

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
GCE Ordinary Level

MARK SCHEME for the October/November 2008 question paper

5096 HUMAN AND SOCIAL BIOLOGY

5096/02

Paper 2 (Theory), maximum raw mark 100

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Page 2	Mark Scheme	Syllabus	er
	GCE O LEVEL – October/November 2008	5096	

- 1 (a) (i) A
- (ii) C
- (iii) B
- (iv) C and D [5]
- (b) (i) 1 - F to duodenum/ileum
2 - P to stomach
3 - S to mouth [3]
- (ii) stomach A P, S, F if labelling shown in (b)(i) is correct
mouth
duodenum/ileum [3]
- (c) villus - increase surface area
muscle - move food along/mix contents A peristalsis
mucus - protect/lubricate lining [3]
- (d) mitochondria release energy; powers active uptake [2]
- (e) (i) liver
- (ii) gall bladder [2]
- (f) (i) emulsifies fats/OWTTE R digests
- (ii) speeds/stimulates/strengthens peristalsis [2]
- [Total: 20]
- 2 (a) G to right ventricle
H to left auricle/atrium
J to one of the two venae cavae
K to one of four pulmonary veins [4]
- (b) wall of left ventricle is thicker/has more muscle R stronger [1]
- [Total: 5]

Page 3	Mark Scheme	Syllabus
	GCE O LEVEL – October/November 2008	5096

- 3 (a) (i) 3/4/5
(ii) 14/15/16
(iii) 10/11/12 [3]
- (b) (i) ovary/corpus luteum
(ii) via the blood [2]
- (c) oestrogen [1]
- (d) (i) 10 [1]
(ii) working: $\frac{3.50 + 1.25}{10} \times 100$; = 2 marks
answer = 47.5% = 1 mark [3]
- [Total: 10]**
- 4 haemophilia, red/green colour blindness, cystic fibrosis, etc.
athlete's foot, ringworm, thrush
malaria
scurvy, rickets, osteomalacia, anaemia, pellagra, beri-beri, kwashiorkor
A.I.D.S., herpes. *R HIV solus* [5]
- [Total: 5]**
- 5 (a) 2 = Nn *A if correctly shown in Fig. 5.1*
3 = NN *R if letters other than N, n are used*
4 = nn
8 = Nn [4]
- (b) (i) $\frac{1}{2}$, 50%, 1 in 2, etc.
(ii) $\frac{1}{4}$, 25%, 1 in 4, 1:3 [2]
- [Total: 6]**
- 6 (a) on Fig. 6.1, P to fovea
Q to edge of retina (join ends of recti to left of this)
R to blind spot [3]
- (b) M to iris *R ciliary body area* [1]
- [Total: 4]**

Page 4	Mark Scheme	Syllabus
	GCE O LEVEL – October/November 2008	5096

- 7 (a) R = photosynthesis
S = animal respiration
T = burning of fuels
- (b) forest cleared by burning - more CO₂
fewer trees/less photosynthesis to use up CO₂

[2]

[Total: 5]

[Section A = 55 marks]

Section B

- 8 (a) In human reproduction fertilisation and implantation occur. Describe what is meant by the terms *fertilisation* and *implantation*.

- (i) fertilisation is fusion of nuclei
- (ii) of gametes/egg and sperm
- (iii) takes place in oviduct/fallopian tube
- (iv) forms zygote
- (v) implantation is embedding of embryo *A embryo*
- (vi) in lining of uterus/endometrium
- (vii) occurs after fertilisation/equals start of pregnancy

[max 6]

- (b) Describe fully the pathway taken by oxygen from the mother's lungs to the fetal tissues.

- (i) diffuses into red blood cells (of mother)
- (ii) combines with haemoglobin/forms oxyhaemoglobin
- (iii) in pulmonary vein
- (iv) into left auricle/atrium
- (v) into left ventricle
- (vi) into aorta
- (vii) into uterine artery/to placenta
- (viii) diffuses(unless used in (i) above)
- (ix) into fetal blood/fetal haemoglobin
- (x) via umbilical vein (to fetal tissues)

[max 6]

Page 5	Mark Scheme	Syllabus
	GCE O LEVEL – October/November 2008	5096

(c) **Some mothers smoke during pregnancy. Explain how smoking may reduce the supply of oxygen to the fetus.**

