

**MARK SCHEME for the October/November 2009 question paper  
for the guidance of teachers**

**5090 BIOLOGY**

**5090/03**

Paper 3 (Practical Test), 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) all 20 boxes reasonably filled, with units somewhere in box ; [1]
- (ii) table marks:  
all boxes numbered, correct regular sequence ;  
clear method of 'tally', somewhere ;  
third column grouping correct, totalling 20 ; [3]
- (iii) frequency diagram marks ;  
ruled, regular columns ;  
x-axis labelled, 'length/mm/cm' ;  
y-axis labelled 'number (frequency)/& numbered. ('o' stated or implied) ;  
range of each column centrally stated on x-axis ;  
accurate for numbers in table ;  
axes reversed: max 3 [5]
- (b) seeds of different sizes ;  
grown in uniform conditions ;  
two of them specified ;  
(soil/medium, temp, light, water, fertiliser – nutrient) ;  
seeds (collected and) measured ;  
recorded, (tabulated, frequency chart) from each plant ;  
replications ;  
analysis/conclusion suggested ;
- A: ref same size seeds ; in different conditions ;  
OVP ; [max 4]
- (c) (i) clear, clean realistic selection for drawing ;  
radicle + plumule at least 5 cm (in straight line) ;  
leaflets/venation shown on plumule ;  
labels: radicle and plumule ;  
label: leaflet/venation/attachment scar or other detail ; [5]
- (ii) clearly shows where measured with both dimensions clear ;  
units at least once ;  
correct expression for calculation ;  
magnification correct and realistic ; [max 3]
- up to 2 d.p. rounded up/down acceptably.
- (d) (i) mauve (etc)/ref. different from control drops ; [1]
- (ii) ref. protein presence ; [1]
- (iii) ref. growing regions/for growth ;  
cells present etc ;  
ref. enzyme (release here) ; [max 2]
- [Total: 25]**

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- 2 (a) (i) chop/crush into small bits ;  
 add ethanol & shake (to form solution) ;  
 add drops of water/pour into water ; [3]

(ii)

	observations	conclusions
<b>W3</b>	remains (relatively) clear no change/colourless ; R: 'negative'	no fat/oil ; *
<b>W4</b>	goes cloudy/white/milky ;	Fat/oil present ; *

[4]

(\* if conclusions '-ve & +ve' allow 1)

- (b) hold piece of specimen on mounted needle/forceps – ignite it ;  
 known mass of specimen ;  
 heat (standard volume) water in test tube ;  
 ensure complete combustion ;  
 record increase in temp. ;  
 repeat for other specimen ;  
 same volume of water ;  
 one that burns longest ;  
 replicate ; [max 5]

- (c) each has same amount energy from starch ;  
 fat (oil) content differs/**W4** has more fat/oil than **W3** ;  
 and yields energy/fat has high energy ;  
**W4** has more energy ; [max 3]

**[Total: 15]**