

**MARK SCHEME for the May/June 2009 question paper
for the guidance of teachers**

5096 HUMAN AND SOCIAL BIOLOGY

5096/02

Paper 2 (Theory), maximum raw mark 100

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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Section A

- 1 (a) (i) osmosis;
- (ii) diffusion;
- (iii) active transport; [3]
- (b) (i) respiration;
- (ii) mitochondrion/-ria; [2]
- (c) (i) short distance (for diffusion); **A** wall one cell thick
- (ii) oxygen combines with/taken up by Hb/keeps gradient steep;
- (iii) time for diffusion to occur;
- (iv) large(r) surface area; [4]
- (d) tops up/maintains oxygen (in alveolus)/takes in oxygen;
removes blood that is full of oxygen/brings up blood with little/without oxygen in it/brings up deox. blood; [2]
- (e) (i) $20 - 16 = 4$, $(4/20) \times 100$;
 $= 20$ (%); [2]
- (ii) 100 (×); [1]
- (iii) warmer; moister; [2]
- (iv) body cannot use/absorb nitrogen gas/nitrogen in this form; [1]
- (f) (i) photosynthesis absorbs much carbon dioxide; forests are areas of high photosynthesis;
clearance often involves burning which releases carbon dioxide; [Max 2]
- (ii) global warming or suitable effect e.g. ice caps melting; desertification; climate change;
A ref. to greenhouse effect **R** ref. to acid rain, ref. to ozone layer [1]

[Total: 20]

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- 2 (a) (i) vitamin D;
- (ii) fibre; [2]
- (b) milk has more calcium;
has vit. D/cereals have no vit. D;
vit. D needed for absorption of calcium; [3]
- (c) (i) cereals;
- (ii) have lowest water content/driest of the foods/do not require refrigeration; [2]
- (d) leafy veg; [1]
- [Total: 8]**
- 3 (a) three from: 3 pairs legs; wings (1 pair); body in 3 parts/head, thorax, abdomen;
R 3 segments. **R** refs to antennae/feelers.
A multicellular; exoskeletons; segmented bodies; jointed limbs; [3]
- (b) (i) mosquito bites/saliva injected;
- (ii) saliva spread on our food; [2]
- [Total: 5]**
- 4 (a) 1500; [1]
- (b) lungs; sweat; **A** 400, 500; [2]
- (c) cholera/dysentery/typhoid/gastroenteritis; **R** diarrhoea [1]
- [Total: 4]**
- 5 (a) (i) so no starch left, all starch used up/destarched;
- (ii) to prevent light reaching leaf **A**/so leaf **A** in dark/prevent photosynthesis;
- (iii) so colour changes in leaf can be seen/AW;
- (iv) to show up colour changes; [4]
- (b) centre diamond/square;
+ base and tip of leaf; [2]
- [Total: 6]**

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6

disease	causative organism	means of transmission
influenza/cold		
	bacterium	
	fluke/flatworm/Schistosoma	
tuberculosis/anthrax/whooping cough		
Athlete's foot/ringworm/tinea		
HIV/AIDS/herpes		

[Total: 6]

7 (a) 6 numbers plotted correctly; joined by a line; labelled; [3]

(b) adding fluoride reduces decay;
credit quantitative statement here;
over whole age range/from 8–13; [Max 2]

(c) enamel/crown; [1]

[Total: 6]

[Section A Total: 55]

Section B

8 (a)

feature	nervous control	hormonal control
info. as	impulses (electrical)	chemicals
via	nerves/nerve circuits	blood
nature	all alike	all different
rates	fast	slow/slower
target nature	single/local	lots/generalised
duration	short	longer lasting

Up to 4 clear contrasts @ 2 marks each.
 Table may be just two contrasting columns.
 If no attempt to list/tabulate mark out of 4

[8]

- (b) if blood sugar rises;
 insulin;
 from pancreas;
 travels in blood; *allow once either here or for glucagon etc.*
 (stimulates conversion) glucose to glycogen (in liver);
 if level falls;
glucagon;
 from pancreas (unless given above);
 converts glycogen to glucose (in liver);
 in emergencies/AW;
 adrenaline;
 converts glycogen to glucose (in liver);

[Max 7]

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- 9 (a) clots help to seal/block wounds;
A ref. to how clot forms;
prevents entry of pathogens/germs;
phagocytes;
engulf bacteria/germs;
digest them;
ooze out of wound/form pus;
lymphocytes;
form antibodies/antitoxins;
to specific invaders/antigens;
antibodies lyse/agglutinate/neutralise invaders; **A** attack
then cleared up by phagocytes;
also memory cells/system has memory;
if pathogen comes again it is quickly suppressed;
numbers of white cells increases in response to infection;

[Max 8]

- (b) disinfectants kill pathogens/bacteria;
not on body/on surfaces, utensils, etc.;
are powerful chemicals;
antiseptics milder;
stop bacteria reproducing; **R** kill bacteria
can be used on skin/wound;
antibiotics are (chemicals) made by microbes;
can be taken internally/injected;
or used externally;
kill bacteria; **R** germs
or slow/inhibit growth;
bacteria can develop resistance;

[Max 7]

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10 Either

(a) up to 3 for each list to total of 4

gene features

Gene is a piece of DNA;
 codes for a particular characteristic/for a protein;
 can exist in two (or more) forms;

chromosome features

chromosome is rod-shaped body;
 carries the genes;
 made of protein and DNA;
 alleles occupy same place (locus) on paired chromosomes;
 chromosomes larger;
 can be seen via microscope in dividing nucleus;

[Max 4]

(b) (i)

	A	×	B	
	Ff		Ff	; (1)
	F		F	
	f		f	; (1)
FF		Ff	Ff	ff
unaff.		unaff.	unaff.	cystic ; (1)

[3]

(ii)

	D	×	H	
	ff		Ff	; (1)
	f		F	
	f		f	; (1)
Ff		ff	(Ff	ff) ; (1)

ignore refs to phenotypes here

[3]

(c) mark up to 3 for each list to total of 5

the pill

pill a hormone or mixture of hormones;
 oestrogen or progesterone;
 taken orally;
 for $\frac{3}{4}$ of cycle/21, 22 days;
 prevents ovulation/plugs cervix;
 very high effectiveness/OWTTE;

the cap

cap a rubber device;
 inserted into vagina;
 to cover cervix/entry to uterus;
 prevents entry of sperm;
 temporary/removed after intercourse;
 less effective;

[Max 5]

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10 Or

(a) up to 3 for each list to total of 4

mitosis

mitosis a cell/nuclear division;
gives two identical cells/nuclei/same number of chromosomes/diploid;
used in growth; **A** in somatic cells A/W
and repair/and replacement;

meiosis

meiosis halves chromosome number/haploid;
used in gamete formation/in gonads; **A** in reproductive cells
products not identical;
example of difference seen;

[Max 4]

(b) J = pp

L = Pp

M = Pp

N = Pp

R = PP or Pp

[6]

(c) Max. 3 for each list to total of 5

IUD device/coil loop;
metal/plastic;
placed into cervix;
by doctor;
stays for months or years;
barrier for sperm/stops sperm (somehow)/stops implantation;
but can be removed/reversible; (up to 3)

vasectomy is cutting vas deferens/sperm duct;
no sperm in ejaculate; **R** refs to prevention of sperm formation A/W
permanent/difficult to reverse; **A** irreversible
100% effective;
requires an operation/more expensive. (up to 3)

[Max 5]