Mark schemes

Q1.

(a) **Level 3**: The method would lead to the production of a valid outcome. The key steps are identified and logically sequenced.

5–6

Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.

3–4

Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.

1–2

No relevant content.

0

Indicative content

- iodine solution tests for starch
- iodine changes from yellow / orange / brown
- to blue-black **or** black **or** dark blue (to show starch is present when added to cake)

- Benedict's (reagent) tests for sugar / glucose
- heat (to at least 60 °C) / boil cake with Benedict's (reagent)
- Benedict's (reagent) changes from blue
- to green / yellow / orange / brown / (brick) red (to show sugar / glucose is present when added to cake)

- risk of skin burns from flame (when heating) **or** risk of skin burns from hot glass **or** risk of scald / burn from boiling water
  - use a water bath
  - wait for equipment to cool before touching
- risk of Benedict's (reagent) spitting into face / eyes when heating
  - wear eye protection
  - point test tube away from face(s) when heating

- risk of Benedict's (reagent) as an irritant **or** risk of iodine (solution) as an irritant
  - clean up spills immediately
  - wear (protective) gloves **or** wear eye protection
  - use a dropper bottle (to reduce chance of spills)

(allow answers in terms of bread)

For **Level 3** answers should include the reagents used to test for starch and sugar with correct positive results, and a risk assessment.

(b) time taken (for bread) to taste / become sweet

ignore time unqualified

1

(c) any **one** from:

- size / mass of bread

  allow amount of bread
- surface area of bread
- location of bread on tongue
- clean mouth between tests

  allow position of bread in mouth

  allow a method of cleaning the mouth between tests

  ignore temperature of bread

  ignore use the same student

1

(d) bread contains <u>starch</u>

1

(starch is) broken down into sugar

allow (starch is) broken down into glucose / maltose

1

by amylase (in saliva)

ignore by carbohydrase (in saliva)

allow (sugar / glucose) solution reaches taste receptors (on tongue)

***alternative route**:*

bread contains sugar / glucose (1)

sugar / glucose dissolves in saliva (in mouth) (1)

(sugar / glucose) solution reaches taste receptors (on tongue) (1)

1

(e) any **one** from:

- investigation not repeated (by the same / different student(s))

  ignore mean not calculated
- (results) rely on student's (perception of) taste **or** taste is subjective
- amount of saliva / amylase produced is variable

  ignore reference to control variables

1

[12]

Q2.

(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]