

**MARK SCHEME for the October/November 2011 question paper
for the guidance of teachers**

5096 HUMAN AND SOCIAL BIOLOGY

5096/21

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) half the number of / 23 chromosomes;
haploid (rather than diploid);
(ignore size / tail / flagellum) [max 1]
- (ii) hold / provide nutrients / food (for embryo / growth);
(ignore not moving reject nutrients for baby / fetus) [1]
- (iii) implantation;
needs supply of energy;
nutrients / AW / (glucose / amino acids);
for growth / development;
(ignore oxygen at this stage)
- needs to send hormonal message / AW / HCG;
to corpus luteum / ovary;
production of progesterone / oestrogen;
by corpus luteum / placenta / uterine lining;
to stabilise conditions / prevent further ovulation / prepare for pregnancy;
prevent menstruation;
would be lost otherwise; [max 4]
- (b) (i) **A** umbilical cord;
B amnion / amniotic sac / membrane; (reject fluid)
C cervix; [3]
- (ii) fetus' heart; [1]
- (iii) evens pressure / shock proofing / AW;
OVP e.g.
temperature;
(qualified) protection;
prevents adhesion;
support;
allows movement;
lung development; [max 1]
- (iv) *from mother to fetus:*
oxygen;
nutrients (2 marks for named nutrients)
glucose / amino acids;
vitamins;
minerals;
antibodies;
water;
fatty acids / fats; [max 2]
- from fetus to mother:*
carbon dioxide / CO₂;
urea; (ignore 'waste substances')
water; [max 2]

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(c) (i) mother's blood pressure higher / AW;
prevents rejection;
may be different blood groups;
mother may suffer (bacterial) infection; (reject virus) [max 2]

(ii) nicotine / carbon monoxide / alcohol / drugs / thalidomide / other suitable example; [1]

(d) uncontaminated / sterile;
no preparation;
more easily absorbed / digested;
at correct temperature;
colostrum / antibodies / anti infective factors;
more nutritionally balanced / less protein than cow's milk / AW; (accept contains all baby's requirements)
less chance of allergic reaction;
mother-child bonding; [max 2]

[Total: 20]

2 (a) chlorophyll; [1]

(b) energy source;
for photosynthesis; [max 2]

(c) carbohydrates; (allow glucose / sugars / starch / cellulose);
protein / amino acids;
fats / lipids / fatty acids;
(allow 2 named carbohydrates for 2 marks) [max 2]

[Total: 5]

3 (a) (i) hinge; [1]

(ii) bending + straightening / flexion and extension / movement in one plane;
(accept line / arrow drawn in on diagram, reject rotation) [1]

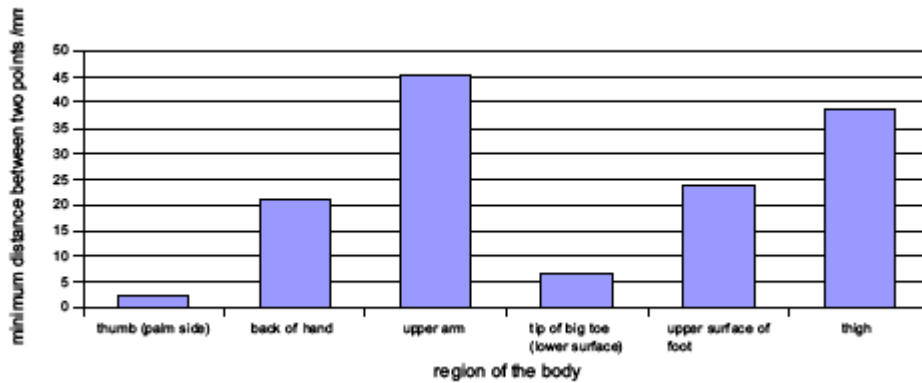
(b) **origin** at scapula (shoulder end);
insertion at radius (elbow end);
(1 mark for origin and insertion at correct ends of triceps) [2]

(c) tendon(s);
(white) fibrous / connective;
(accept collagen); [2]

[Total: 6]

- 4 (a) column lengths drawn accurately;
labelled;
see below

[2]



- (b) minimum distance between two points is smaller for the thumb; (accept figures)
thumb is more sensitive (than the back);
more / denser sensors / nerve endings / AW;
ref. to function e.g. holding or manipulation of objects;

[max 2]

- (c) similar difference on 2 sides;
toe less sensitive than thumb;
functional idea: foot more protected by shoes / less manipulation;

[max 2]

[Total: 6]

