**M1.**(a)    (140 + 240 + 380 + 450 = ) 1210

**1**

(b)    the local people decided to farm cattle

**1**

a company starts growing plants for biofuels

**1**

(c)    carbon dioxide
                    *in this order only*

**1**

photosynthesis

**1**

(d)    animals and birds migrate because there is less food

**1**

more habitats are destroyed

**1**

(e)    any **one** from:
•    breeding programmes (for endangered species)
•    regeneration (programmes)
•    reintroduction of field margins / hedgerows
•    awareness raising with politicians / public
•    recycling

**1**

**[8]**

**M2.**     (a)   water

                                                                                                                **1**


            oxygen
                            *in this order only*
                            *accept correct chemical symbols*
                            *allow $H_2O$ / $OH_2$*

                                                                                                                **1**


      (b)    allow light (in / through) / need light
                            *do **not** accept attracts light*
                            *ignore heat / moisture / carbon dioxide*
                            *ignore so the plants can be seen*
                            *accept the converse, ie the black plastic bag would not let
                            light in (1)*

                                                                                                                **1**


            for photosynthesis / make sugar / glucose
                            *so there would be no photosynthesis (1)*
                            *do **not** allow make food unqualified*

                                                                                                                **1**


      (c)    Increase (in leaves / new leaves)
                            *ignore growth unqualified*

                                                                                                                **1**


            (then) level off **or** number of (new) leaves (then) stays the same

                                                                                                                **1**


            numerical statement eg max at 3 tablets / 5 (new) leaves
                            *should refer to one of the first two marking points*
                            *for every extra tablet get 1 extra leaf = **2** marks*
                            *for every extra tablet get 1 extra leaf then it levels off = **3**
                            marks*

                                                                                                                **1**

**M3.** (a) xylem **and** phloem

*either order*
*allow words ringed in box*
*allow mis-spelling if unambiguous*

**1**

(b) (i) movement / spreading out of particles / molecules / ions / atoms

*ignore names of substances / 'gases'*

**1**

from high to low concentration

*accept down concentration gradient*
*ignore 'along' / 'across' gradient*
*ignore 'with' gradient*

**1**

(ii) oxygen / water (vapour)

*allow $O_2$ / O2*
*ignore $O^2$ / O*
*allow $H_2O$ / H2O*
*ignore $H^2O$*

**1**

**[4]**

**M4.** (a) protein

**1**

(b) (i) (more) magnesium gives more growth / more leaves / more duckweed
*if converse must be clear that less magnesium gives less growth*

**1**

(ii) **A** gave highest number of leaves / plants **or** more than others
*it equals 'A'*
*use of numbers must compare A with at least one other*

**or**

**A** gave most growth / most duckweed **or** more than others
*allow faster / fastest / better / best growth*
*allow more growth with nitrate / less growth without nitrate*
*do not allow 'no' growth without nitrate*

(c) (i) mark (c) as a whole

sensible method:

e.g. mass / weighing
*ignore dry or fresh*
*allow other sensible method involving measuring eg length of roots – ignore 'size' of roots or measure roots unqualified*

**1**

(ii) corresponding explanation:
*ignore accuracy*

e.g. includes roots / includes <u>whole</u> plant**or**leaves vary in size**or**(length / mass / surface area given in c(i)) is a continuous variable

**1**
**[5]**

**M5.**(a)    oxygen

> *allow O₂ / O2*
> *do **not** accept O² or O*

                                                                                          **1**

(b)    (i)    light

                                                                                          **1**

       (ii)   chlorophyll

                                                                                          **1**

       (iii)  decrease

                                                                                          **1**

(c)    any **three** from:

- for respiration / energy
> *do **not** accept use energy for photosynthesis*
- to make cellulose / starch
> *accept named carbohydrate other than glucose*
- to make lipid / fat / oil
> *accept fatty acid / glycerol*
- to make protein
> *accept named protein / amino acid / named amino acid*
- to build big molecules from small molecules / metabolism
> *if no other marks awarded for making molecules allow **1**
> mark for growth / repair / new cells*

                                                                                          **3**
                                                                                       **[7]**

**M6.** (a) (i) **C** and **D**

*no mark if more than one box is ticked*

**1**

(ii) any **one** from:

*do **not** allow if other cell parts are given in a list*

• (have) cell wall(s)

• (have) vacuole(s)

**1**

(b) (i) **A**

*apply list principle*

**1**

(ii) **D**

*apply list principle*

**1**

(c) respiration

*apply list principle*

**1**

**[5]**

**M7.**(a)    chlorophyll is needed for photosynthesis

1

light is needed for photosynthesis

1

(b)    increases

1

levels off / reaches a maximum / remains constant / stays the same / plateaus
*do **not** allow stops / stationary / peaks*
*allow stops increasing*

1

goes up to / reaches a maximum / levels off at (a rate of) 200 (arbitrary units)
**or**
levels off at 225 – 240 (light units)
*ignore references to other numerical values*

1

(c)    (i)    higher light intensity does not increase rate of photosynthesis
*accept the graph stays level (above this value)*
*allow stops increasing*
*allow the rate of photosynthesis stays the same (above this value)*

1

(ii)    any **two** from:

- carbon dioxide (concentration)
- temperature / heat
- (amount of) chlorophyll / chloroplasts
*allow water*
*allow ions / nutrients*
*ignore ref to surface area of the leaf*

2

**[8]**

**M8.**(a) (i)    in the direction of the force of gravity

**1**

(ii)   against the force of gravity

**1**

(b) (i)    diagram completed to show stem bending / leaning towards the window
            *the bend / lean can be at / from any point above pot level*
            *ignore any leaves*

**1**

(ii)   more light (for leaves)
            *ignore heat*

**1**

more photosynthesis / biomass / glucose
            *ref to 'more' needed once only, eg 'more light for*
            *photosynthesis' = 2 marks*
            *if no other marks given allow 1 mark for 'to get light for*
            *photosynthesis'*

**1**

**[5]**

**M9.**(a) (i) LHS = water

*accept $H_2O$*
*do **not** accept $H^2O$ / H2O*

**1**

RHS = oxygen
*accept $O_2$*
*do **not** accept $O$ / $O^2$ / O2*

**1**

(ii) light / sunlight
*ignore solar / sun / sunshine*
*do **not** allow thermal / heat*

**1**

(iii) chloroplasts
*allow chlorophyll*

**1**

(b) (i) 20

**1**

(ii) any **one** from:
• light (intensity)
• temperature.

**1**

(c) (i) To increase the rate of growth of the tomato plants

**1**

(ii) Because it would cost more money than using 0.08%

**1**

Because it would not increase the rate of photosynthesis of the tomato plants any further

**1**

**[9]**