# MARK SCHEME for the May/June 2010 question paper for the guidance of teachers 

## 5090 BIOLOGY

5090/21
Paper 2 (Theory), maximum raw mark 80

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.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

- CIE will not enter into discussions or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the May/June 2010 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

| Page 2 | Mark Scheme: Teachers' version | Syllabus | Paper |
| :---: | :---: | :---: | :---: |
|  | GCE O LEVEL - May/June 2010 | 5090 | 21 |

## Abbreviations

Mark schemes will use these abbreviations:

- ; separates marking points
- $/$ alternatives
- $\mathbf{R}$ reject
- A accept (for answers correctly cued by the question, or guidance for examiners)
- AW
- underline
- max
-     + alternative wording (where responses vary more than usual) actual word given must be used by candidate (grammatical variants excepted) indicates the maximum number of marks that can be given statements on both sides of the + are needed for that mark

| Page 3 | Mark Scheme: Teachers' version | Syllabus | Paper |
| :---: | :---: | :---: | :---: |
|  | GCE O LEVEL - May/June 2010 | 5090 | 21 |

## Section A

1 (a) (i) sun / light
(ii) chemical ( R potential unqualified)
(b) (i) respiration
(ii) any three from : muscle contraction / movement, impulses, temperature maintenance / (body) heat, cell division / growth, metabolic or anabolic reactions / building up molecules, active transport, ATP production, kidney function, ( $R$ excretion / digestion / reproduction)
(c) (i) grass / vegetation $\rightarrow$ ox $\rightarrow$ tick (A producer) $\downarrow \quad \downarrow \quad$ (arrows must be as shown) ; (A recognisable names)
(ii) energy loss along the chain last organism receives least energy need large number of ticks to supply required energy ticks would be in danger of extinction / effect on ecosystem ref. size or mass / very small ticks / large oxpeckers

2 (a) lower volume / less urine less water / more concentrated correct ref. to fewer nitrogenous compounds / salts to be removed kidneys reabsorb more water to keep blood concentration constant
(b) sweating inhibited / AW
loss of ability to regulate temperature effectively
body would overheat / AW ORA
effect on metabolism / enzymes
(c) kills / AW, bacteria ( R germs)
responsible for decomposition / breakdown of nitrogenous compounds / waste products can be used all over body / does not block sweat ducts temperature regulation not affected

| Page 4 | Mark Scheme: Teachers' version | Syllabus | Paper |
| :---: | :---: | :---: | :---: |
|  | GCE O LEVEL - May/June 2010 | 5090 | 21 |

3 (a) (factors) - any 2 from: humidity / AW, temperature / heat, light, wind, amount of water in soil AW
(explanations): (dry air ORA) ref. concentration gradient faster rate of evaporation / transpiration faster rate of diffusion
(higher temperature ORA) faster rate of evaporation faster molecular movement / ref. energy
(bright light ORA) stomata open allows greater volume of vapour to be lost / AW
(moving air ORA) blows away water / vapour / moisture; increases concentration gradient faster rate of diffusion
(soil water) less water uptake
stomata close / AW
stops water loss
(b) warms up more quickly at first / like glasshouse
humidity increases
becomes a limiting factor or described / less transpiration
(c) water comes from the soil (not plant)
carried in xylem / xylem just hollow tubes
contains only dissolved salts / metabolites carried in phloem poison remains in cells
it is only water that evaporates during transpiration

4 (a) (i) D cilia
E goblet (cell) / mucus (-producing cell) / gland (cell)
(ii) ref. beating / AW
moving mucus + towards throat / upwards / away from lungs containing germs / dirt
(b) (i) Fig. 4.1(b) + Fig. 4.2(a) (A in either order) ;
(ii) carcinogenic / AW
tar + impervious to gases
emphysema / break down of alveoli walls
reduced surface area
less $\mathrm{O}_{2}$ absorption / to red blood cells / body cells named affected organ (e.g. extremities / brain / heart)
effect on (named) organ
tiredness / shortness of breath

| Page 5 | Mark Scheme: Teachers' version | Syllabus | Paper |
| :---: | :---: | :---: | :---: |
|  | GCE O LEVEL - May/June 2010 | 5090 | 21 |

5 (a) root hair
(b) (i) magnesium / nitrates*
(ii) nitrates* (*once only)
(c) (i) active transport / uptake requires energy
from respiration / mitochondria
ref. living / cell + membrane
*ref. (against) concentration gradient
(ii) *ref. concentration gradient diffusion
cellulose / cell wall fully permeable direct pathway to xylem / no barrier [ ${ }^{*}$ = allow once only in (i) or (ii)]

| Page 6 | Mark Scheme: Teachers' version | Syllabus | Paper |
| :---: | :---: | :---: | :---: |
|  | GCE O LEVEL - May/June 2010 | 5090 | 21 |

## Section B

6 (a) pollen from anthers to stigma (self) of same flower or flowers on same plant (cross) different plant
same species
(b) germination
pollen tube
digests or description / grows
down style
enters ovary
ovule
fertilisation / fusion
nuclei
seed + ovary (wall) / pericarp = fruit ref. falling petals / sepals

7 (a) (cerebrum) conscious thought memory
intelligence
learning
sight
speech
hearing
sensation (e.g. touch / taste / smell)
voluntary action (or named e.g. arm movement)
(b) (cerebellum) the main centre of co-ordination / fine movement posture / muscle tone
balance
instinct
(c) ref. maintenance of constant internal environment / homeostasis detects changes in*
any two from :
blood concentration, in (blood) temperature,
$\mathrm{CO}_{2}$ concentration in blood, control of blood pressure
triggers appropriate response / AW*
(* A controls / regulates for ONE mark)

## 8 Either

(a) absorption / passes into villus
capillary
blood plasma
in solution
(hepatic) portal vein
(b) made into protein or named
deamination or described
carbohydrate production / glucose
ref. respiration / loss as $\mathrm{CO}_{2}$
storage as glycogen
urea
hepatic vein
renal artery
kidney
ureter
urine / sweat
bladder / urethra

8 OR
(a) cell / nuclear division producing genetically identical cells/ nuclei maintaining chromosome number
(b) growth
repair / replacement of cells / tissues
asexual / vegetative reproduction / cloning
(c) in sexual reproduction gametes
produced by reduction division / meiosis
have half the number of chromosome / haploid
fertilisation
fusion of nuclei / gametes
restoration of chromosome number / diploid
ref. asexual reproduction
mitosis

