

**Mark scheme 5090/3 – Practical Test November 2001**

- 1(a)(i) [See drawing]  
 Drawing marks: 4  
 1. Realistic, clear & clean, at least 6 cm across, not 3D  
 2. Main vascular bundles shown  
 3. Intermediate, smaller bundles shown / epidermis drawn (double line) / strengthening tissue drawn (sides/angles)  
 Labels: veins / bundles ;  
 xylem / phloem / epidermis / strengthening tissue / parenchyma ;  
 (**Not** cuticle/pith/cortex/cambium)
- (ii) Clear indication where measured ;  
 measurement of drawing accurately recorded ;  
 expression of length of image divided by length of specimen ;  
 correct recording of magnification ; (up to 2 d.p.) 4  
 (No mark if excessively rounded)  
 Times into & out of water recorded and at least 20 min. ; 1
- (b) Water entered (cells) ;  
 By (end-)osmosis ;  
 From higher water potential / hypotonic surroundings ;  
 [But must be clear if reference is to solute or solvent in terms of concentrations]  
Cells enlarged ;  
 Cuticle / epidermis / stronger (tissue) ;  
 Prevented / limited elongation of that side / uneven elongation or expansion ;  
 [up to 5] 5
- (c)(i) Xylem ;  
 stained / black (yellow/orange/darker if iodine) dots / areas ; 2
- (ii) Line of stain shown ;  
 At least 3 cm (any plane) quality of drawing ; 2
- (iii) Xylem / vessels ;  
 Tubular/no cross walls/no obstruction ;  
 Reference to capillarity/lignin wall ; [up to 2] 2
- 2(a)(i)&(ii) marks combined.  
 1. Record of measurements at 0.5 mm intervals ; [range 3 mm to 10 mm]  
 2. System e.g. tally, apparent ;  
 3. Table well ruled ;  
 4. Well labelled, including units ;  
 5. 40 records ;  
 6. Accurate sub-totals ; [more than 2] 6
- (iii) Attempt at randomness ; 1

- (b) *See drawing*  
 1. neatly & visibly ruled, good size  
 2. accurate plotting (own figures)  
 3. axes labelled [x = length – mm, y = number of grains]  
 4. and numbered below columns 4
- (c)(i) bimodal ;  
 another accurate reference ; e.g. description / numerical analysis 2
- (ii) genetic difference / two varieties / reference to variation / other good idea ;  
 1
- (d) (short &) round v (long &) thin [**Not** just short v long] / reference to  
 colour difference ; 1
- (e) Plants grown from short and from long seeds ;  
 Both self-pollinated ;  
 Safeguard – eg. prevention of pollen contamination / mixing ;  
 Resultant seeds measured ;  
 Suitable conclusion for either ; 5

**Required for question 1:**

a piece of fresh celery, 10 cm long

**Required for question 2:**

approximately 60 grains of cooking rice, from a 50 – 50 mixture of short-grained and long-grained varieties