

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MARK SCHEME for the October/November 2008 question paper

0610 BIOLOGY

0610/31

Paper 31 (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.

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 must be read in conjunction with the question papers and the report on the examination.

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Question 1

- (a) *ignore absence of feature(s)* *ignore slime*
 shell ;
 muscular foot ; **R** leg / false foot
 (soft) unsegmented body ;
 tentacles ;
 mantle / mantle cavity ;
 gills ;
 AVP ; e.g. visceral mass **R** exoskeleton [max 2]
- (b) *species name* *ignore refs to generic name*
 second name / follows genus name ;
 begins with small letter / all small letters ; [max 1]
- (c) *asexual = 0 marks*
 sexual / external ;
 involves, gametes / fertilisation ; [2]
- (d) (i) *current of water provides*
 (good) source of oxygen ; **A** ref to obtaining oxygen
R 'from gills' / 'easy to breathe'
 low carbon dioxide concentration ; **A** ref to losing carbon dioxide
 food source ;
 protection / hiding, from predators ;
 blood / mucus (from gills), may be food source ; [max 1]
- (ii) *one of the following* *ignore growth / maturity*
 increase in complexity
 differentiation / specialisation, of cells / tissues
 formation of, new structures / organs / tissues / different types of cells
A change in, structure / form [1]
- (e) *one mark for named species, two max for details. If no species = no marks,*
*NB species **may** be identified in outline of conservation*

 named species ; *must be an endangered species* **R** whale(s), **A** rhino(s)
if in doubt check IUCN red list <http://www.iucnredlist.org> [1]

 nature reserve / game park / sanctuary / AW ;
 protection of habitat / stop habitat destruction / fenced area / restore habitat
A example ;
 control of, predators / grazers / parasites / disease ;
 provide food supply ;
 prevent hunting / reduce poaching / reduce fishing / AW ;
A wardens / rangers
 education (of local population) ;
 captive breeding / provide breeding sites ;
 release of captive bred organisms ;
 AVP ; ; e.g. dehorn rhinos, ban trade [max 2]

[Total: 10]

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Question 2

- (a) *bars must be within potato square*
- bars plotted accurately at 2.6 and 5.6 ;
shading correct according to key ; [2]
- (b) (i) (sugar) beet ; [1]
(ii) wheat ; [1]
- (c) *award three different main points as given below
or award two marks for the main points and max one for any detail of one point*
- use of named appropriate machinery ; e.g. tractor / combine harvester
detail e.g. more efficient, sowing / harvesting / watering ;
(artificial) fertilisers ;
detail e.g. prevent mineral deficiencies / provide more nutrients ;
pesticides / insecticides / fungicides / AW ;
detail e.g. control, pests / diseases, feed / destroy / damage, crops ;
 A reduce losses to, pests / diseases
herbicides ;
detail e.g. control / kill, weeds / competitors ;
use of, hormones / named hormone(s) ;
detail e.g. reduce vegetative growth / promote fruiting / AW ;
irrigation ; **R** 'put on (more) water'
detail e.g. prevent water becoming limiting factor / not relying on rain / AW ;
glasshouses / greenhouses ;
detail e.g. control, light intensity / carbon dioxide concentration / temperature
- monoculture ;
detail e.g. easier to harvest ;
- genetic engineering / gene transfer / GM ; *ignore* genetic technology
artificial selection / selective breeding ;
detail e.g. improve, growth / aspect of yield / quality / disease resistance /
 pest resistance ; [max 3]
- (d) *idea that water content of plants varies ;* [1]
- (e) *idea that energy is lost, along a food chain / between maize and cows ;* [1]
- energy loss by animals to max 2*
food not eaten ;
food not, digested / absorbed ; **A** egested
(chemical energy) excreted ;
heat loss ;
movement ;
respiration ; [max 2]

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(f) (i) 6O_2 ; R $6\text{O}^2 / 6\text{O}_2$ [1]

(ii) large surface area / broad / wide ; R flat
 chloroplasts / chlorophyll ;
 leaf mosaic / leaves arranged to avoid shading ;
 leaves, grow at right angles to light / move to follow the sun ;
 cuticle / epidermis, thin / transparent ;
 leaf is thin ;
 palisade cells tightly packed ;
 movement of chloroplasts towards light source ;
 AVP ; [max 2]

(iii) root hair(s) ;
 down water potential gradient / from high to low water potential / soil has
higher water potential / root has lower water potential ;
 osmosis / across partially permeable membrane ;
 A semi-permeable / selectively permeable R 'and active uptake' [3]

(iv) (carbon dioxide) diffuses (from air) / ref to down diffusion gradient ;
 through stoma(ta) ;

 air spaces, between (mesophyll) cells / in leaf ;
 dissolves in water, on / in, cell wall ;
 (diffuses) through, cell wall / membrane ;

 carbon dioxide from, respiration / mitochondria ; [max 2]

[Total: 19]

