**MARK SCHEME**

**MAXIMUM MARK: 40**

**SYLLABUS/COMPONENT: 0610/06**

**BIOLOGY**

(Alternative to Practical)
Question 1

(a) (i) Graph

O - axes to show correct orientation;
S - suitable scale to fill the printed grid; [at 10 mins scale should cover 2½ large squares]
L - label axes correctly with appropriate unit;
P + P - correct plotting [minus 1 for 1 error, minus 2 for 2 errors]
D - ruled straight lines from point to point / smooth line of best fit [R. wavy lines. No extrapolation back to axes. Allow extra line past 10 min for label line]
K - identify lines by labels or use of a key;

Histogram allow L, O, K to max 3. [7]

(ii) temperature drops faster at first / AW;
temperature continues to drop but slower / AW;
but if A loses heat with no further detail, max 1 mark
no credit for a description comparing A with B and C [2]

(iii) reference to one tube having dropped more / lower / faster than another;
A compared with B / A compared with C / B compared with C;
(if just final temperatures given with no working = 0)

(iv) reference to animals or tubes with idea of transfer of heat/trap warm air/keep them warm
/maintain body temperature;
use of appropriate scientific term – insulation/conduction/radiation/convection;

(b) shield tubes from draughts/move apparatus out of draught;
use of lids [to reduce loss of heat from too exposed surface];
stir the water before taking temperature reading;
replication/average/ accept measure more tubes in outer ring C;
more frequent readings; [ignore longer periods]

R. leave longer/use more test tubes or larger groups/use of animals or blood instead of water/tagging tubes/alter volume of water.

[Total: 15]

Question 2

(a) (i) Drawing: clear outline of whole animal; R sketchy outlines and excessive artistic shading

proportions; R. obvious gross errors(extra detail not present
 e.g. open carapace
detail; check 3 parts to body and 3 pairs of segmented legs.

Labels: number and structure for 1 mark
6 legs/3 pairs/6 jointed appendages;
2 antennae/feelers; R. anthers/tenaclets;
3 parts to body / head and thorax and abdomen;
R. segmented body alone
2 pairs of wings (accept 1 pair of wings / wing covers)
ignore mouthparts/carapace/hard case. MAX [5]

(ii) measurement of Fig 2.1 3 to 4.2 cm max. AND
measurement of the candidate’s drawing ...............cm [to include units once];
working to calculate magnification;
magnification;
check answer, must be times or x in front of figure without units.
if answer is incorrect look for correct working accept a ratio if correct [3]
(b) **TWO** precautions and explanations from:-

- traps must be checked early and regularly;
  - so animals do not become eaten/escape;

- use of suitable fluid;
  - to kill the insects/to stop carnivorous insects/predators/large animals eating beetles;

- suitable covering/mesh;
  - animals washed away/eaten; rain;

- container deep enough/grease sides of pit;
  - so beetles cannot escape/trap insects;

*R. bait/food to attract insects/identification of insects/exit holes for rain/glass pits/position of pits/gap around tin/sharp edge/use of gloves.*  

MAX [4]

(c) **THREE** visible differences between beetle in Fig. 2.1 and the butterfly in Fig. 2.3

