii)	<p>self-pollination is within the same, plant/flower ;</p> <p>cross-pollination is between different plants ;</p>	[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]	