

**MARK SCHEME for the October/November 2010 question paper  
for the guidance of teachers**

**5090 BIOLOGY**

**5090/61**

Paper 6 (Alternative to Practical), maximum raw mark 40

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.

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- 1 (a) (i) Graph marks:  
light intensity on x-axis, carbon dioxide intake on y-axis ;  
x-axis labelled light intensity / arbitrary units and y-axis labelled carbon dioxide intake / arbitrary units ;  
good linear scales including positive and negative values ;  
clear and accurate plotting ;  
connections ruled / smooth line of best fit ; [5]
- (ii) carbon dioxide intake or photosynthesis (rate) ;  
increases with increased light intensity ;  
up to 6–11 arbitrary units ;  
light limiting photosynthesis ;  
at higher light intensities carbon dioxide intake / photosynthesis rate remains constant ; R. stops  
carbon dioxide or another factor limiting (photosynthesis) ; [max 4]
- (iii) 0.5–0.9 arbitrary units ; [1]
- (iv) photosynthesis absorbing CO<sub>2</sub> + respiration producing CO<sub>2</sub> ; at same rate ; [2]
- [Total: 12]**
- 2 (a) wings ;  
veins ;  
legs ;  
segments / joints ;  
head / thorax / abdomen / three body regions ;  
antennae / head appendages ;  
eyes ; R. spiracles mouthparts [max 4]
- (b) comparable but contrasted pairs:  
4 wings : 2 wings ;  
thick or hairy legs : thin or smooth legs ;  
short / thick legs : long / thin legs ;  
hairy legs : smooth legs ;  
4 forward / 2 backwards facing legs : 2 forward / 4 backwards facing legs;  
large eyes : small eyes ;  
short or simple antenna : long or 'furry' antenna ;  
rear end forked : rear end not forked or pointed or simple AW ;  
mouthparts absent : mouthparts present AW ; [max 4]
- (c) 63–69 mm ;  
correct expression – measurement over 40 ;  
magnification well expressed × or times up to 2 dp no units [3]
- [Total: 11]**

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- 3 (a) (i) and (ii)**  
 add iodine solution ;  
 turns (blue) black ;  
 add biuret reagent ;  
 (from blue to) mauve / violet / lilac / purple ; [4]
- (b) (i)** protease / enzyme (digests protein) ;  
 amino acids formed ; R. nitrates  
 movement through phloem / translocation ; [3]
- (ii)** (on Fig. 3.1) arrow(s) drawn in cotyledon towards embryo ; [1]
- (c)** secretion contains protease/enzyme ;  
 insect's body (content) digested ;  
 into amino acids ;  
 used by plant ; [max 3]
- (d) (i)** for amino acid / protein formation ;  
 for growth / repair ;  
 for chlorophyll / green leaves / prevent yellow leaves ; [2]
- (ii)** (culture) solution with no nitrogen / nitrate ;  
 (control) solution with nitrates / nitrogen ;  
 ref. aeration / topping up ;  
 suitable use of lid ;  
 same size / species of plant used ;  
 with same light / temperature / grown for same time period ;  
 pale or yellow leaves / poor root system / stunted stature of plant lacking nitrates or  
 converse ; [max 4]

**[Total: 17]**