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Question 3

- (a) (i) *mycoprotein has* *accept converse answers for beef*
less protein / figures compared ;
less fat / figures compared ;
 fibre / figures compared ; **A** roughage
 carbohydrate / figures compared ; [max 2]
- (ii) *assume answers are about mycoprotein*
less fat / 9.2 g compared to 48.6 g / 39.4 g less fat / 5× less fat ;
 so less risk of + heart disease / heart attack / blockage of arteries / obesity ;
A 'clogged' / 'furred' / hardening *ignore* diabetes
 fibre / 19.5 g compared to 0 g ;
 so less risk of, constipation / bowel cancer ;
A faster transit time / helps peristalsis / easier defecation explained [4]
- (b) (i) *award two marks if correct answer (1.7) is given*
if no answer or incorrect answer award one mark for correct addition to get 98.3
 $49 + 9.2 + 19.5 + 20.6 = 98.3$
 $100 - 98.3 = 1.7$ (g) ;; [2]
- (ii) *accept first answer on the line*
 mineral(s) / named mineral / ions / salt(s) / vitamin(s) / named vitamin ;
 calcium / potassium / sodium / magnesium / iron / phosphate / iodine / zinc
R nitrate / sulphate / micronutrients [1]
- (c) (i) glucose / sucrose / lactose / maltose / sugar(s) / molasses / corn steep
 liquor ; **A** carbon source
 minerals / mineral salts / vitamin(s) ;
 ammonia / ammonium / amino acids ; **A** nitrogen source [max 2]
- (ii) filter / separate liquid from solid / retain solids / AW ; [1]
- (iii) carbon dioxide ; **A** CO₂ [1]
- (d) (i) 24 °C ; **A** a temperature within range 20 to 30 °C [1]
- (ii) *ignore refs to the paddle*
 heat released / exothermic ;
 (during) respiration / metabolism / fermentation ; [2]
- (iii) constant, production / growth ;
A optimum temperature / produce antibiotic as fast as possible
 low temperature will slow down, enzyme action / fungal growth ;
 high temperature will, denature enzymes ; **R** if 'and too low'
 high temperature will kill fungus ; **R** if 'and too low'
 high temperature may breakdown, product / antibiotic / penicillin ; [max 2]
- (iv) use a water jacket ; [1]

[Total: 19]

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Question 4

- (a) penis becomes, firm / erect ;
penis inserted into vagina ;
ejaculation ;
sperm / semen, deposited, in vagina / near cervix ; [max 2]
- (b) (i) mechanical / barrier ; **A** physical [1]
- (ii) semen / sperm, collect / trapped, in condom ; **A** cannot enter female
so fertilisation is not possible / sperm cannot reach egg *or* oviduct / AW ;
A male gamete for sperm **R** 'sperm cannot reach ovary' [2]
- (c) (i) **1** HIV transmitted in, semen / vaginal fluids / body fluids / blood ;
2 from infected to, uninfected / AW, during sexual intercourse ;
3 condoms, prevent contact between body fluids ; **A** mixing of body fluids
4 (no condoms) more unprotected sex / greater chance of infection ; [max 2]
- (ii) sharing needles (during drug taking) ; **R** unsterilised / used
tattoos / body piercing ;
(transmission in) blood products / blood transfusion / transplants ;
A blood to blood contact, e.g. open wounds ;
A refs to breast milk ; across placenta ; (blood mixing) at birth ; [max 2]
- (iii) virus, invades / attacks / kills, lymphocytes / CD4 cells / T cells ;
R white blood cells unqualified
antibodies, not produced / don't work / not effective ; *ora*
phagocytes not as effective ; *ora*
loss of (existing) immunity ;
cannot defend against / (more) susceptible to / less resistance to ,
pathogen / infection / disease ; **A** ref to opportunistic infection
R 'fight' disease / infection [max 3]
- (d) (i) sores / ulcers, on, penis / genitals ;
discharge (of pus) from, penis / urethra / sex organ(s) ;
(male) pain when urinating ;
inflammation of, testes / prostate / urethra / vagina ;
discharge of pus from the vagina ; [max 1]
- (ii) *accept any from (i) if not already given*
damage to, urinary / reproductive, organs ;
sterility / infertility ;
blindness in a baby born to a mother with the disease ;
abdominal pain ;
produce antibodies ; [max 1]
- (iii) use antibiotic(s) / named antibiotic ; **A** penicillin (although not used now) [max 1]

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Question 5

- (a) (i) reserves last longer for walking / ora ;
(approx) 4 times longer / other use of figures ; [2]
- (ii) glucose **and** muscle glycogen ; [1]
- (iii) fat **and** carbohydrate ; [1]
- (iv) *award two marks if correct answer (16.6 / 17) is given*
if no answer or incorrect answer award one mark for correct working
- 1660 / 100 **OR** 5800 / 350 **OR** average of the two
16.57 / 16.58 / 16.59 / 16.6 / 17 (kJ per gram) ;; **R** rounding down to 16.5 [2]
- (b) (i) muscle, growth / development / repair ; **A** 'make / build up, muscle' [1]
- (ii) to build up, energy / glycogen, reserves / stores ;
muscle / liver, glycogen ;
converted to fat / stored as fat ; [2]
- (c) (i) $C_6H_{12}O_6 \longrightarrow 2C_3H_6O_3$ (+ energy released)
- 1 mark for glucose + lactic acid formulae correct ;
1 mark for balanced equation ; **R** if anything else given ($CO_2 + H_2O$) [2]
- (ii) 1 short, time / distance, for sprint *or* long, time / distance, for marathon ;
2 sprint needs (lots of) energy quickly / marathon needs energy over long period ;
3 sprint oxygen supply not sufficient / oxygen supplied during marathon ;
4 anaerobic does not need oxygen / aerobic needs oxygen ;
5 lactic acid, removed after sprint / would build up in marathon ;
6 ref to muscle, fatigue / cramp / pain ;
7 ref to oxygen debt ;
8 AVP ; e.g. fat has higher energy content useful for marathon [max 4]
- (iii) glycogen in liver broken down to glucose ;
correct ref to glucagon ; **R** if 'glucagon breaks down glycogen...' ;
glucose from liver enters the blood ; **R** 'excreted into blood' ;
idea that balances use of glucose ; **A** 'replaces glucose used up' [max 2]

[Total: 17]