Mark schemes

Q1.

(a) 46 000 **or** 16 400 **or** 12.8 **or** 0.8

1

46 000 **and** 16 400
or
262 400

1

46 000 **and** 209 920
or
3593.75

1

2191.3
or

$$\frac{46\,000 \times 10\,000}{209\,920}$$

or

$$\frac{3593.75 \times 10\,000}{16\,400}$$

1

2190

1

(b) suitable scale, symmetrical around 0

1

labels for *x*-axis
and for bars

(biomass in) kg
(bars) maize and chickens

1

correct values plotted:
chickens 2200
maize 4200

allow a tolerance of ±½ small square
ignore height of bars

1

(c)

$\frac{2200}{4200}$

1

= 0.5238… : 1
or
11 : 21
or
1 : 1.9

allow rounded value

1

(d) lost via egestion / faeces

ignore urine / excretion / waste
ignore not digested
*do **not** accept respiration*
*do **not** accept not eaten*
*do **not** accept movement **or** as heat **or** for keeping warm*

1

(e) lysine and tryptophan

1

(f) any **one** from:

- chickens need low amounts of leucine (for growth)
  *do **not** accept leucine is not needed (for growth)*
- (chicken) proteins contain low amount / proportion of leucine

1

[13]

Q2.

(a) **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

- glyphosate kills weeds but does not harm GM soya
- (so) less competition for light / water / ions / (named) minerals / (named) salts / space
- more light / water for <u>photosynthesis</u>
  - (so) more glucose produced
- more glucose for
  - respiration for energy
  - cellulose for cell walls
  - starch for stored energy / glucose (in soya beans)
  - protein for cell structure / storage (in soya beans)
  - lipids for energy storage (in soya beans)
- more water for
  - turgor / support
  - transport
  - medium for reactions
  - hydrolysis / digestion of (stored) organic substances
- more magnesium
  - for chlorophyll
- more nitrate
  - for amino acids / proteins
- more phosphate
  - for DNA

For **Level 3**, answers must include detail of factors that increase the yield of GM maize.

(b) any **two** from:

- do not know effects on animals / humans (when eaten)
  ignore reference to ethical concerns or religion
  allow do not know side effects on animals / humans (when eaten)
- gene / allele may be transferred to other (wild) plants
- reduce biodiversity
- increased cost of seed (for farmers)
  or
  increased cost to consumer (for product)
  ignore cost unqualified
- may affect flavour / taste (of product)

2

Q3.

(a) gene (for antigen)

allow DNA / allele for antigen

ignore DNA / allele unqualified

1

(b) (pure) antigen(s)

1

(c) the viruses may cause an infection

1

(d) any **three** from:

- (sun) light
  ignore sun
- water
  allow moisture / rain
- ions / minerals / salts
  allow a named example
  *allow **two** named ions for **2** marks*
  ignore nutrients / food
- oxygen in the soil
  ignore carbon dioxide
- space

3

(e) crop plants grow better

or

crop plants have higher yield

ignore reference to competition

1

(f) any **one** from:

- may kill / harm / poison **other** plants
  ignore it is poisonous unqualified
- may pollute streams / rivers / soil
- may kill / harm / poison humans / animals
  allow may alter taste of (GM) maize
  allow may reduce biodiversity
  ignore reference to cost

1

[8]