

**QUESTIONSHEET 1**

- (a) A - liver;  
B - stomach;  
C - colon/descending colon/large intestine; 3
- (b) (i) absorption;  
of products of digestion/salts/vitamins; 2
- (ii) Any two of: long/many villi to increase surface area/microvilli to increase surface area/dense capillary network/  
presence of lacteals;; 2
- (c) Any two of: saliva/pancreatic juice/intestinal juice;; 2
- (d) (i) small intestine/ileum;  
(ii) stomach;  
(iii) large intestine/colon; 3
- TOTAL 12**
- 

**QUESTIONSHEET 2**

- (a) A - villus;  
B - circular muscle;  
C - longitudinal muscle;  
D - crypt (of Lieberkühn); 4
- (b) (i) shape increases surface area/large surface area;  
microvilli increase surface area;  
many capillaries to absorb into blood/good blood supply;  
lacteals to absorb into lymph;  
surface epithelium only one cell thick; max 4
- (ii) Any four of: peptidase/exopeptidase/endopeptidase/carboxypeptidase/aminopeptidase/  
to digest polypeptides to amino acids/  
maltase to digest maltose to glucose/  
lactase to digest lactose to glucose and galactose/  
sucrase to digest sucrose to glucose and fructose/  
lipase to digest fats to fatty acids and glycerol;;; 4
- TOTAL 12**
- 

**QUESTIONSHEET 3**

- (a) 37<sup>o</sup>C;  
because this is the temperature at which saliva normally acts/  
enzymes denature at high temperatures/at temperatures over 45°C; 2
- (b) body fluids/tissue fluid/plasma/lymph; 1
- (c) starch molecules are too big; 1
- (d) glucose/maltose/reducing sugar; 1
- (e) mix equal volumes of solution and Benedict Reagent;  
boil in waterbath;  
brick red precipitate implies glucose/maltose/reducing sugar is present; 3
- TOTAL 8**

**QUESTIONSHEET 4**

- (a) A - epithelium;  
 B - longitudinal muscle;  
 C - circular muscle; } allow 1 mark for 'muscle' unqualified.  
 D - lumen; 4
- (b) (i) duodenum/ileum;  
 (ii) stomach;  
 (iii) ileum/small intestine;  
 (iv) duodenum; 4
- (c) stratified squamous epithelium;  
 thick and keratinised/contains keratin;  
 to withstand friction/abrasion of passing food; 3
- TOTAL 11**
- 

**QUESTIONSHEET 5**

- (a) 

Stimulus	food/taste/smell of food ;
Receptor	taste buds ;
Effector	salivary glands ;

3
- (b) (i) reflex; 1
- (ii) gastrin; 1
- (iii) nervous system acts faster (than hormones);  
 but hormonal effects last longer; 2
- (c) nervous system can stimulate immediate production of gastric juice;  
 hormonal control means flow can continue for some time after meal has been eaten;  
 therefore digestion begins as soon as possible and continues for as long as food is in the stomach; 3
- TOTAL 10**
- 

**QUESTIONSHEET 6**

- (a) there is a marked increase in the secretion/volume/concentration of hydrogen carbonate ions of pancreatic juice;  
 at 20 mins; 2
- (b) on a separate occasion the same person/animal;  
 could be injected with a similar solution minus the secretin;  
 this would show whether the effect is due to the presence of secretin only; 3
- (c) 0 mins:  $0.3 \times 17 = 5.1$  (iu);  
 20 mins:  $17.7 \times 3 = 53.1$  (iu); 2
- (d) increases volume of pancreatic juice secreted;  
 increases concentration hydrogen carbonate ions;  
 increases amylase secretion (but effect masked by large volume increase); 3
- TOTAL 10**

