M1.

(a)

Protein synthesis	**L;**
Modifies protein	**H;**
Aerobic respiration	**N;**

3

(b) 1800−2200;

1.8, 2.0 or 2.2 in working or answer = 1 mark.

Ignore units in answer.

1 mark for an incorrect answer in which student clearly divides measured length by actual length (of scale).

Accept I / A or I / O for 1 mark but ignore triangle.

Accept approx 60mm divided by 30µm for 1 mark

2

[5]

M2.(a) 1. Large / dense / heavy cells;

2. Form pellet / move to bottom of tube (when centrifuged);
3. Liquid / supernatant can be removed.

Must refer to whole cells.

3

(b) Break down cells / cell parts / toxins.

Idea of 'break down / digestion' needed, not just damage

1

(c) 1. To stop / reduce them being damaged / destroyed / killed;

Reject (to stop) bacteria being denatured.

2. By stomach acid.

Must be in context of stomach.

2

(d) 1. More cell damage when both present / A;

2. Some cell damage when either there on their own / some cell damage in B and C;

MP1 and MP2 − figures given from the graph are insufficient.

3. Standard deviation does not overlap for A with B and C so difference is real;

MP3 and MP4 ***both*** *aspects needed to gain mark.*

4. Standard deviations do overlap between B and C so no real difference.

MP3 and MP4 accept reference to significance / chance for 'real difference'

3 max

(e) 1. Enzyme (a protein) is broken down (so no enzyme activity);

Accept hydrolyse / digested for 'broken down'.

2. No toxin (as a result of protein-digesting enzyme activity);

Must be in the correct context.

3. (So) toxin is protein.

This must be stated, not inferred from use of 'protein−digesting enzyme'.

3

[12]

M3.(a) 1. How to break open cells and remove debris;
2. Solution is cold / isotonic / buffered;
3. Second pellet is chloroplast.

3

(b) 1. **A** stroma;
2. **B** granum.

Accept thylakoid

2

(c) $\left(\frac{length\ of\ chloroplast}{length\ of\ bar}\right)$ µm

1

(d) **Two** of the following for **one** mark:
Mitochondrion / ribosome / endoplasmic reticulum / lysosome / cell-surface membrane.

1 max

[7]

M4.(a) 1. Starch formed from α-glucose but cellulose formed from β-glucose;
2. Position of hydrogen and hydroxyl groups on carbon atom 1 inverted.

2

(b) 1. Insoluble;
2. Don't affect water potential;
OR
3. Helical;
Accept form spirals
4. Compact;
OR
5. Large molecule;
6. Cannot leave cell.

2

(c) 1. Long and straight chains;
2. Become linked together by many hydrogen bonds to form fibrils;
3. Provide strength (to cell wall).

3

[7]

M5.(a) 1. (If injected into egg), gene gets into all / most of cells of silkworm;
2. So gets into cells that make silk.

2

(b) 1. Not all eggs will successfully take up the plasmid;
2. Silkworms that have taken up gene will glow.

2

(c) Promoter (region / gene).

1

(d) 1. So that protein can be harvested;
2. Fibres in other cells might cause harm.

2

[7]

M6.(a) 1. Add drop of water to (glass) slide;
2. Obtain thin section (of plant tissue) and place on slide / float on drop of water;
3. Stain with / add iodine in potassium iodide.

3. Allow any appropriate method that avoids trapping air bubbles

4. Lower cover slip using mounted needle.

4

(b) 1. **W** – chloroplast, photosynthesis;
2. **Z** – nucleus, contains DNA / chromosomes / holds genetic information of cell.

2

(c) 1. High resolution;
2. Can see internal structure of organelles.

2

(d) Length of bar in mm × 1000.

1

[9]

M7.(a) 1. Bilayer;

Accept double layer
Accept drawing which shows bilayer

2. Hydrophobic / fatty acid / lipid (tails) to inside;

3. Polar / phosphate group / hydrophilic (head) to outside;

2. & 3. need labels
2. & 3. accept water loving or hating

2 max

(b) (i) 1. (Rough endoplasmic reticulum has) ribosomes;
accept "contains / stores"

2. To make protein (which an enzyme is);
Accept amino acids joined together / (poly)peptide
Reject makes amino acids
Ignore glycoprotein

2

(ii) (Golgi apparatus) modifies (protein)

OR

packages / put into (Golgi) vesicles

OR

transport to cell surface / vacuole;

Accept protein has sugar added
Reject protein synthesis
Accept lysosome formation

1

[5]