

MARK SCHEME for the May/June 2010 question paper
for the guidance of teachers

9700 BIOLOGY

9700/22

Paper 2 (AS Structured Questions), maximum raw mark 60

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- 1 (a) *plant cell because presence of*
 cell wall ; **A** cellulose cell wall **R** incorrect cell wall materials
 plasmodesma ; **A** plasmodesmata
 tonoplast ; **A** vacuolar membrane
 large/central, vacuole ; **ignore** permanent [2 max]

(b)

name of organelle	diagram of organelle(s) as seen under the electron microscope (not to scale)	one function of organelle	cell type(s) in which organelle is located
	<i>all 3 for one mark</i> oval/circular shape <u>and</u> two membranes close together <u>and</u> inner membrane infolded as two or more cristae ;	<u>aerobic</u> respiration/ATP, production/synthesis ; A oxidative phosphorylation A ref. β oxidation fats A ref. urea/ornithine cycle R any answer that refers to synthesis/production, of energy	
centrioles ; A centriole A centrosome			animal ;
	<i>both for one mark</i> two membranes <u>and</u> ribosomes on external surface ; R if ribosomes are excessively large		animal and plant/both ;
		processing/modification/AW/ packaging, of, proteins/ molecules ; A description of modification e.g. glycosylation A production of, <u>secretory/ Golgi, vesicles</u> A production of lysosomes R protein synthesis	
chloroplast ;			

[8]

[Total: 10]

Page 3	Mark Scheme: Teachers' version	Syllabus	Paper
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2 (a) (i) right, atrium/auricle **and** left ventricle ; *correctly labelled*
left hand side box right hand side box [1]

(ii) *right atrium has* (ora for left atrium)

lower, concentration/partial pressure/AW, of, oxygen ; **R** no oxygen

A (right) deoxygenated blood (versus oxygenated blood)

A higher saturation of haemoglobin with oxygen

higher concentration/AW of, hydrogen carbonate ions/carbon dioxide ;

A more carbaminohaemoglobin

higher concentration of water molecules/high(er) water potential/less negative water potential ;

higher concentration/AW, of glucose ; [2 max]

(b) *reject if more than one letter for each disease*

pulmonary stenosis = **G** ;

coarctation of the aorta = **D** ;

ventricular septal defect = **F** ; [3]

(c) *accept ora where relevant*

suggest

1 blood flows from aorta to pulmonary artery ;

2 increased volume of / more, blood to lungs ;

A blood to lungs at higher pressure

3 oxygenated and deoxygenated mix ;

4 oxygenated blood / blood from aorta, to lungs ;

explain (why blood flows from aorta to pulmonary artery)

5 left ventricle thicker wall (than right ventricle) ;

6 (so) contraction generates greater force (than right ventricle)/AW ;

7 higher pressure in aorta (than pulmonary artery) ; [3 max]

[Total: 9]

3 (a) 53 % ;; 2 marks for correct answer

*max 1 mark for correct calculation but, no/incorrect, answer
or not to nearest whole number*

$$72.4 - 33.9 = 38.5$$

$$(38.5 / 72.4) \times 100 = 53.18 / 53.2$$

[2]

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(b) R greater wealth unless linked to points below
any two valid reasons e.g. accept answers written as ora

- 1 more educated population ; *in context of health*
- 2 better/greater access to, health care/AW ;
- 3 higher level of preventive medicine ; e.g. immunisation programmes
- 4 better diet ; A ref. to less malnourished
 A ref. to access to food supplies
- 5 greater access to, therapeutic medicines/drugs ; A antibiotics
- 6 better/less overcrowded, housing/living conditions ;
- 7 better, sanitation/sewage treatment ;
- 8 greater access to uncontaminated drinking water ;
 R clean water unqualified
- 9 fewer, fatal diseases/AW ;
- 10 ref. to effects of, civil war/war ;
- 11 ref. to natural disaster ;

[2 max]

(c) (i) rank of % positive (of countries) is different to rank of difference in decrease in life expectancy ;
 data quote to support ; e.g. Kenya 6th highest % positive but 3rd highest decrease in life expectancy
 S. Africa 4th highest % positive but 6th highest decrease in life expectancy
 countries with, similar/same, decrease (in life expectancy) have different % positive ;
 data quote to support ; e.g.
 Malawi 17.8 years decrease, 16%, cf South Africa 17.5 years, 19.9%
 Kenya 20.1 years, 14%, cf Zambia 20.1 years, 20% ;

with ref. to decrease in life expectancy and % positive

Kenya, does not fit general trend/AW ;

South Africa, does not fit general trend/AW ;

data quote to support ; e.g.

