AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



MARK SCHEME

4.3.3 PLANT DISEASE

SCORE	PERCENTAGE
/96	%

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Q1.

(a) phloem

1

(b) translocation

1

(c) either:

less (sugars for) respiration

1

(so) less energy released

1

or

less amino acids made (1)

(so) less protein produced **or** less protein synthesis (1)

or

less cellulose made (1)

(so) weaker cell walls (1)

(d) (aphids) can fly to another plant **or** part of the plant

ignore to fly unqualified

1

to get (more) food

allow to find a mate
allow idea of less competition for food
allow to escape predators
*do **not** accept escape prey*

1

(e) (oil) prevents aphids from attaching to leaf **or** causes aphids to slide off leaf

ignore 'the leaf is slippery'

or
idea that oil may harm / kill the aphid

allow oil may be unpleasant to the aphid

1

(f) (plant / stem has) thorns

allow spines / spikes / prickles
ignore stings
*do **not** accept thorns protect (the plant) from predators*

1

(g) C

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if any other letter given then no marks for the question

1

(fungi / spores) blown by / in direction of the wind

allow black spot / disease is blown by / in direction of the wind

or

it's the closest plant (to A)

*do **not** accept reference to bacteria / viruses / pollen being blown*

1

(h) any **one** from:

- spread rose bushes out more

  allow isolate the infected plant
  allow idea of barrier around infected plant
  ignore separate unless qualified

- remove any infected parts of the plant

  allow remove infected plant / A

- use a fungicide

  ignore pesticide
  *do **not** accept insecticides / herbicide*

1

[11]

Q2.

(a) (mouthpiece) has pierced / entered the phloem

or

(the aphid) has been feeding from the phloem

1

(b) yellow leaves due to lack of chlorophyll

ignore 'chloroplasts'
ignore magnesium is needed to make chlorophyll

1

(therefore) less / no light absorbed (by chlorophyll)

1

(therefore) lower rate of / no photosynthesis

*do **not** allow 'energy is produced by photosynthesis'*

1

(therefore) plant makes less / no sugar / glucose

1

(therefore) plant converts less / no sugar / glucose into protein (for growth, so growth is stunted)

allow less glucose / sugar converted into cellulose (cell wall)

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allow less energy for protein synthesis

1

(c) inject the protein / it into a mouse

1

combine lymphocytes with tumour / cancer cells to make hybridoma (cells)

ignore white blood cells
allow T or B lymphocytes
ignore tumour unqualified

1

find a hybridoma which makes a monoclonal antibody specific to PVY

1

(the scientist) clones (the hybridoma) to produce many cells (to make the antibody)

*do **not** allow cloning of original stem cells*

allow many rounds of cloning / mitosis

1

[10]

Q3.

(a) a fungus

1

(b) **Level 3 (5-6 marks):**
Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.

Level 2 (3-4 marks):
Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.

Level 1 (1-2 marks):
Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

Level 0
No relevant content

Indicative content

	defence	**description of defence**
animals	skin	sebum / oils to kill microbes dead layer difficult to penetrate
	nose	hairs keep out dust and microbes
	trachea / bronchi	mucus traps microbes cilia moves mucus
	stomach	(hydrochloric) acid kills bacteria

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	white blood cells	produces antibodies produces antitoxins engulf microbes / phagocytosis
plants	cell wall	tough / difficult to penetrate
	waxy cuticle	tough / difficult to penetrate
	dead cells / bark	fall off, taking pathogens with them
	production of antibacterial chemicals	kill bacteria
fungi	antibiotic production	kill bacteria

6

(c) any **three** from:

- sterilise agar (before use)
- sterilise (Petri) dish before use
- disinfect bench (before use)
- pass inoculating loop (through flame)
- secure lid with (adhesive) tape
- minimise exposure of agar / culture to air / lift and replace lid as quickly as possible

allow:

- *dip loop into ethanol (after flaming)*
- *keep the lid on the plate for as long as possible*
  or
  minimise exposure of agar to air
  or
  only tilt the lid off (rather than remove it)
- *flame the neck of the bottle*

3

(d) to prevent the growth of a harmful pathogen

1

[11]

Q4.

(a) stinging hairs / can sting

1

(so) this harms herbivores / stops animals eating them

1

(so) less of the plant is removed / damaged

1

(b) clove (oil)

1

it has the largest areas with no bacteria growing

*allow largest inhibition zone **or** description of largest inhibition zone*

1

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(c) antibiotics were not tested

1

[6]

Q5.

(a) **A**

1

(b) **D**

1

(c) use the same type of plant
or
give equal amount of water to each plant
ignore size of pot

1

(d) (advantage) more minerals

1

(disadvantage) cost / not free

1

[5]

Q6.

(a) to kill virus
or
to prevent virus spreading

1

(b) take (stem) cells from meristem
or
tissue culture
allow take cuttings

1

(c) use Benedict's solution

1

glucoses turns solution blue to orange

1

(d) **Level 2 (3–4 marks):**
A detailed and coherent explanation is provided. The student makes logical links between clearly identified, relevant points that explain why plants with TMV have stunted growth.

Level 1 (1–2 marks):
Simple statements are made, but not precisely. The logic is unclear.

0 marks:
No relevant content.

Indicative content
- less photosynthesis because of lack of chlorophyll
- therefore less glucose made

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so

- less energy released for growth
- because glucose is needed for respiration

and / or

- therefore less amino acids / proteins / cellulose for growth
- because glucose is needed for making amino acids / proteins / cellulose

4

[8]

Q7.