**QUESTIONSHEET 7**

- (a) (i) contains all the (necessary) dietary components;  
in the correct proportions to maintain health;  
carbohydrates + proteins + lipids + salts + vitamins (+ water); **3**
- (ii) ageing; energy requirements fall so reduce carbohydrate/fat; **2**  
pregnancy; need extra calcium/iron to make fetal bone/blood; **2**  
lactation; Need extra sugar/fat/calcium to make milk; **2**  
(Could also give, sickness, growing, changing to more active job)
- (b) (i) non-essential amino acids can be made by the body and so need not be in the diet;  
essential amino acids cannot be made in the body and so must be in the diet; **2**
- (ii) reduces absorption of sugars/fats (from gut);  
so helps to control weight;  
enables easy formation of faeces/easy defaecation/contributes to bulk of faeces;  
reduces incidence of bowel disease/diverticulosis/ulcerative colitis/constipation/cancer of the colon; **max 3**
- TOTAL 14**
- 

**QUESTIONSHEET 8**

- (a) (i) 1. 2.0;  
2. 9.0 (accept in range 8.5 -9.5) **2**
- (ii) 1. - pepsin;  
2. - trypsin; **2**
- (iii) pepsin works best in acidic/low pH;  
trypsin works best in alkaline/high pH; **2**
- (b) (i) Any two of: provides optimum pH for stomach enzymes/disinfection/activates pepsinogen to pepsin/  
aids iron absorption;; **2**
- (ii) Any two of: provides alkaline pH for duodenal enzymes/neutralises stomach acid/  
saponification/alkaline hydrolysis of fats;; **2**
- TOTAL 10**
- 

**QUESTIONSHEET 9**

- (a) peanut temp rise =  $78^{\circ}\text{C}$  } ;  $4.18 \times 20 \times 78 =$  } ; 6521 Joules;  
bread temp rise =  $21^{\circ}\text{C}$  } ;  $4.18 \times 20 \times 21 =$  } ; 1756 Joules; **4**
- (c) peanut;  
contains much fat and oil whereas bread contains starch;  
fat and oil have greater energy content (than starch); **3**
- (c) oil/fat/lipid; **1**
- (d) carbon; **1**
- (e) some heat from flame is lost and doesn't heat the water;  
food may not be completely burnt/different water contents in food to begin with; **2**
- TOTAL 11**

**QUESTIONSHEET 10**

- (a) oesophagus; peristalsis; cardiac sphincter; hydrochloric acid; pepsin; chyme; pyloric sphincter; secretin; pancreozymin; emulsify; trypsinogen; enterokinase; protein; blood/villi; hepatic portal; 15
- (b) (i) Any three of: glucose/sugars/amino acids/minerals/vitamins/water ;;; 3
- (ii) fat/fatty acids and glycerol; 1
- (c) the utilisation by the body of the absorbed foods;  
as respiratory substrate/for ATP production;  
or for protein/enzyme/hormone synthesis; 3
- TOTAL 22**
- 