Kenya larger decrease than, Malawi/South Africa, but lower % positive

Kenya 20.1 years decrease but only 14.0 %, compared to, Malawi 17.8 with 16.0%/
 South Africa 17.5 with 19.9 % ;

[2 max]

(ii) *any two relevant factors e.g.*

- 1 anti HIV drug therapy/AW ;
- 2 ref. to treatment of AIDS-related diseases ;
- 3 ref. to education to prevent, transmission/spread ;
- 4 use/provide free, condoms/femidoms ; A dental dams
- 5 avoid promiscuity ; A one sexual partner
- 6 HIV mothers avoid breast feeding ;
- 7 heat treat/screen, blood (for transfusion) ;
- 8 needle-exchange schemes/AW ; A ref. to sterile syringes
- 9 use of sterile equipment, qualified e.g. in surgery/tattooing/piercing ;
- 10 testing for HIV status/contact tracing ;
- 11 ref. to vaccine development ;

[2 max]

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- (d) 1 primary/immune, response ;
2 ref. specificity; *in correct context*
3 (HIV/virus) antigens ;
4 antigen presentation/antigen presenting cell/APC/described ;
5 clonal selection/described ; e.g. recognition of/binding to, antigen by, B-lymphocyte
6 sensitisation/activation/described ; e.g. cell growth or cellular changes
7 clonal proliferation/formation of clone/mitosis/cell division/AW ;
8 B-lymphocytes/B-cells/plasma cells, synthesise/produce/secrete/release, antibody ;
9 T(helper)-lymphocyte response described ; e.g. cytokine production
ignore ref. to T killer cells [5 max]

[Total: 13]

- 4 (a) (i) (describes the) sequence of amino acids (in a polypeptide chain) ; **A** order/arrangement [1]

- (ii) H₂O/water, released ;
(correct) bond formation between (lysine) carboxyl group and (valine) amino group ;
dipeptide (of lysine and valine) and formed with correct structural formula ; [3]

- (b) (i) *secondary*

- 1 regular order/pattern, based on H-bonds ;
2 between CO– group of one amino acid and NH– group of another ;
3 alpha-helix and β -pleated sheet ;

tertiary to max 4

- 1 folding coiling ;
2 interactions between, R groups side chains ;
3 two correctly named bonds ; e.g. hydrogen bonds, disulfide, bonds/bridges, ionic bonds, hydrophobic interactions
4 further description of bonds ; e.g. *disulfide* between cysteine (S–H) groups
hydrogen between polar groups (NH– and CO–)
ionic between ionised amine and carboxylic acid groups
hydrophobic interactions between non-polar side chains
5 ref. active site, specific/precise, shape ;
6 ref. globular/AW, shape ; **A** spherical/ball
7 ref. amino acids with, hydrophilic/polar, R groups facing to outside ; ora [5 max]

- (ii) enables (protein to) function/AW ; **A** enables antimicrobial action/AW
A biological catalyst, qualified
provides active site ;
qualified ref. to specificity ; [1 max]

- (c) altered, (mRNA) codon(s)/triplet(s) ; **A** named type of mutation
changed/AW, amino acid(s) ;
ref. to effects of stop codon ; e.g. shortened polypeptide chain
different, primary structure/described ;
A ref. to differences in, transcription/translation
ref. to different properties of, R group/side chain (of normal v replaced amino acid) ;
altered tertiary structure/AW ; **A** different R group interactions
A change/loss of, active site
idea of globular to fibrous change/hydrophilic R groups no longer to outside ; [3 max]

[Total: 13]

5 (a) one mark for each correct row ; ; ; ;

	cartilage	ciliated epithelium	elastic fibres	goblet cells	smooth muscle
A	✓		✓		✓
B	✓	✓		✓	✓
C	x	✓	✓		
D		x	✓	x	

