Mark schemes

1 (a) 6 6 6

all required

accept a '6n 6 n n 6n' version of the balanced equation provided it is correct in every detail

1

(b) any **two** of

- (presence of) chlorophyll **or** (amount of) chloroplasts

  accept green leaves (or other green parts)

- (sufficient) light (intensity)

- (light) of **a** suitable wavelength

  any light other than green light

  do not credit Sun's energy or sunshine or Sun

2

(c) **guard cells**

any **two** of

 * control by osmosis
* the movement of gases

   *accept movement of carbon dioxide **or** oxygen **or** water vapour*

   beware movement of CO_2 out

   accept a diagram or description

 * through the stoma

2

palisade cells

any **two** of

 * near the upper surface
* contain (a great) <u>many</u> **or** <u>more</u> chloroplasts
* (so) contain the most chlorophyll

2

(d)   any three of

   * for respiration
   * conversion to (insoluble) starch

   or to food store **or** to (other)carbohydrates
   * (conversion to) sucrose **or** to food store **or** to (other) carbohydrates

   or polysaccharides

                   *do not credit just to grow **or** live*

                   ***or** survive*

                   accept conversion to food store

                   ***or** to (other) carbohydrates once only*

   * (conversion to) lipids **or** fats **or** oils
   * (conversion to) amino acids **or** (plant) proteins **or** auxins **or** (plant) hormones **or** enzymes

                                                                      3

                                                                                  [10]

2   *idea*
provide (more) light
provide (more) CO_2
provide (plenty of) water
if any one of these is low it will limit the reaction
[Do not allow answers referring to temperature,
as optimum is specified in question 3)

                   any three for 1 mark each

                                                                                  [3]

3   (a)   line increasing in daylight 6 – 18 ($\pm$ 2 hr)
             line decreasing 0 – 6 ($\pm$ 2 hr)
             line decreasing 18 – 24 ($\pm$ 2 hr)
                         for 1 mark each

       but
       mirror image (i.e. opposite gradients)
                         gains 3 marks

                                                                      3

(b) *idea:*
slower growth (credit even if refers only to leaves)
less photosynthesis/glucose (than if leaves fully green)
each for 1 mark

2

[5]

4 carbon dioxide concentration

1

since atmospheric concentration very low / value give e.g. 0.03%
allow carbon dioxide used up

1

temperature high
allow if light chosen as a factor

1

light intensity high
allow If temperature chosen as a factor

1

[4]

5 (a) + light = + photosynthesis
+ light = + photosynthesis to a limit
limit depends on temp/CO$_2$ levels
+ CO$_2$ = + photosynthesis
+ temp = + photosynthesis
each for 1 mark

5

(b) need to raise optimum levels
when one other raised
to get max/economic yield
each for 1 mark

2

[7]