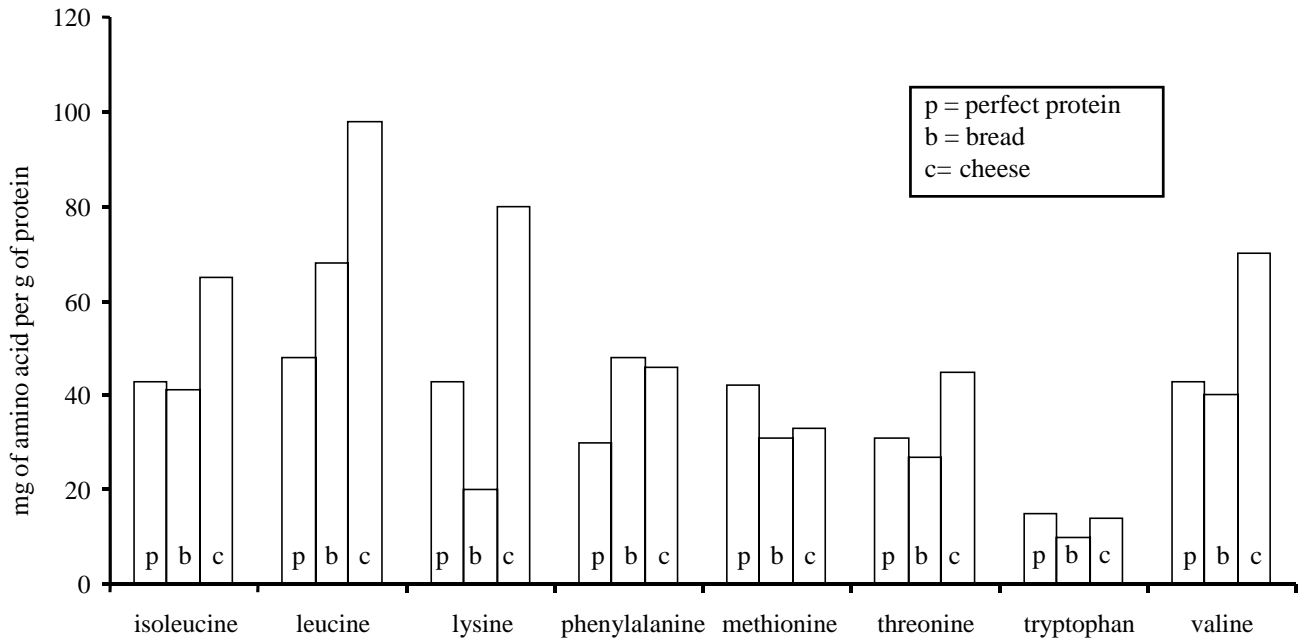
**QUESTIONSHEET 11**

- (a) (i) diet/any correct food/margarine/liver/eggs/butter;  
ref to fish liver oils (as dietary supplement);  
manufactured/activated in the skin during sunlight; max 2
- (ii) failure of bones to harden/ossify/softening of bones;  
bow legs/knock knees/bent long bones;  
teeth fail to harden properly; max 2
- (iii) clean air act/smokeless zones (so that children receive more sunlight);  
fortification of margarine/foods with vitamin D;  
use of cod/fish liver oil as dietary supplement; max 2
- (iv) to pass to the baby for healthy bone growth/need to supply mother and baby with adequate quantities;  
ref to across the placenta/via milk; max 2
- (b) (i) weight of carotene to be ingested =  $750 \times 6 = 4500 \mu\text{g}$ ;  
∴ weight of carrots to be eaten =  $\frac{4,500}{12,000} \times 100$ ;  
= 37.5 g; 3
- (ii) night blindness/failure to manufacture rhodopsin;  
xerophthalmia/keratinised/opaque cornea;  
dry scaly epithelial surfaces/more prone to infection; max 2
- (iii) liver/butter/cheese/eggs/fish liver oils; 1
- (iv) ref fortification/it is added to margarine by the manufacturer; 1
- TOTAL 15**

**QUESTIONSHEET 12**

(a) essential amino acids cannot be made by the body and so must be in the diet;  
non-essential amino acids can be made in the body and so need not be in the diet; 2

(b) (i) labelled axes; suitable scale; correct plotting; key/blocks labelled; 4



(ii) cheese is deficient in tryptophan/methionine;  
but is a good source of the other essential amino acids/named example; 2

bread is deficient in lysine/tryptophan/methionine/threonine;  
but is a good source of other essential amino acids/named examples; 2

when eaten together the deficiencies of one are complemented/made up by the other/becomes equivalent to perfect protein;  
for example, lysine deficiency in bread is compensated by its high content in cheese; 2

(iii) some foods do not contain all the dietary requirements ;  
or have inadequate quantities of some requirements;  
thus to obtain all requirements in the correct quantities many different foods must be eaten; max 2

(c) kwashiorkor; 1

**TOTAL 15**

**QUESTIONSHEET 13**

- (a) (i) (mutualism is the) close association between 2 living organisms;  
of different species;  
which is beneficial to both;  
eg. ruminants and cellulose digesting bacteria/Rhizobium and clover/alga and fungus in lichens; **max 3**
- (ii) (parasitism is a) close association between 2 living organisms of different species;  
to the benefit of the parasite;  
causes damage/disadvantage to the host;  
eg. sheep and liver fluke/pig and tapeworm/dog and flea; **max 3**
- (b) saprophytes;  
fungi;  
Mucor/Penicillium/other e.g;  
enzymes/accept named correct enzymes;  
extracellular;  
absorbed; **6**