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- 5 (a) (i) contact with ground / chemicals / fertilisers / pesticides / sewage / urine / faeces
ora; [1]
- (ii) low microbiological purity means more microbes / bacteria;
link to high rainfall;
farmland run-off / sewage overflow / AW;
OR
low rainfall;
less water to dilute pollutants;
warm weather (faster bacterial multiplication);
when animals nearer river / faeces / urine / droppings); [max 2]
- (iii) less / no flow / AW;
less dilution (compared with a river);
concentration by evaporation;
less oxygenated; [max 2]
- (iv) no direct contact with sewage / urine / faeces of human or animal origin;
water filters / percolates through rock / long residence time;
any factor reducing bacterial growth e.g. temp / O₂ / nutrients; [max 2]
- (v) fertiliser (2 named fertilisers / pesticides 2 marks);
nitrate;
phosphate;
pesticides, herbicides, oil, **named** chemical waste (solvents etc.); [max 2]
- (b) poisoning / toxic to nervous system;
accept damage to named specific organ / system affected heart, bones,
intestines, kidneys, reproductive and brain / brain damage / reduced IQ; [max 1]
- [Total: 10]**
- 6 (a) less haemoglobin;
less oxygen carried;
less respiration;
less energy; [max 3]
- (b) iron is part of / needed to make haemoglobin; [1]
- (c) (i) malarial parasite / *Plasmodium* damages red blood cells / disrupts RBC
development / increases RBC destruction;
(ii) blood loss from urinary system / gut; [2]
- (d) blood loss due to menstruation;
pregnancy;
inherited / (described) / sickle cell / thalassaemia; [max 2]
- [Total: 8]**

Section B

7 (a)

	vitamin C	vitamin D	calcium	
(i)	citrus fruits / reasonable alternative; (ignore vitamin tablets)	fish liver oil; egg; liver; dairy products; (1 only) (ignore exposure to sunlight, vitamin tablets)	milk / dairy products;	[3]
(ii)	formation of collagen / connective tissue / epithelial tissues; wound healing;	absorption / deposition of calcium ions;	formation of bones / teeth; blood clotting; muscle contraction / nerve function; (1 only)	[3]
(iii)	scurvy;	rickets / osteomalacia;	rickets / osteomalacia;	[3]
(iv)	poor wound healing; bleeding gums; teeth blackening / falling out; (1 only)	poor bone formation AW; bowed / ricketty legs;	poor bone formation AW; bowed / ricketty legs;	[3]

- (b)** eat fruits & veg raw;
avoid heating for long time;
avoid cooking in large amounts of water;
keep cooking liquid (e.g. for stock);
do not overdo peeling / chopping vegetables;

[max 3]

[Total: 15]

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8 (a) disturbance of normal processes of the body;
loss of health / AW; [max 1]

(b) (i) *Typhoid*

- **causative organism**
Salmonella (typhi); (ignore bacteria) [1]

- **method of spread**
drinking water;
food contamination;
houseflies;
poor food hygiene;
human carriers; [max 2]

- **control measures**
treating drinking water
improved personal hygiene / food preparation;
prevent housefly access to faeces / food;
detail e.g. bins / screens / fridges;
sanitation;

- + **treatment**
medical treatment;
carrier tracing;
antibiotics / named;
vaccination / active immunisation / AW; [max 4]

(ii) *Tuberculosis*

- **causative organism**
Mycobacterium (tuberculosis) / Mycobacterium (bovis); (accept *M* + species) (ignore bacteria) [1]

- **method of spread**
'spores';
droplet / aerosol in coughing / spitting;
meat / milk from infected cows; [max 2]

- **control measures**
good ventilation / avoid overcrowding / improved lifestyle / diet;
avoid spitting / uncovered coughing;

- + **treatment**
BCG vaccination;
mass X-ray;
Mantoux testing;
antibiotic / drug treatment / streptomycin / Isoniazid / Rifampicin /
Pyrazinamide / Ethambutol;
cow testing / milk pasteurisation / sterilisation; [max 4]

[Total: 15]

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Section C

- 9 (a)** starch chewed / surface area increased / physical digestion;
 (chemical) digestion;
 enzymes:
 by amylase;
 in saliva;
 in pancreatic juice;
 to maltose;
 maltose digested;
 by maltase;
 to glucose;
 in mouth (buccal cavity) / duodenum / ileum; [max 6]

- (b)** via villi;
 ileum / small intestine;
 diffusion;
 active transport;
 capillaries;
 hepatic portal vein;
- respiration;
 aerobic / oxygen;
 mitochondria involved;
 carbon dioxide and water;
 energy released;
 anaerobic;
 lactic acid product;
 less energy produced; [max 9]

[Total: 15]

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- 10 (a)** in via mouth (buccal cavity) or nose / nasal passages;
 passes to throat / pharynx;
 then via glottis;
 down trachea / windpipe;
 bronchi;
 bronchioles;
 into alveoli;
 dissolving / forming solution;
 diffusing;
 through epithelium;
 into capillary;
 entering red blood cell;

[max 6]

- (b)** into red blood cells; if not given in **(a)**
 forming oxy-haemoglobin / making blood oxygenated; if not given in **(a)**
 out via pulmonary vein;
 through heart;
 left atrium;
 left ventricle;
 aorta;
 (through) artery;
 through) capillary;

diffusion;
 tissue fluid;

which carry out **aerobic** respiration;
 inside mitochondria;
 energy release;

respiration;
 aerobic / oxygen;
 mitochondria involved;
 carbon dioxide + water;

[max 9]

[Total: 15]