Mark schemes

Q1.

(a) ***Leaf 1 or covered with black paper***
no light so no photosynthesis (occurs)
ignore reference to water
ignore reference to carbon dioxide
1

Leaf 2 or covered with transparent plastic
no carbon dioxide so no photosynthesis
1

Leaf 3 or not covered
light and carbon dioxide present so leaf can photosynthesise
ignore no limiting factors
1

for either Leaf 1 / 2
(so) glucose not made
1

(and therefore) glucose / sugar cannot be converted to starch
*allow converse for **Leaf 3***
*if neither marking points 4 and 5 awarded, allow starch (previously present) has been broken down for **1** mark*
1

(b) (green) starch / present / positive
*allow blue-black / black **or** dark blue*
and
(white) no starch **or** not present **or** negative
allow yellow / orange / brown
*both required for **1** mark*
1

(c) green part contains chlorophyll **and** white part does not
ignore chloroplasts
1

(so) light is absorbed by green part (but not by white part) so photosynthesis occurs and starch can be formed
allow (so) light is absorbed by chlorophyll / chloroplasts so photosynthesis occurs and starch can be formed
allow converse for white part
ignore colours of starch test if referenced
1

(d) magnesium

allow Mg / Mg^{2+}

allow nitrate / iron

allow other correct named ions

1

(e) chlorosis

1

(f) (measure the) <u>volume</u> (of oxygen) released / produced in a given time

or

(count / number of) bubbles released / produced in a given time

allow answers in terms of a specific time

ignore measure the amount (of oxygen) released in a given time

1

(g) (a factor that) if increased would increase the rate (of a reaction)

or

(a factor that) prevents the rate (of a reaction) increasing

allow answers in terms of (a) named factor(s)

allow (a factor that) prevents the maximum rate (of a reaction) being reached

1

(h) increasing temperature while keeping the carbon dioxide (concentration) constant increases the rate (of photosynthesis)

allow increasing the carbon dioxide (concentration) while keeping temperature constant increases the rate (of photosynthesis)

1

increasing the temperature increases the movement of the molecules / particles / substrate

or

increasing the temperature increases the rate of enzyme activity

allow increasing the temperature increases the kinetic energy of the molecules / particles / substrate

allow increasing the temperature increases the frequency of collisions between molecules / particles

1

increasing carbon dioxide concentration increases (the concentration of) substrate / reactants

1

all rates plateau at a certain point due to another factor being limiting

allow all rates plateau at a certain point due to chlorophyll being limiting

*do **not** accept all rates plateau at a certain point due to light being limiting*

1

(i)

light intensity $\propto \frac{1}{\text{distance}^2}$

1

[17]

Q2.

(a)

Thick, waxy layer on leaf surface		✓
Berries that are poisonous	✓	
Bark on trees that falls off		✓

all three rows correct = **2** marks
two rows correct = **1** mark
one row correct = **0** marks

2

(b) (it looks like the hornet so) predators / animals are tricked / deceived (by the colouring) **and** so avoid eating it

*allow (it looks like the hornet so) predators / animals are warned off **and** so avoid eating it*

allow correctly named predators eg birds

1

(c) **Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.

5–6

Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.

3–4

Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

1–2

No relevant content

0

Indicative content

- less absorption of water
  - less water so lower rate of photosynthesis
    - so less glucose produced
    - for respiration / energy release
    - so less cellulose produced so fewer cells walls / cells made
    - so fewer amino acids produced to make new proteins
  - cells lose turgidity

- less absorption of (named) ions / minerals
  - fewer nitrates so fewer proteins made for growth
  - fewer magnesium ions so less chlorophyll produced
    - so lower rate of photosynthesis

- damage to phloem
  - less transport of sugars to root cells
    - for respiration / energy release

- damage to xylem
  - less water transported (to cells)
  - fewer nitrates reach cells
    - so fewer proteins made for growth
  - fewer magnesium ions reach cells
    - so less chlorophyll produced
    - less magnesium / chlorophyll so lower rate of photosynthesis

- less anchorage

(d) genetic material / DNA / chromosomes is doubled / replicated / copied / duplicated

1

the (replicated) chromosomes are pulled / moved apart

the (replicated) chromosomes are separated

1

cytoplasm divides into two (cells)
or
cell membrane divides to form two cells

allow two new nuclei form

allow the nucleus divides (into two)

1

the set of chromosomes in each new cell are identical (to one another)

allow each new cell has the same set of DNA / alleles / genes (as the other)

1

(e) differentiation

ignore specialisation

1

[14]