

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

**5096 HUMAN AND SOCIAL BIOLOGY**

**5096/23**

Paper 23 (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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- 1 (a) thin / gaps between cells ;  
allows diffusion / named substance to pass ;  
to / from surrounding cells ; [3]
- (b) B ;  
C ;  
A ; [3]
- (c) deposit on walls of arteries ;  
smaller lumen / less room for blood ; [2]
- (d) bicuspid / mitral + open ;  
aortic / semilunar valve + closed ;  
ref. valve action + contraction / relaxation / pressure change ; [3]
- (e) any two from :  
more carbon dioxide ;  
blood returning from body cells that give out CO<sub>2</sub> AW / CO<sub>2</sub> lost in lungs ;  
**or**  
less oxygen (A deoxygenated) ;  
oxygen used up in body cells/gained in lungs ;  
**or**  
warmer ;  
from body / cells at 37 °C / air in lungs usually cooler ;  
(accept reverse if ref. to tropical heat)  
**or**  
higher pH ;  
dissolved CO<sub>2</sub> is acidic ; [max 4]
- (f) lack of oxygen ;  
lack of glucose ;  
cells cannot respire ;  
no amino acids ;  
cannot build new proteins ;  
for repair ;  
lack of hormones / salts ; [max 5]
- 2 (a) to emulsify fat / provide suitable pH / make alkaline ; [1]
- (b) fats changed to fatty acids ;  
fatty acids lowered pH / indicator colourless when acidic ; [2]
- (c) (i) I, J, H (in this order) ;  
enzyme produces more product when there is more substrate / AW ; [2]

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- 3 (a) blocked fallopian tube / oviduct ; [1]  
ovum cannot pass to uterus / sperm cannot reach ovum ; [1]
- (b) 22 – 25 days ;  
uterus lining in optimum condition ;  
maintained by highest levels of progesterone ; [3]
- (c) oestrogen line peaking around ovulation ;  
lowest around time of progesterone increase ;  
remaining raised around time of implantation ; [max 2]
- 4 (a) **P** – vertebrae / vertebral column / backbone  
**Q** – rib  
**R** – external intercostal muscle  
**S** – mouth / nose / larynx / throat / pharynx ;;  
(all 4 correct = 2 marks, 2 or 3 correct = 1 mark, 1 correct = 0 mark) [2]
- (b) (external) intercostals ;  
diaphragm; [2]
- (c) **K** ;  
**N** ; [2]
- (d) any three from:  
flat versus domed ;  
forced up versus pulled down ;  
piston versus muscle ;  
sides moveable / sliding versus sides fixed ; [max 3]
- 5 (a) refraction at cornea and lens ;  
convergence on or just in front of fovea ; [2]
- (b) (i) **W** ; [1]  
(ii) ciliary muscles + relax ;  
pull on suspensory ligaments + tighten ;  
pull on edges of elastic lens ; [max 2]
- 6 (a) hinge ; [1]
- (b) tendon ;  
inelastic ;  
transmits force to ulna ;  
triceps contracts + arm straightens ; [max 2]

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- 7 (a) underarms tend to be most smelly / AW ;  
sweat would not be able to evaporate ;  
remove latent heat ;  
cool body / necessary in temperature regulation / AW ; [max 3]
- (b) bacteria decompose organic matter / named in sweat ;  
reduces smell but still allows temperature regulation ; [2]
- 8 (a) named example (e.g. *Schistosoma*) ;  
sexual + asexual reproduction ;  
two hosts ;  
name of secondary host ;  
many larval stages ;  
any ref. to larval behaviour ;  
ref. reproduction occurring in larval stage ; [max 5]
- (b) two named bacterial diseases ;;  
(allow each point only if correct for the disease to which it refers)  
prevention of food contamination (e.g. typhoid) ;  
use of disinfectants / soap / handwashing (typhoid / cholera) ;  
control of vectors (e.g. typhoid) ;  
sanitary disposal of faeces (typhoid / cholera) ;  
isolation of patients (many diseases) ;  
ventilation / avoiding overcrowding (ref. TB) ;  
avoidance of spitting (TB) ;  
mass X-ray (TB) ;  
treatment of drinking water (typhoid / cholera) ;  
tracing of carriers (typhoid) ;  
vaccination (many diseases) ;  
drug treatment / antibiotics (TB / gonorrhoea etc.) ;  
use of condoms (gonorrhoea / syphilis) ; [max 10]
- 9 (a) nitrate ;  
through plant roots ;  
combining with a carbohydrate (or named carbohydrate) ;  
made in cells ;  
forming amino acids ;  
amino acids linked to form proteins ; [max 5]

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- (b) digested ;  
 protease ;  
 named site of digestion ;  
 amino acids ;  
 absorption ;  
 by capillaries ;  
 of villi ;  
 carried by HPV ;  
 to liver  
 deamination or process described ;  
 urea ;  
 hepatic vein + renal artery ;  
 kidney ;  
 excretion as urine ;  
 bacterial action to release nitrate ion ;

[max 10]

## 10 Either

- (a) (i) (active) exposure to pathogen ;  
natural + example (such as TB) ;  
artificial + example (TB / smallpox, etc.) ;  
 vaccination ;  
 body makes own antibodies ;  
 white blood cells / memory cells ;
- (ii) (passive) natural + example ;  
 antibodies transferred ;  
 from mother across placenta ;  
 in milk ;  
artificial + example ;  
 inoculation of serum / antitoxins ;  
 produced by a different species / artificially ;

[max 9]

- (b) carbon monoxide with ;  
 reaction with haemoglobin ;  
 irreversible ;  
 decreased O<sub>2</sub> carriage by blood ;  
 watering eyes / coughing ;
- lead with ;  
 damage to nervous system ;  
 loss of muscular control ;  
 cramps ;  
 coma ;
- particulates ;  
 nitrogen oxides (NO) + vasodilation ;

[max 6]

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10 Or

- (a) (mitosis)  
 maintenance of chromosome number ;  
 same genetic content ;  
 characteristic of growth ;  
 (meiosis)  
 reduction division / AW ;  
 in gonads ;  
 to form gametes;  
 genetically unique / AW ;

[max 6]

- (b) selection of upper and lower case symbols ;  
 correct use of the terms : dominant ;  
 recessive ;  
 allele ;  
 parents / gametes ;

Bb × Bb ;  
 B b b B ;  
 BB Bb Bb bb ;

or diagram:

	<b>B</b>	<b>b</b>	
<b>B</b>	BB	Bb	
<b>b</b>	Bb	bb	∴

3 : 1 (ratio) ;  
 dominant : recessive ;

[max 9]