Need points from **both** insects to be compared – statements MUST be paired.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Beetle fig 2.1</th>
<th>Butterfly fig 2.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>wings</td>
<td>one pair / no wings / folded wings</td>
<td>2 pairs of wings [alone] /</td>
</tr>
<tr>
<td></td>
<td></td>
<td>bigger / visible wings /</td>
</tr>
<tr>
<td></td>
<td></td>
<td>unfolded / upright wings;</td>
</tr>
<tr>
<td>wing covers</td>
<td>present</td>
<td>wings exposed / absent;</td>
</tr>
<tr>
<td>antennae (accept ecf for</td>
<td>shorter / smaller / no swellings /</td>
<td>longer / larger /</td>
</tr>
<tr>
<td>incorrect name already</td>
<td>segmented</td>
<td>swellings at tip /</td>
</tr>
<tr>
<td>penalised)</td>
<td></td>
<td>not segmented;</td>
</tr>
<tr>
<td>mouthparts</td>
<td>pincers / claws / piercing parts / AW</td>
<td>proboscis / tongue /</td>
</tr>
<tr>
<td></td>
<td></td>
<td>sucking;</td>
</tr>
<tr>
<td>eyes</td>
<td>none / not visible / small</td>
<td>compound / visible / large;</td>
</tr>
<tr>
<td></td>
<td><em>R. simple eyes</em></td>
<td></td>
</tr>
<tr>
<td>body</td>
<td>accept small</td>
<td>accept large;</td>
</tr>
<tr>
<td>abdomen</td>
<td>not visible (accept not segmented</td>
<td>visible / segmented;</td>
</tr>
<tr>
<td></td>
<td>segments not visible)</td>
<td><em>R. striped/shaded</em></td>
</tr>
<tr>
<td>legs</td>
<td>hairy / claws</td>
<td>not hairy / no claws;</td>
</tr>
<tr>
<td></td>
<td><em>R. length of legs</em></td>
<td></td>
</tr>
</tbody>
</table>

MAX [3]

[Total: 15]
Question 3

(a) Award 1 + 1 mark in pairs (i.e. second mark can only be awarded with its own first mark)
   ONE of:-
   Cover with petroleum jelly;........ Plant will not wilt;
   Cover with polythene bag/bell jar/bottle;..... condensation/drops of water will collect; R.
   water vapour
   Use of photometer;........ bubble movement/level of capillary water;
   Shoot in container;........ water taken up; [needs for water to be covered with oil to
   prevent evaporation/covered with polythene].
   Cobalt chloride paper;........ colour change – to pink;
   Anhydrous copper sulphate ...colour change – to blue; R. litmus/universal indicator [2]

(b) to prevent / minimise loss of moisture / water from the soil / pot by evaporation; [1]

(c) similar apparatus including same sized/mass plants/equal number of leaves; ignore ref. to
   same bags
   same conditions of water added before starting investigation;
   same time for readings/one day;
   same conditions of light;
   same temperature;
   same humidity;
   same air movement;
   data analysis/comparison of graphs;
   if candidate describes a different experiment, then max 2 for 2 controlled conditions
   MAX [4]

(d)

<table>
<thead>
<tr>
<th>feature</th>
<th>description</th>
<th>comment relating to adaptation</th>
</tr>
</thead>
<tbody>
<tr>
<td>leaves</td>
<td>no leaves / small leaves / small surface area / spines / thorns; hairs [or stem or plant];</td>
<td>to reduce water loss / transpiration; for protection / to prevent being grazed / eaten; to trap water;</td>
</tr>
<tr>
<td>stem (R. bulb)</td>
<td>swollen / thick / fleshy / succulent; green / ref. chlorophyll;</td>
<td>stores water; for photosynthesis [as leaf area reduced];</td>
</tr>
<tr>
<td>cuticle / skin</td>
<td>thick/waxy; R. hard alone</td>
<td>stops water loss;</td>
</tr>
<tr>
<td>roots</td>
<td>long / tap; shallow / network / fibrous / many roots;</td>
<td>to trap / absorb water from deep; to trap/absorb water over wide area; R. store water</td>
</tr>
<tr>
<td>hairs/spines</td>
<td>on stem / plant / surface;</td>
<td>traps moist air; reduce transpiration;</td>
</tr>
<tr>
<td>stomata</td>
<td>not in direct light / sunken / less in number;</td>
<td>reduce water loss / reduce transpiration;</td>
</tr>
<tr>
<td>plant shape</td>
<td>width / thickness / less surface area to volume ratio / reduce surface area; ignore compact</td>
<td>stores water / reduce water loss;</td>
</tr>
</tbody>
</table>

3 valid features without adaptation comment = max 1
R. big roots / main root / light reflecting / shiny / ribs / grooves MAX [3]

[Total: 10]