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Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2014 series

0610 BIOLOGY

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

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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Abbreviations used in the Mark Scheme

- ; separates marking points
- / separates alternatives within a marking point
- R reject
- I ignore (mark as if this material was not present)
- A accept (a less than ideal answer which should be marked correct)
- AW alternative wording
- underline words underlined must be present
- 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
- A, S, P, L Axes, Size, Plots and Line for graphs
- O, S, D, L Outline, Size, Detail and Label for drawings
- (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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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>1 (a)</td><td>A – (waxy) cuticle;
B – palisade mesophyll / palisade layer / palisade cell;
C – (lower) epidermis / epidermal layer;
D – stoma / stomata / guard cell(s);
E – air / gas, space;</td><td>5</td><td>I outer layer / AW
R mesophyll / palisade unqualified

R (spongy) mesophyll</td></tr>
<tr><td>(b)</td><td>
<table>
<tr><th>function</th><th>letter from Fig. 1.2</th></tr>
<tr><td>controls movement of substances into and out of the cell</td><td>G</td></tr>
<tr><td>creates a pressure to maintain the shape of the cell</td><td>K</td></tr>
<tr><td>produces sugars using light as a source of energy</td><td>L</td></tr>
<tr><td>withstands the internal pressure of the cell</td><td>J</td></tr>
<tr><td>controls all the activities of the cell</td><td>F</td></tr>
</table>
</td><td>5</td><td></td></tr>
</table>

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Question	Answer	Marks	Guidance for Examiners
(c) (i)	volume of, oxygen / gas, increases (with time); levels off / reaches a plateau / AW; increases rapidly at start and then slows down**;** use of data;	**max 3**	**I** 'reaction stops' e.g. levels off at 6.2 cm^3 of oxygen at 90 seconds data quotes must have units
(ii)	substrate / hydrogen peroxide / reactant / AW, fits into enzyme; active site; shape is, complementary / AW; any reference to lock and key; product(s) / oxygen and water, formed and leaves the enzyme; AVP;	**max 3**	**A** answers in the context of catalase **I** 'speeds up the reaction' **R** if shape is the same **A** product and enzyme separate e.g. enzyme can work again / enzyme not used up / enzyme is not changed during reaction / lowers activation energy
		[Total: 16]	

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Question	Answer	Marks	Additional Guidance
2 (a)	removal from the, body / organism / cell; poisons / toxins / harmful substances; waste product(s), of metabolism / respiration / deamination / chemical reactions; substances in excess (of requirements) / AW;	max 3	**A** 'substances that cause harm' / 'harmful' **A** named example e.g. CO_2, urea, salt, named ions, amino acids toxic waste products of metabolism / AW = 2 marks
(b) (i)	protein;	1	
(ii)	glucose**;**	1	
(iii)	urea **and** salts**;**	1	**A** sodium / ions
(c)	any three from: pelvis; ureter; bladder; urethra;	max 3	
(d)	homeostasis;	1	
		[Total: 10]	

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Question	Answer	Marks	Additional Guidance
3 (a)	**1** secrete / make / use, enzymes; **2** breakdown <u>insoluble</u> substances to <u>soluble</u> substances; **3** (named) protease; **4** breaks down protein to amino acids; **5** amylase / carbohydrase; **6** breaks down starch to, glucose / maltose / sugar; **7** lipase; **8** breaks down fat to fatty acids and glycerol; **9** (named) products respired; **10** using oxygen; **11** carbon dioxide released; **12** ammonia produced; **13** AVP; ref to nitrification	**max 5**	**A** pepsin e.g. glucose / sugars / fatty acids / amino acids **MP9**, **MP10** and **MP11** can be taken from a word equation **MP9** can be awarded for $C_6H_{12}O_6$ in a chemical equation **MP10** and **MP11** can be taken from a correctly balanced chemical equation
(b)	(chlorine) kills bacteria / acts as a disinfectant; **R** 'remove bacteria' (some) bacteria may, cause disease / be pathogenic; so water is not harmful to the environment / does not kill (named) organisms;	**max 2**	**A** microorganisms **I** harmful unqualified **I** makes the water safe unqualified kills, pathogenic / disease-causing, bacteria = 2
		[Total: 7]	

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Question	Answer	Marks	Additional Guidance
4 (a)	**1** thick, wall; **2** withstands (blood) pressure; **3** muscular tissue; **4** vasoconstriction / vasodilation; **5** elastic (tissue); **6** recoils to maintain (blood) pressure / smoothes out blood flow; **7** small lumen; **8** maintains (blood) pressure; **9** fibrous tissue; **10** maintains shape / prevents bursting;	**max 4**	max 3 for structures (MP1, 3, 5, 7 and 9) function marks (MP2, 4, 6, 8, 10) must relate to a structure **A** tunica media and tunica externa for wall **I** reference to lining / endothelium **R** increase
(b) (i)	13 kPa;	**1**	
(ii)	**1** blood pressure decreases as cross-sectional area increases (to capillaries); **2** continues to decrease / remains constant, as cross-sectional area decreases (in the veins); **3** speed of blood decreases as cross-sectional area increases (in the capillaries); **4** increases as cross-sectional area decreases in, veins / vena cava;	**max 3**	

