

**MARK SCHEME for the November 2005 question paper**

**5090 BIOLOGY**

**5090/02**

**Paper 2 maximum raw mark 80**

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

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### Section A

- 1 (a) bacterium/named bacterium ; [1]
- (b) specific pH read from graph ;
- ref. to acid/low pH ;
- sours/curdles the milk ;
- flavours the cheese ; [max. 3]
- (c) stomach ;
- stomach is acidic/ref. *HCl* ;
- enzyme has optimum low pH AW ;
- young mammals consume only milk ;
- curdling increases surface area ; [max. 2]
- (d) (i) the use of vegetable oil/unsaturated fat ;
- (A v.v. for animal fat)
- (ii) Any two from: obesity or described, named circulatory ;
- disorder, dairy allergies ;: [3]
- [9]
- 2 (a) A - alveolus/air sac ;
- B - **capillary** ;
- C – RBC/erythrocyte ; [3]
- (b) one mark each for statements 2 and 3, remove a mark for each ;
- incorrect ;: [2]
- (c) dissolves ;
- diffuses ;
- combines with haemoglobin/forms oxyhaemoglobin ;
- ref. any structure/substance which O<sub>2</sub> passes through ; [max. 3]
- (d) more oxygen in air breathed out ;
- Fe needed for haemoglobin ;
- less haemoglobin formed ;
- less oxygen absorbed by (red) blood (cells) ; [max. 3]
- [11]

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- 3 (a) (i) chlorophyll ; [1]  
(ii) magnesium ; [1]  
(b) (i) carbon dioxide/carbon(IV)oxide ;  
photosynthesis ; [2]  
(ii) supplied with oxygen ;  
for respiration ;  
waste product/carbon dioxide removed AW ;  
camouflage ;  
food/part of food chain AW ;  
importance in reproduction/eggs attached to leaves AW ;  
shade ; [max. 4]  
(c) animal/fish + no CCW/vacuole/chloroplasts ; [1]  
[9]
- 4 (a) pollution ; [1]  
(b) (i) carbon dioxide/carbon monoxide/sulphur dioxide/various  
oxides of nitrogen (R symbols) ; [1]  
(ii) global warming AW/carboxyhaemoglobin AW/acid rain  
(effect must be related to named gas) ; [1]  
(c) (i) Any two from: drainage from land, ion/salt/nutrients or  
named, sewage, dung, warmer water ;; [2]  
(ii) bacteria in sewage/cow dung ;  
decomposition AW ;  
oxygen used up ;  
bacteria + respiration ;  
animals/plants + unable to respire ; [max. 4]  
[9]
- 5 (a) (i) M - (inferior) **vena cava** ;  
N - (systemic) **aorta** ;  
O - pulmonary **vein** ; [3]

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- (ii) muscle ;
- coronary + artery** ; [2]
- (b) (i) semilunar valves correctly shown + label ;
- (ii) & (iii) tricuspid correctly shown ;
- bicuspid correctly shown ;
- both correctly labelled ; [4]
- (c) 1, 4, 2, 3. (3 if all correct, 2 if correct sequence, but starting in wrong place, 1 for any two in sequence) ;;; [3]
- atrium contracts then ventricle contracts, forcing tcv closed and as pressure builds up, slv open
- [12]

The **maximum** mark for Section A is **50**

### Section B

- 6** ref. in either (a) or (b) to reflex action ;
- neurones/impulses ;
- (a) **ciliary** ;
- muscles + relax** ;
- (suspensory) ligaments ;
- tighten AW ;
- pull on lens AW ;
- lens flatter AW ;
- to focus on distant object/longer focal length ; [max. 6\*]
- (b) brighter light ;
- circular iris muscles contract** ;
- radial muscles relax** ;
- pupil becomes smaller ; [max. 4\*]
- (\* to include either of the first two marking points) [Total = 10]

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- 7 (a) oviduct/Fallopian tube ;
- zygote ;
- cell division/mitosis ;
- ball of cells/blastula/blastocyst ;
- uterus ;
- spongy lining/endometrium ;
- implantation ; [max. 4]
- (b) (i) Each need must be qualified with the importance to pregnancy (max. 1 for list of three unqualified nutrients)
- iron + blood production ;
- calcium/phosphate + bone ;
- protein for embryonic growth ;
- vitamins for healthy development ; [max. 3]
- (ii) contains correct proportions of dietary requirements ;
- antibodies ;
- correct temperature ;
- inexpensive/readily available ;
- sterile ; [max. 3]
- [Total = 10]
- 8 E (A any point marked \* to score once only – up to max. for each section.)
- (a) water + inside cells\* ;
- osmosis\* ;
- pressure/turgor\* ;
- cells push against one another\* ;
- strengthening/lignin ;
- in xylem ;
- effect of roots ; [max. 4]

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- (b) (i) stem droops/sags AW ;  
 (plus any points marked \* from above)
- (ii) insufficient water in plant ;  
 water lost by plant faster than it is absorbed ;  
 lack of water in soil ;  
 low humidity ;  
 wind ;  
 high temp ; **[max. 6]**
- [Total = 10]**

8 O

- (a) (i) no roots to bind soil AW ;  
 no protection for soil from wind/rain ;  
 soil washed away ; **[3]**
- (ii) less transpiration ;  
 fewer clouds ;  
 less rainfall ;  
 ref. to temperature (higher temperatures without trees) ; **[max. 3]**
- (iii) loss of livelihood AW ;  
 loss of food ;  
 loss of fuel ;  
 loss of remedies ;  
 homelessness/relocation ; **[max. 3]**

[N.B. MAX. 8 for (a)]

- (b) nutrients are in the seed ;  
 nutrients from the soil are not required ;  
 Any TWO from: needs water, oxygen, suitable temperature ;; **[max. 2]**
- [Total = 10]**