(a) compare them to (pictures in) a gardening manual / website

1

send to laboratory (for testing)

1

(b) (nitrate) stunted growth

1

(magnesium) yellowing of leaves

allow chlorosis

1

(c) (fertiliser **S**)

has most nitrogen for good growth

*if no other marks awarded allow **1** mark for (fertiliser **s**) has more minerals than compost*

1

(and) has high(est) potassium content for stronger roots

1

(it is also) cheaper than fertiliser **T**

1

(however) has less phosphate than fertiliser **T** (although more than compost) so flowers / fruit perhaps less important for the gardener

1

[8]

Q8.

(a) protein

1

(b) (i) (more) magnesium gives more growth / more leaves / more duckweed

if converse must be clear that less magnesium gives less growth

1

(ii) **A** gave highest number of leaves / plants **or** more than others

*it equals **'A'***

*use of numbers must compare **A** with at least one other*

or

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A gave most growth / most duckweed **or** more than others

allow faster / fastest / better / best growth

allow more growth with nitrate / less growth without nitrate

do not allow 'no' growth without nitrate

(c) (i) mark (c) as a whole

sensible method:

e.g. mass / weighing

ignore dry or fresh

allow other sensible method involving measuring eg length of roots – ignore 'size' of roots or measure roots unqualified

1

(ii) corresponding explanation:

ignore accuracy

e.g. includes roots / includes <u>whole</u> plant
or
leaves vary in size
or
(length / mass / surface area given in c(i)) is a continuous variable

1

[5]

Q9.

(a) <u>less</u> carbon dioxide <u>used</u>
or high<u>er</u> carbon dioxide (concentration) in jar

*do **not** allow no carbon dioxide used or no change in carbon dioxide*

1

because <u>less</u> photosynthesis **or** light was a limiting factor

*do **not** allow no photosynthesis*

1

(b) magnesium / Mg

*do **not** allow manganese / Mn*

allow iron / Fe

ignore nitrates

1

[3]

Q10.

(a) photosynthesis

*do **not** accept other additional processes*

1

(b) (i) any **three** from, eg:

ignore time / apparatus

- mass of pondweed

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*<u>type</u> of pondweed = max **2***
accept amount / volume / length / size
ignore number / surface area of leaves / pondweed unqualified

- volume of water
  accept amount
- other reasonable features of the water
- light intensity
  accept distance between light source and tube / pondweed
- light colour
  accept light if neither colour nor intensity is given
- carbon dioxide
- temperature
- pH

3

(ii) any **one** idea from, eg:
ignore reference to cost

- how much oxygen they give off
- is pondweed poisonous to fish
- will fish eat pondweed
- is pondweed harmful to environment
- how long the pondweed lives
- growth rate / size of pondweed
- reference to appearance / aesthetics
- availability

1

(c) magnesium / Mg
accept iron / Fe
ignore ion and $^{+}$ or $^{-}$
ignore nitrate

1

[6]

Q11.

(a) root

1

(b) (i) chlorophyll

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1

(ii) absorbs / traps / takes in light

*do **not** accept attracts / solar energy /sunshine / sun*

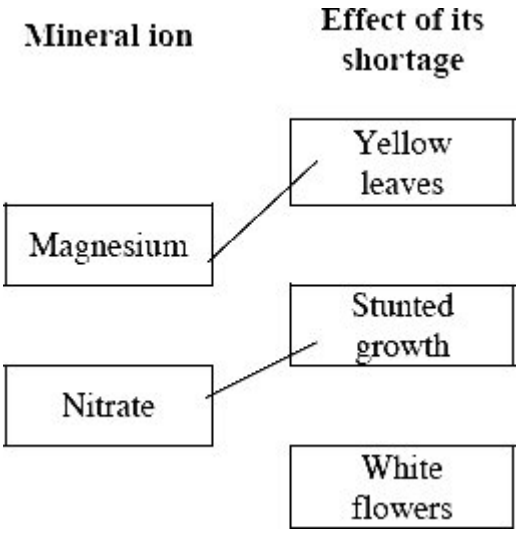
1

(for) photosynthesis

accept to make food / glucose / sugar/ biomass

1

(c)



***1** mark per correct line*

extra line from a mineral ion cancels the mark

2

[6]

Q12.

(a) any **three** from:

- ((mean) mass) increases up to 7 / 8 units (of light) then levels off
- light limiting factor up to 7 / 8 units
- for photosynthesis

  must be in correct context
- other factor / temperature limiting above 7 / 8 units

3

(b) any **two** from:

- cost of providing conditions / heat / light / CO_2
- effect of treatment on profit

  allow too much of factor is wasteful
- relevant use of data from graph eg limiting factors
- named other factors eg fertiliser / pest control / weeds / density of planting

  allow taste / appearance

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2

(c) **nitrate function**

produce amino acids / proteins / enzymes

ignore DNA

*do **not** allow chlorophyll*

1

nitrate deficiency

stunted growth

allow description

ignore plant dies

1

magnesium function

produce chlorophyll

ignore chloroplasts

1

magnesium deficiency

yellow leaves / plant

ignore plant dies

1

[9]

Q13.

use less nitrate / fertiliser

accept use none

use a different fertiliser is neutral

prevent nitrate fertiliser run off is neutral

1

any **two** from:

explanation that with less or none the crops still grow

make more land available to grow more crops

monitoring of water

legislation

organic farming / manure

genetically modified crops

give babies bottled water

2

[3]

Q14.

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(a) *idea:*
wood goodness recycled/crops goodness removed
gains 1 mark

1

but
wood minerals/nutrients recycled/crops remove nutrients/minerals
gains 2 marks

wood and crops compared
for 1 mark

2

(b) (add) fertiliser/nutrients/minerals
(add) manure/animal waste/compost
any two for 1 mark each

(accept move to new area for 1 mark)
rotation
max marks 2

2

[5]

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