[4]

(b) goblet cells to max 3

synthesise/produce/secrete/release, mucus ;

mucus, sticky/AW ;

(mucus) traps/AW, pathogens/AW , dust/particles/AW, pollen ;

A named organism types/microorganisms

R cilia traps

increased secretion when, inflamed / infection ;

qualified ref. to role of mucus ; e.g.

increases distance (e.g. of pathogen) to reach (epithelial) cells

acts as barrier/prevents, entry/attachment to, cells

prevent, infections/pathogens reaching alveoli *allow once only in either section*

cilia to max 3

waft/move/AW, mucus ;

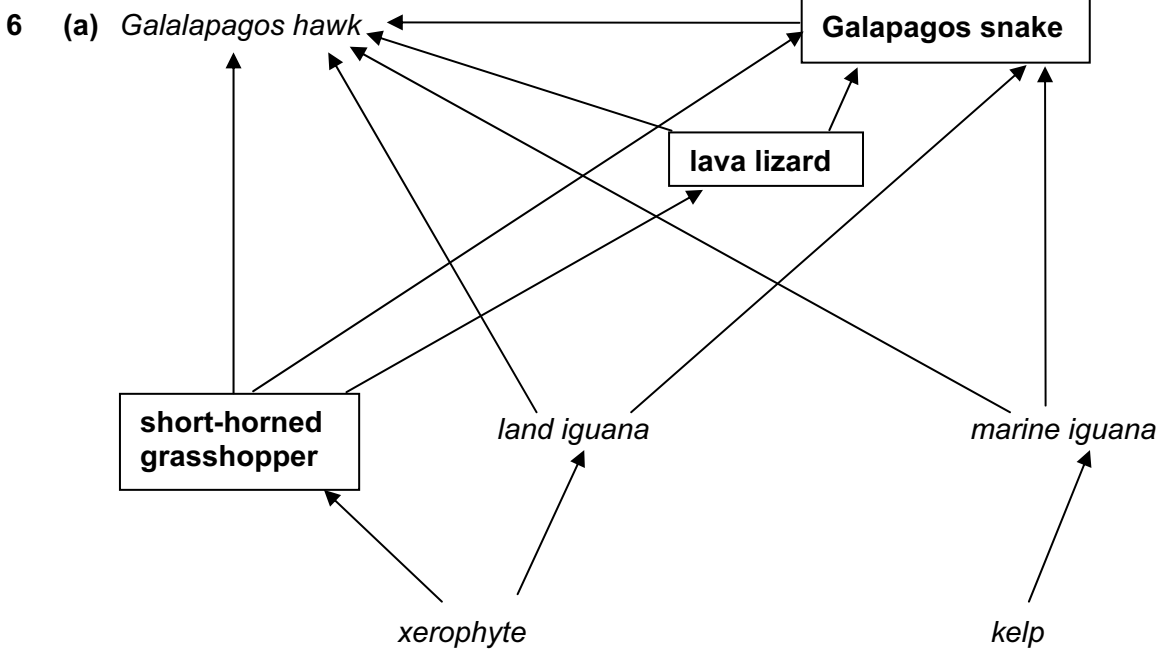
synchronous/metachronal, rhythm ; AW

movement towards back of throat for, swallowing/coughing out ;

qualified ref. to role of cilia in health ; e.g. ref. to, normal air flow/ventilation/keeping airways clear

[4 max]

[Total: 8]



animals in correct boxes ;
 all five animals to hawk ;
 all animals except hawk to snake ;

(only) short-horned grasshopper to lava lizard
 xerophyte to short-horned grasshopper and land iguana } ;
 kelp to marine iguana

max 3 if all correct but one arrow head missing
max 2 if arrow heads, mixed in incorrect direction/missing [4]

(b) kelp and xerophytes ; *allow ecf for next two mps if only one organism*
 both, photosynthetic/autotrophic/fix carbon/AW ; **A** both have chlorophyll
 both are, at the start of the food web/at the first trophic level/the source of energy to rest of
 food web/AW ; [3]

[Total: 7]