

**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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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) $Dd \times Dd$ (**R** if wrong symbols used) ;
 $D \quad d \quad D \quad d$ (*) ;
 (* = **A** if correctly deduced from wrong cross) ;
 $DD \quad Dd \quad Dd \quad dd$ (*) ;
 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 / protocists, 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 / CO₂) ;
 digestion / breakdown / decomposition + original substrate (named) ; [2]
 (**A** conversion) (**R** compost) (**A** nitrogen fixation)

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- (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 microorganisms (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) *Any two from:* different antibiotic, barrier nursing, antibacterials,
general cleanliness, vaccination, isolation, one OVP ;; [2]

[Total: 50]

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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 ;
more powerfully / larger stroke volume AW | *one* mark ;
(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]

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

(b) thin + short distance for gases to move ;
 thin + ref. light penetration ;
 flat / broad / large surface area / rt. angles to sun + more (AW) light absorption ;
 (with large surface area, 'more' not required after +)
chloroplasts ;
 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 diffusion ;
 cell surfaces + large surface area for CO₂ 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 ;
increases / maximum + 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) ;
diffusion ;
 through stomata / pores ; [max 6]

[Total: 10]