- (i) carbon monoxide combines with/poisons maternal haemoglobin
- (ii) less oxygen carried
- (iii) nicotine crosses placenta/enters fetus
- (iv) vasoconstricts/less (fetal) blood flow in placenta
- (v) so less oxygen/exchange

[max 3]

9 (a) **Describe and explain the changes that take place in the skin to prevent our body from overheating.**

- (i) vasodilation/arterioles open
- (ii) more blood into capillaries/close to surface
- (iii) more heat lost
- (iv) by conduction/convection/radiation
- (v) more sweat secreted
- (vi) evaporates
- (vii) takes (latent) heat from blood/skin *A cools*

[max 6]

(b) **Explain the following:**

- (i) **We can continue to lose heat even when the air temperature is above 40 °C.**
- (ii) **Hot and humid conditions are less comfortable than hot and dry ones.**
- (iii) **Babies may need a blanket when adults do not.**
- (iv) **Sportsmen playing in the sun for several hours now coat exposed areas of their skin with protective sun creams.**
- (i) no conduction/convection/radiation now to air
but evaporation continues/is faster/easier
so heat still lost
- (ii) evaporation slow/nil in humid conditions
sweat accumulates
no cooling effect
- (iii) babies have larger relative surface area/larger surface to volume ratio
so lose heat easily/more quickly than adult
- (iv) sunlight has damaging radiation
i.e. ultraviolet
causes mutations (in skin cells/DNA)
(seen as) skin cancers

[max 9]

Page 6	Mark Scheme	Syllabus
	GCE O LEVEL – October/November 2008	5096

10 Either

(a) Describe the signs and symptoms of malaria.

- (i) headache
- (ii) high fever
- (iii) (profuse) sweating
- (iv) (then) shivering
- (v) fever periodic

[max 4]

(b) Using the information in Fig. 10.1 and your knowledge of vaccines, explain why it has proved so difficult to make a vaccine that is 100% effective against malaria.

- (i) several kinds of malaria
- (ii) so several kinds of antibodies needed
- (iii) parasite inside RBC's
- (iv) inside liver cells *allow 1 for inside cells (unnamed)*
- (v) little time/hours only free in blood
- (vi) so little time for immune system to attack
- (vii) credit refs. to changing surface antigens

[max 5]

(c) Give three reasons why not all mosquitoes are capable of infecting humans.

- (i) not all mosquito species carry malaria
- (ii) not all bite Man
- (iii) only adults bite
- (iv) only females bite
- (v) not all females infected

[max 3]

(d) List three ways of reducing the numbers of the mosquito.

- (i) drainage of swamps/speed flow in ditches/cover butts/empty tins
- (ii) oil on water surfaces
- (iii) insecticide in water sources
- (iv) insectivorous fish/*gambusia*
- (v) use of *Bacillus thuringiensis*
- (vi) (residual) insecticides on walls etc. inside houses
- (vii) catch males, sterilise and release, etc.

[max 3]

Page 7	Mark Scheme	Syllabus
	GCE O LEVEL – October/November 2008	5096

10 Or

(a) Describe the signs and symptoms of schistosomiasis.

- (i) lethargy/feeling tired
- (ii) anaemia
- (iii) blood in urine/faeces
- (iv) pain on passing urine/stools
- (v) liver damage

[max 4]

(b) Explain why one contact with an infected mosquito can lead to malaria, but repeated larval contacts are needed to produce symptoms of schistosomiasis.

- (i) malaria parasite reproduces in Man
- (ii) (asexual) reproduction in liver cells
- (iii) in red blood cells
- (iv) no numbers build up
- (v) no (asexual) reproduction/multiplication in Man of *Schistosoma*
- (vi) one larva gives rise to one adult
- (vii) adults cause symptoms

[max 5]

(c) Explain why schistosomiasis is more common in children than in adults.

- (i) infection occurs in water
- (ii) by larvae penetrating skin
- (iii) children play/paddle in water
- (iv) more likely to be barefoot

[max 3]

(d) Several species of rat are referred to as a reservoir of infection for schistosomiasis. Explain fully what this means.

- (i) rats are source of eggs/worms
- (ii) even if parasite absent from humans
- (iii) so snails can be reinfected
- (iv) so human can be reinfected

[max 3]