**TOTAL 12****QUESTIONSHEET 14**

- (a) mode of nutrition is basically autotrophic/photosynthesis;  
tend to live in nitrogen deficient habits so have evolved to capture (and digest) insects;  
lure the insects with bright colour/sweet nectar/scent;  
secrete proteases onto the insects/digest proteins to amino acids;  
absorb the amino acids directly into the plant tissues for assimilation; **max 4**
- (b) ruminants eat grass and so have a problem digesting cellulose;  
chew the cud to break down the cell walls (by extra mastication);  
have cellulose digesting bacteria/fungi in the rumen;  
these break cellulose down to acetic/ proprionic/ butyric acids;  
products/these are absorbed (by the blood) and used in metabolism; **max 4**
- (c) feed on dead organic matter/extracellular digestion;  
ref to saprophytic mode of nutrition;  
secrete enzymes into substrate to digest food content;  
proteases, carbohydrases and lipases;  
products of digestion absorbed into hyphae for assimilation; **max 4**

**TOTAL 12**

***QUESTIONSHEET 15***

- (a) organic substances required in minute quantities;  
lack of vitamin produces specific (deficiency) symptoms/diseases; **2**
- (b) (i) **Vitamin C**  
Source: Fruits/fresh vegetables;  
Function: maintenance of healthy skin/connective tissue/capillary walls/prevention of excess bleeding; **2**
- (ii) **Vitamin A**  
Source: carrots/fresh vegetables/butter/margerine/liver/cheese/eggs/fish liver oils;  
Function: manufacture of rhodopsin/visual purple/maintenance of healthy epithelia; **2**
- (iii) **Vitamin D**  
Source: fish liver oils; egg yolk; manufactured/activated in skin when exposed to sunlight;  
Function: stimulates calcium absorption in gut/calcium metabolism; uptake of phosphorus; **2**
- (c) kwashiorkor = protein deficiency;  
marasmus = protein and energy/carbohydrate deficiency; **2**

**TOTAL 10**

---

***QUESTIONSHEET 16***

- (a) Estimated Average/Mean Requirement; **1**
- (b) the nutrient intake which equals/exceeds the nutrient needs of most of the population; **1**
- (c) obesity/overweight;  
leads to an increased risk of,      diabetes;  
  coronary heart disease;  
  hypertension;  
  cancer;  
  arthritis;  
  stroke; **max 4**

**TOTAL 6**

**QUESTIONSHEET 17**

- (a) the energy needed to maintain vital functions/essential metabolism/metabolism at rest;  
e.g. blood circulation/temperature control/ventilation; 2
- (b) (i) males have greater proportion of muscle;  
muscle metabolically very active;  
males have less body fat so lose more heat; **max 2**
- (ii) too much fat is associated with coronary heart disease/myocardial infarction/obesity/stroke/arthritis;  
but some fat intake is needed to supply essential fatty acids/fat soluble vitamins/phospholipids/cholesterol; 2
- (c) Any four of:  
increased maternal requirement for carbohydrate for energy/  
(increased) protein for tissue growth of fetus/  
minerals/Ca/Mg/Fe/for fetus/fetal bone growth/blood formation/  
folic acid for fetal red cell formation/  
vitamin A/C/D;;; 4

**TOTAL 10****QUESTIONSHEET 18**

- (a) A: fat/triglyceride;  
Product: fatty acids and glycerol;  
Enzymes: pancreatic/intestinal; lipase; 4
- B: dipeptide;  
Product: amino acids;  
Enzymes: exo/endo/carboxy/amino; peptidase; 4
- C: maltose/disaccharide;  
Product: monosaccharides/glucose;  
Enzyme: maltase; 3
- (b) obsession about weight loss/dieting/exercise;  
psychological disorder;  
muscle wasting;  
loss of body fat;  
low blood pressure;  
disturbed menstrual cycle; **max 4**

