Mark schemes

Q1.

(a) any **one** from:

- (cell **or** sub-cellular structures) grows
- increase in (number of) sub-cellular structures

  *do **not** accept nucleus*

  ignore increase in cell parts / components

- increase in (number of) mitochondria

  allow increase in respiration

- increase in (number of) ribosomes

  allow increase in protein (synthesis)

  *do **not** accept changes that occur as the cell divides*

1

(b) (cell) membrane

1

(c) *substitution*

$$\text{length} = \frac{24\,500\,000}{3.14 \times 125^2}$$

allow use of π button on calculator for 3.14

allow use of $\frac{22}{7}$ for 3.14

1

(length =) 499.363 (nm)

allow 499 (nm)

1

recall of equation

$$\text{magnification} = \frac{\text{image size}}{\text{real size}}$$

1

correct conversion of mm to nm **or** nm to mm
(4 mm = 4 000 000 nm)

allow conversion at any point

1

$$\frac{4\,000\,000}{499.363}$$

allow use of correctly rounded calculated value for length

1

×8010

allow ×8010.205

*do **not** accept if unit given*

allow an answer consistent with an incorrectly rounded / calculated value for length

1

(d) chromosomes cannot be pulled (by the fibres) to each end of the cell

1

(so) nucleus cannot divide

ignore chromosomes cannot be separated unqualified

*allow **two** (genetically identical)*

cells cannot be formed

ignore cytokinesis

ignore the cell cannot divide

1

(e) tumour cannot grow / proliferate / spread

allow stops secondary tumours forming

allow stops metastasis

ignore stops uncontrolled cell division

*do **not** accept the cancer / tumour cannot become malignant*

1

(f) testing the drugs on live tissues in a laboratory

1

[12]

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]