Plant Nutrition
Mark Scheme 3

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Plant Nutrition
Sub-Topic	
Paper Type	Alternative to Practical
Booklet	Mark Scheme 3

Time Allowed: **45   minutes**

Score: **/37**

Percentage: **/100**

1	(a)	**O** outline; **S** size and proportion; **D** details; Label;	**[4]**	
	(b) (i)	midrib / (network of)veins / petiole or leaf stalk / serrated edge / AW / AVP	**[1]**	size / shape /sharp. Give ECF BOD for incorrect drawing label.
	(ii)	entire v divided (into leaflets) / simple v compound / AW; leaf v <u>leaflets</u>; pointed tip v rounded tip; AVP;	**Max [2]**	Must have a comparative answer.
	(c) (i)	line to or within palisade cell;	**[1]**	
	(ii)	start / entry from outside through lower stoma; end on or in labelled cell / c(i) cell;	**[2]**	Max 1 if no arrows or arrows in wrong direction
	(d)	measurement **: 14** $\pm$ 1 mm); formula : length ÷ magnification; calculation **: 0.05** (0.046 – 0.054 mm);	**[3]**	If different unit e.g. cm, then units must be present.
	(e) (i)	idea of mesophyll cells / blade / lamina / AW decomposed first / veins or midrib remain; midrib / veins harder or tougher (so remain) / lamina softer or weaker / AW; by bacteria / fungi / microorganisms or detritivores / named examples; digestion / respiration / decay (by decomposers); AVP;	**Max [3]**	

(ii)	**A** –axes and linear scaling; **S** – size; **P** – correct plots; **L** – line;	**[4]**	
(iii)	increase in mass at start / first 6 months / AW; (overall or after 6 months) mass decreases; correct reference to figures;	**[3]**	
		[Total: 23]	

2 (**Drawing: S**   size and proportion (drawing should be same size as Fig. 2.1)
(acceptable range– length 12.0 – 12.4cm and width 4.3 – 4.7cm; only check with ruler when in doubt)
O   outline clear and serrated, to include petiole: R if shaded
V   veins shown joined to central vein / midrib on **both** sides and branching; (see sheet of sampled drawing – minimum is 2 branched veins on both sides of midrib)   [MAX. 2]

     Labels; 2 from: midrib/main vein;
                            network of veins/branched veins;
                            petiole ; ignore stem/stalk
                            leaf blade/lamina;   [MAX. 2]

(b) (i)   calculation 30 – 36 (accept within this range – no need to calculate candidates' response. no units needed given on answer line – ignore if other units given)   [1]

    (ii)   1.   means of scoring squares to avoid counting twice;
                  (look at diagram Fig. 2.1 for evidence of this)
            2.   whole squares counted;
            3.   part squares included in total leaf area;

            as alternative method
            2a.   count number of empty squares;
            3a.   subtract from total;   [MAX. 2]

(c) (i)   epidermal cell;
              guard cell; (label line must go to cell and not stoma)
              (labels of cell 1 and cell 2 where candidates have partly misinterpreted question allow MAX. 1 and MAX. 1 for two lines without labels for named cells)   [2]

    (ii)   2 guard cells ringed; (R if more than 2 stomatal groups are ringed = 4 cells)   [1]
Number points on ticks
(d)   1.   use of microscope/ref to magnification;
          2.   preparation of epidermis for viewing e.g. epidermal peel/nail varnish/wax/reference to photograph; (ignore ref to staining)
          3.   count number of stomata in a given **area**; (however expressed)
          4.   determine the area (viewed under the microscope);
          5.   calculate the area of the leaf;
          6.   total number of stomata for whole leaf to be described as calculation;
               (this will be thousands)
          7.   description of some sort of calculation   (only if marking points 5 or 6 have not been awarded)
              (ignore – idea of counting bubbles from leaves, transpiration, AW)   [MAX. 4]

                                                                      [Total: 14]