**TOTAL 15**



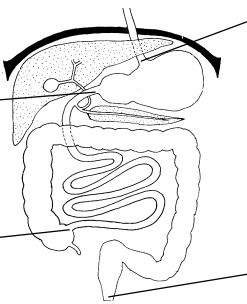
**QUESTIONSHEET 19**

- (a) (one that) contains all required nutrients in correct proportions;  
carbohydrate/protein/fat/vitamins/inorganic ions/water; 2
- (b) (i) A  $\frac{105}{(1.8)^2} = \frac{105}{3.24}$  ; = 32.4 ;
- B  $\frac{70}{(1.64)^2} = \frac{70}{2.69}$  ; = 26.0 ; 4
- (ii) individual A;  
has higher BMI/falls in 'clinically obese' range; 2
- (c) graph does not support the suggestion;  
obese individuals have higher metabolic rates/greater rate of energy use than thin individuals;  
if they had a 'super efficient' metabolism their metabolic rates would be lower than thin individuals; max 2

**TOTAL 10****QUESTIONSHEET 20**

- (a) (i) 1. salivary glands/pancreas;  
2. liver/gall bladder;  
3. salivary glands/stomach/small intestine/large intestine/colon;  
4. stomach; 4
- (ii)
- pyloric  
sphincter;

ileocolic  
valve;



cardiac sphincter;

anal sphincter;

4
- (b) adds bulk to faeces/makes it easier to form faeces;  
increases speed of movement of material through digestive system;  
helps protect against cancers/ulcerative colitis/diverticulosis;  
reduces fat absorption/binds up enzymes after use; max 3

**TOTAL 11**

**QUESTIONSHEET 21**

- (a) an organism which obtains its energy/food/nutrients from another living organism/host;  
without (necessarily) killing the organism/host;  
lives in/on the host organism; 3
- (b) flattening gives large surface area for food absorption/ref to thin segments/proglottids;  
hooks to attach to gut (wall) of host;  
suckers to attach to gut (wall) of host; max 2
- (c) (i) ref to hospitable environment;  
nutrients obtained in convenient form/ready digested form;  
ref to advantage of locomotory ability of host; 3
- (ii) difficult to spread to new hosts/for eggs/offspring to reach new hosts; 1
- TOTAL 9**
- 

**QUESTIONSHEET 22**

- (a) (i) A = columnar; epithelium; B = smooth; muscle; C = capillary; D = lacteal; 4
- (ii) large surface area for greater absorption;  
possess microvilli which further increase surface area;  
rich supply of blood capillaries to transport absorbed products away;  
contains lacteal/lymph duct for fat absorption;  
contains smooth muscle/can contract/wave to come into contact with products; max 3
- (The question uses the verb 'explain'. Thus the points should be qualified with the explanations in order to score.)
- (b) (i) salivary amylase/pancreatic amylase digests starch/glycogen;  
to maltose;  
maltose digested by maltase to glucose;  
sucrose digested by sucrase to glucose and fructose;  
lactose digested by lactase to glucose and galactose;  
lactase/maltase/sucrase are in intestinal juice/succus entericus; max 4
- (ii) glucose/galactose/fructose absorbed in ileum/small intestine;  
fructose absorbed by facilitated diffusion;  
glucose/galactose actively absorbed;  
in combination with sodium ions/ref carrier protein needs glucose + galactose + Na<sup>+</sup> to work; max 3

**TOTAL 16**

**QUESTIONSHEET 23**

- (a) breakdown of large/complex insoluble substances;  
by hydrolysis;  
into small/simple soluble ones;  
involves enzymes; **max 2**
- (b) surface area of mucosa increased by folds/ridges/rugae;  
surface area (also) increased by having thousands of /many villi;  
villi have good blood supply;  
lacteals for fat absorption;  
individual epithelial cells possess brush border/microvilli (to increase surface area for absorption); **max 3**
- (c) saprophytic;  
feed on dead organisms/waste products/organic matter (in soil);  
secrete extracellular enzymes;  
amylases for digestion of carbohydrates/lipases for digestion of fats;  
absorb products of digestion/sugars/fatty acids/glycerol; **max 3**

**TOTAL 8**