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Question	Answer	Marks	Additional Guidance
(c)	(oxygen) diffuses (from blood to tissue fluid); across the, wall / membranes (of the capillary); down a concentration gradient / from high concentration to low concentration; pressure forces out, water / (named) solutes; (pressure) filtration;	**max 3**	
(d)	muscle(s) in arteriole contract; arterioles constrict / vasoconstriction occurs; less blood flows to, skin / capillaries; decrease in loss of heat (from the blood) by, radiation / conduction / convection; AVP;	**max 3**	**I** capillaries, vasoconstrict / constrict **A** 'stops blood flow to skin' **R** movement of arterioles / capillaries away from the surface of skin / AW **A** prevent heat loss by, radiation / conduction / convection e.g. ref to shunt vessel(s) / blood taking a deeper route
		[Total: 14]	

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Question	Answer	Marks	Additional Guidance
5 (a) (i)	**X** – protein (coat / AW) / capsid / capsomere(s); **Y** – genetic material / nucleic acid / RNA;	2	**A** DNA / gene(s) **R** nuclear material / chromosome
(ii)	cell wall; cell membrane; cytoplasm; loop of DNA; (slime) capsule; flagellum / flagella; plasmids; ribosome(s); AVP;	max 3	**R** cellulose cell wall **I** size / complexity / shape e.g. pili
(b) (i)	number of people living with HIV: numbers living with HIV increased (from 1990), levelled off / increased slightly, from 2000 / 2001 / 2002; any one correct data quote from vertical axis for numbers living with HIV; number of people newly infected with HIV: numbers newly infected increased (and levelled off between 1994 and 1998) **and** decreased since, 1997 / 1998; any one correct data quote from vertical axis for numbers newly infected with HIV;	4	date quotes must have correct year, but **A** 'starts' for 1990 and 'ends' for 2009 / 2010 **A** any correct manipulation of the data, e.g. increased by / percentage increase, etc. **A** ± ½ a square for data quotes

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Question	Answer	Marks	Additional Guidance
(ii)	people living with HIV are living longer; success of (named) treatment for HIV / AIDS; success in reducing transmission; reference to, education / information / funding, about HIV / AIDS;	**max 2**	e.g. drugs / antivirals / AZT / nursing care **A** ref. to barrier contraception / condom / femidom
(iii)	from mother to fetus / across the placenta; from mother to baby at birth; in breast milk; unprotected / unsafe sex; sharing, needles / syringes; in blood products / blood for transfusion / transplants / blood to blood contact; AVP;	**max 3**	**R** saliva **R** other sharps, e.g. razors unless qualified by blood contact **R** using contaminated / dirty / used, needles unqualified **A** intravenous drug use / AW **R** donating blood **R** blood unqualified **A** 'blood exchange' **I** body fluids unqualified
(iv)	weakens the immune system / reduces capacity of body to respond to disease / AW; lymphocytes are, damaged / destroyed / killed / not functional; (B / T) lymphocytes / white blood cells, stop making antibodies; any **two** roles of antibodies or lymphocytes or phagocytes which will not happen or not happen very well;;	**max 3**	**R** 'no immune system' / 'destroys immune system' **A** 'fight' disease antibodies stop, pathogens spreading (in the body) antibodies cause pathogens to, clump / agglutinate antibodies kill bacteria antibodies make it easier for phagocytes to ingest pathogens antibodies, neutralise toxin(s) / make toxins harmless phagocytes, ingest / AW, pathogens lymphocytes kill infected cells
		[Total: 17]	

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Question	Answer	Marks	Additional Guidance
6 (a) (i)	**1** concentration of PCBs increases up the food chain / **ora**; **2** concentration is much higher in larger organisms / **ora**; **3** big(gest) increase between herring and porpoise; **4** (only) herring / porpoise / animals at top of food chain, have a range of concentrations; **5** use of figures (arbitrary units) to make a comparison between two, trophic levels / organisms;	**max 3**	**MP4** must be a qualitative statement, not just statement of figures **MP5** – must be a comparison not just figures unqualified, e.g. use of 'but', 'and', 'only', etc. and accept ×1.8 / 2, ×4, ×30, ×384, ×1900
(ii)	animals at higher trophic levels live longer; eat many of the animals below them in the food chain; PCBs cannot be, excreted / eliminated / removed / broken down; so build up in the body (tissues); bioaccumulation / biomagnification;	**max 3**	
(b) (i)	mutation / change in DNA; any mutagen; gene(s) code for, AHR / protein; any sensible suggestions about change to protein molecule; fish susceptible to PCB poisoning died; fish with changed protein survived and reproduced; passing on mutant allele; reference to (natural) selection;	**max 5**	**A** ref to genetic variation **R** AHR / protein, mutates e.g. radiation e.g. different amino acid sequence
(ii)	fish with mutant allele not at an advantage / no selection for PCB resistance; PCB resistant fish may not compete well with others / **ora**; so less successful at breeding / **ora**; leave fewer offspring / **ora**; idea that mutant allele is diluted as fish interbreed;	**max 2**	**A** 'the altered AHR protein is of less / no use'

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Question	Answer	Marks	Additional Guidance
(c)	**1** persistent / does not breakdown / accumulates; **2** fill up / takes up space in, landfill sites / rubbish dumps; **3** suffocate / choke, animals; **4** kills animals that get trapped in it; **5** release, toxins / poisons; **6** AVP;	**max 3**	**MP1 A** 'can't get rid of them' / takes a long time to breakdown **MP3** and **MP4** do not allow kill unqualified **MP5** maybe in context of leaching out, burning or eating **I** references to recycling **I** pollution unqualified • (fill with water to become) breeding grounds for mosquitoes • blocks light for, photosynthesis • negative effect on tourism / visual pollutant • blocks drains • blocks flow of water in, rivers / streams • reduces soil, drainage / aeration • interferes with water treatment allows spread of alien species in the oceans
		[Total: 16]	

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