

1. (a) (i) Chloroplast. 1
(ii) Granum / thylakoids. (*not: lamella*) 1
- (b) 3.2 - 3.3 - *gains 2 marks*
Working shows measured length divided by magnification - *gains 1 mark* 2
- (c) Contains chlorophyll / pigments for light absorption;
Different pigments to absorb different wavelengths;
Stacking / arrangement of grana/thylakoids maximises light catchment;
Stroma contains enzymes for photosynthesis;
Outer membrane keeps enzymes in chloroplast;
Starch grains / lipid droplets store products of photosynthesis;
Ribosomes / DNA for enzyme/protein synthesis;
Shape of chloroplast gives large surface area for CO₂, absorption. 2
- [6]**
2. (a) **A** ribosome (*RER neutral*); 1
B vacuole; 1
C smooth ER / SER; 1
- (b) (i) support / strength / shape / prevents osmotic lysis;
(*protection, permeability neutral*) 1
(ii) photosynthesis / light energy → chemical energy;
(*makes food/sugar neutral*) 1
- (c) 0.2 – 0.24 gains 2 marks;
ELSE evidence of observed measurement
(5 – 6 mm / 0.5 – 0.6 cm) ÷ 25 000
gains one mark; 2
- [7]**
3. (a) cells become specialised/change to carry out a particular function; 1
- (b) (i) named organelle e.g. nucleus/nuclear envelope; vacuole;
chloroplast; RER; mitochondrion; no membrane bound organelles;
(*only award if no organelles named*)
(*reject ribosomes, cell membrane, cell wall*)
ref to large(r) size 2 max
- (ii) $94/95/96 \times 10$; principle (measured distance Y-Z)
 $\frac{44/45/46}{\text{length of scale bar}}$
20.4 – 21.8 2
(*correct answer 2 marks*)
- (iii) no cell wall (permanent) / (large) vacuole / chloroplasts / smaller;

(accept microvilli)

1 max

[6]

4. (a) 16 gains 2 marks; 2
- (accept 15.5 . 16.5)*
- (principal of calculation i.e. measured distance*
(31-33mm/3.1-3.3cm) gains 1 mark) Mag
- (b) relevant adaptation;
and explanation for second mark; e.g.
- idea of many chloroplasts / lots of chlorophyll;*
to trap or absorb light (energy);
- elongated cells;*
idea of maximum light absorption / light penetration;
- chloroplasts move;*
to trap or absorb light (energy);
- range of pigments;*
can absorb a range of wavelengths / colours / for max light absorption;
- large S.A. or cell wall feature e.g. thin / permeable;*
for (rapid) CO² absorption; 2
- [4]
5. (a) (Group of) similar/identical cells/cells with a common origin; 1
- Q Ignore references to function*
- (b) (i) Add iodine/stain specific for starch to the slide/cells/tissue/
 /add iodine/stain specific for starch and examine under microscope;
 Blue-black/blue/black/purple; 2
- Reject sample*
- (ii) Need a single layer of cells/only a few cells thick/not too many
 layers;
 Light must be able to pass through;
 Detail obscured by cells underneath; 2 max

- (c) Both are polymers/made of monomers;
Joined by condensation/molecules can be broken down by hydrolysis;
Both have 1-4 links;
Contain C(arbon), H(ydrogen) and O(xygen)/both made up of glucose;
Both insoluble;
Both contain glycosidic bonds;

2 max

*Accept other valid answers.
Ignore ref to unbranched.*

[7]