UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the May/June 2009 question paper

for the guidance of teachers

5090 BIOLOGY

5090/02 Paper 2 (Theory), maximum raw mark 80

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International Examinations

Section A

1 **(a)** wilting/ed / flaccid (**R** plasmolysed) ; [1]

(b) **(i)** *Mark the first, one per line from:*
low humidity / dry air AW (**R** 'humidity') ;
wind ;
lack of (available) water / drought ;
high or raised temperature / hot / warm (**R** warmth, temp. unqualified) ; [max 2]

(ii) (**A** even if condition is inaccurate)
evaporation / (evapo) transpiration ;
water loss faster than rate of water uptake AW ;
loss of water from cells (**R** plant) ;
loss of turgor / flaccidity / ref. pressure AW (**R** plasmolysed) ;
loss of support (**R** droop / wilt) ; [max 4]

(c) (T.S. can score stoma size and labels only)
(labels – in either drawing) guard cell(s) + stoma(ta) ;
(drawings, must be 2) sausage shaped, touching at top and bottom in both ;
larger stoma in left-hand drawing ; [3]

2 **(a)** Dd × Dd (**R** if wrong symbols used) ;
D d D d (*) ;
(* = **A** if correctly deduced from wrong cross)
DD Dd Dd dd (*) ;
1 : 2 : 1 (look for link with genotypes) ;
3 : 1
+ yellow : grey ;
correct ref. gametes (**A** even if qualifying incorrect cross) ; [6]

(b) DD (**A** e.c.f. for incorrect symbols) ;
ref. 1 in 4 would be DD ;
leaves ratio 2 yellow : 1 grey ; [3]
(**A** explanation on diagram – accept on **(a)** so long as linked)

3 **(a)** **(i)** (*in either order – one per line, mark the first.*) Any ***two*** *from* :
bacteria, fungi, protozoa / protoctists, algae ;; [2]
(**A** named examples from different groups. For **one** mark max. **A** saprotrophs etc.)

(ii) virus ;
'live' only on living material / host AW / are not living / do not respire ; [2]
(**A** they do not live there / do not cause decomposition)

(b) any named ion / breakdown product of protein / fat / carbohydrate ;
(**A** alcohol / CO_2)
digestion / breakdown / decomposition + original substrate (named) ; [2]
(**A** conversion) (**R** compost) (**A** nitrogen fixation)

(c) (i) respiration (of microorganisms) (**R** 'of compost') ;
releases energy / heat (**A** produces heat AW) ;
(**R** produces, makes etc.)
plenty of food / nutrients (or named) (**R** compost) (for microorganisms) ; [max 2]

(ii) different microoganisms (thrive at different temperatures) ;
ref. to link between temperature and enzyme action ;
*Any **two** from*:
ref. effect of pH, lack of food, build-up of waste products, competition ;; [max 2]
(**R** compost)

4 (a) (i) ureter (*accurate spelling)* ; [1]

(ii) wave like / rhythmic AW ;
contraction of muscles (if named must be circular) ;
pushes urine (or description of) (**R** urea alone) ;
to bladder ; [max 3]

(b) renal artery ;
C has thinner walls (or described) than **D** (o. r. a.) ;
C has wider (lumen AW) than **D** (o. r. a.) ; [3]

(c) (water lost as) ref. sweat ;
more AW + urea (in urine) ;
blood concentration has to be maintained ;
more water (re)absorbed in kidneys / less water in urine / urine more concentrated ; [max 3]

5 (a) penicillin or any other named antibiotic ; [1]

(b) 1990 to 1994 (or any figure(s) within those dates) ; [1]

(c) antibiotic treatment too readily / over-prescribed ;
antibiotic treatment withdrawn too early / did not finish the course ;
mutation or described ;
new varieties of bacteria ;
resistant AW (**A** tolerant) (**R** immune) ;
reproduction (of resistant strain) / ref. passing on genes ; [max 5]

(d) (i) ***Any** two from*: no longer cured the disease AW, expensive (at higher dosage), more effective treatment available, use different antibiotic ;; [max 2]

(ii) **A*ny** two from*: different antibiotic, barrier nursing, antibacterials, general cleanliness, vaccination, isolation, one OVP ;; [2]

[Total: 50]

Section B

6 (a) (i) (fats) carbon / (C) + hydrogen / (H) + oxygen / (O) ;

(ii) (proteins) C + H + O + N (ignore other possibilities such as S) ; [2]
(**A** names)

(b) (i) (carbohydrates) respiration (or process described) ;
energy + release (**A** source of, **R** words that imply production) ;
a named use of energy within the body ;
use for fibre or roughage / for gut peristalsis ;

(ii) (vitamins) e.g. of **two** named vitamins ;;
function / deficiency symptom or disease linked to correct vitamin ;

(iii) (water) solvent ;
medium for (**R** helps) chemical reactions / enzyme activity ;
transport medium ;
much of (AW) cell / body / blood content is water ;
(needed to replace that) lost in sweat / urine / breath ; [max 8]
(**R** simple references to temperature control)

[Total: 10]

7 (a) $C_6H_{12}O_6$ / glucose / hexose / monosaccharide / simple sugar (**I** yeast) ;
$2C_2H_5OH + 2CO_2$ / alcohol or ethanol + carbon dioxide ; [2]
(**I** any refs. to energy)

(b) (i) (breathing) fast(er) ; | **A** 'breathe more' for *one* mark
deep(er) ; |
(heart beat) fast(er) ; | **A** 'more' for *one* mark
more powerfully / larger stroke volume AW ; |
(**A** ref. higher blood pressure)
faster circulation of blood ;
supplying more AW oxygen* / compensation for lower O_2 concentration ;
removing more AW carbon dioxide* ; [max 4]
[* or in **(ii)**]

(ii) (muscles) increased + supplies of glucose (to muscles) ;
increased + work-rate (person) / contraction (muscle) ;
faster + respiration (in muscle cells) ;
more + energy ;
increased supply of O_2 [* or in **(i)**] ;
increased removal of CO_2 [* or in **(i)**] ;
delays lactic acid production / removes lactic acid ; [max 4]

[Total: 10]

8E (a) (nitrates) reduced (to zero) protein / amino acid manufacture ;
poor / stunted / restricted AW + growth (**A** no) ;
(magnesium) yellow leaves / chlorosis ;
less / no <u>chlorophyll</u> ; [max 3]

(b) thin + short distance for gases to move ;
thin + ref. light penetration ;
flat / broad / large surface area / rt. angles to sun + <u>more</u> (AW) light absorption ;
(with large surface area, 'more' not required after +)
<u>chloroplasts</u> ;
in mesophyll (or named) ;
epidermis / cuticle + transparent for light entry ;
stomata / pores + gas movement (**I** water vapour) ;
air spaces + gaseous movement (**I** water vapour) ;
by <u>diffusion</u> ;
cell surfaces + large surface area for CO_2 entry ;
presence of vein / v.b. / xylem + to bring water /phloem to remove products ; [max 7]

[Total: 10]

8O(a) long / microscopic or very small ;
large surface area ;
<u>increases / maximum</u> + uptake ;
water / ions / oxygen absorbed ;
in contact with soil water / between soil particles ; [max 4]

(b) xylem ;
brings water ;
leaf cell contents more concentrated ;
water leaves xylem by osmosis ;
water (film) on (surfaces of mesophyll) cells ;
evaporates + air spaces ;
increased / high humidity inside leaf ;
concentration gradient (or described) ;
<u>diffusion</u> ;
through stomata / pores ; [max 6]

[Total: 10]