AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



MARK SCHEME

4.4.1 PHOTOSYNTHESIS (PACK 3)

SCORE	PERCENTAGE
/77	%

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Q1.

carbon dioxide concentration

1

since atmospheric concentration very low / value give e.g. 0.03%

allow carbon dioxide used up

1

temperature high

allow if light chosen as a factor

1

light intensity high

allow If temperature chosen as a factor

1

[4]

Q2.

(a) genes

1

asexual

1

clones

1

(b) keeps cuttings damp / prevents wilting

allow keeps warm / acts like a greenhouse
allow keeps pests off

1

[4]

Q3.

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

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genetically modified crops

give babies bottled water

2

[3]

Q4.

(a) respiration

reject start respiring / respire only at night

1

no photosynthesis because no light

1

(b) photosynthesis rate greater than respiration rate

1

reject no respiration / photosynthesis only

photosynthesis since light

1

[4]

Q5.

(a) 6 6 6

all required

accept a '6n 6 n n 6n' version of the balanced equation provided it is correct in every detail

1

(b) any **two** of

- (presence of) chlorophyll **or** (amount of) chloroplasts

  accept green leaves (or other green parts)

- (sufficient) light (intensity)

- (light) of **a** suitable wavelength

  any light other than green light

  do not credit Sun's energy or sunshine or Sun

2

(c) **guard cells**

any **two** of

* control by osmosis
* the movement of gases

*accept movement of carbon dioxide **or** oxygen **or** water vapour beware movement of CO_2 out*

accept a diagram or description

* through the stoma

2

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palisade cells

any **two** of

* near the upper surface
* contain (a great) many **or** more chloroplasts
* (so) contain the most chlorophyll

2

(d) any three of

* for respiration
* conversion to (insoluble) starch

or to food store **or** to (other)carbohydrates
* (conversion to) sucrose **or** to food store **or** to (other) carbohydrates

or polysaccharides

*do not credit just to grow **or** live*
***or** survive*
accept conversion to food store
***or** to (other) carbohydrates once only*

* (conversion to) lipids **or** fats **or** oils
* (conversion to) amino acids **or** (plant) proteins **or** auxins **or** (plant) hormones **or** enzymes

3

[10]

Q6.

(a) (i) photosynthesis

1

(ii) respiration

do not credit combustion
do not credit decay

1

(iii) dry

*accept hot **or** windy **or** drought*

1

(b) any **three** from

* evaporation (of water)

***or** loss of water vapour*

* (mostly) from the leaf / leaves

do not credit incorrect reference to leaves

* through the stomata

accept through each stoma
accept through the stomas(sic)

* causing a pull

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or *causing an increase in osmotic potential (at the top of the plant)*
or *causing an increase in water potential (at the top of the plant)* ***or*** *causing a decrease in osmotic pressure (at the top of the plant)*

* (so that) water moves up (through the plant)
do not credit water vapour moves up through the plant

* as the transpiration stream

* water enters through roots (and goes up plants)

3

[6]

Q7.

(a) diatoms photosynthesise **or** are producers

1

the amount of growth depends upon the energy **or** light they get
accept more light means more growth
or *they multiply more in more light*
do not accept they need light

1

(b) (i) eaten by small fish
do not accept eaten by fish

1

minerals **or** nitrate **or** phosphates
or nutrients **or** food supply used up
or reduced

1

(ii) any **two** from

gets colder
light decreases
end of their life span **or** die
accept more being eaten than being formed

eaten by small fish
do not accept a decrease in nitrates
or *phosphates*

1

(c) increased minerals **or** nitrates **or** phosphates

1

any **one** from

due to death **or** decay of diatoms **or** fish
do not accept death of large fish

1

influx of minerals in an ocean current

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do not accept extraneous pollution ***or*** *dumping by a ship*

1

[8]

Q8.

(a) both axes labelled
both axes appropriate scale
plotting 7 correct
good attempt at line graph
each for 1 mark

4

(b) more fertiliser added more yield increased
gains 1 mark

but
yield increases with fertiliser up to maximum
gains 2 marks

yield **increase** slows down above 125/150 kg/ha
either for 1 further mark

(do **not** allow yield falls)
maximum yield with 175 kg/ha

3

[7]

Q9.

(a) + light = + photosynthesis
+ light = + photosynthesis to a limit
limit depends on temp/CO_2 levels
+ CO_2 = + photosynthesis
+ temp = + photosynthesis
each for 1 mark

5

(b) need to raise optimum levels
when one other raised
to get max/economic yield
each for 1 mark

2

[7]

Q10.

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

1

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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]

Q11.

(a) line increasing in daylight 6 – 18 ($\pm$ 2 hr)
line decreasing 0 – 6 ($\pm$ 2 hr)
line decreasing 18 – 24 ($\pm$ 2 hr)
for 1 mark each

but
mirror image (i.e. opposite gradients)
gains 3 marks

3

(b) *idea:*
slower growth (credit even if refers only to leaves)
less photosynthesis/glucose (than if leaves fully green)
each for 1 mark

2

[5]

Q12.

idea
provide (more) light
provide (more) CO_2
provide (plenty of) water
if any one of these is low it will limit the reaction
[Do not allow answers referring to temperature,
as optimum is specified in question 3)
any three for 1 mark each

[3]

Q13.

ideas for

- more food produced/increased yield

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- cheaper food
- bigger income for farmer (allow profit)
- less loss/damage/spoilage of crop
- allow less wasted growth (of straw due to drawing)

any three for 1 mark each

3

ideas against

- chemicals harm people (do not accept "affect flavour")
- fertiliser costly
- fewer worms (in soil)
- weedkillers kill valued/useful wild plants
- insecticides/pesticides kill useful insects/other animals

(general idea that chemicals harm plants/animals gets only 1 of these)

- (weedkillers insecticides/pesticides/fungicides/hormones/chemicals) contaminate water
- (increased risk) pesticide resistance over production/food mountains
- possible eutrophication/nitrate in river/extra plant growth/
- explanation of eutrophication

for 1 mark each to a maximum of 4 marks

4

[7]

Q14.

(a) idea that

- light doesn't reach deeper parts
- plants need / absorb light
- to make food

gain 1 mark each to maximum of 2

but
so they can photosynthesise

gains 2 marks

2

(b) herring will be on the bottom
herring follow / will be feeding on the copepods — independent marking points

for 1 mark each

2

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[4]

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