

MARK SCHEME

GCSE

BIOLOGY

AQA - COMBINED SCIENCE

B 4 - TEST 1
BIOENERGETICS
Beginner

Mark schemes

| | | | |
|-------------|--|---|------------|
| 1. | (a) (i) oxygen | | |
| | <i>do not credit air</i> | | 1 |
| | (ii) lung(s) | | |
| | <i>do not credit blood or nose or windpipe alone but accept as a neutral answer if included with lungs</i> | | 1 |
| (b) oxygen | | 1 | |
| | | | |
| | lactic acid | | |
| | <i>both words required</i> | | 1 |
| | | | |
| | | | [4] |
| 2. | (a) (i) 150 | | 1 |
| | (ii) any two from: | | |
| | <i>accept correct use of numbers</i> | | |
| | <i>accept pulse rate</i> | | |
| | <ul style="list-style-type: none">• lower resting rate• lower rate during exercise• recovers faster after exercise | | |
| | <i>allow a general statement about lower rate if neither of the first two points given</i> | | 2 |
| (b) glucose | | 1 | |
| | | | |
| | oxygen | | 1 |
| | | | |
| | | | [5] |
| 3. | (a) more water vapour | | |
| | <i>accept more water</i> | | 1 |
| | | | |
| | more carbon dioxide | | 1 |
| | | | |
| | less oxygen | | 1 |

- (b) (i) glucose
accept carbohydrate(s)
accept sugar(s) 1
- (ii) heat
or thermal
or internal kinetic 1
- (iii) lungs
accept alveoli / alveolus
do not credit air sacs
do not credit capillaries
both neutral if included with lungs 1
- (c) oxygen
accept O₂ 1
- lactic 1

[8]

- 4.** (a) 66 (beats per minute) 1
- (b) heart rate increased 1
- (c) 4 1
- (d) any **two** from:
- resting heart rate was lower
 - heart rate did not increase as much
 - heart rate did not increase as fast
 - heart rate returned to normal sooner
- 2

(e) **Level 2 (3–4 marks):**

A detailed and coherent explanation is given, which logically links changes in the body during exercise to reasons for these changes.

Level 1 (1–2 marks):

Discrete relevant points made. Links may not be made.

0 marks:

No relevant content

Indicative content

Changes:

- breathing rate increases
- deeper breathing
- (body) temperature increases
- sweating occurs
- muscle fatigue
- vasodilation

Explanations linked to correct change:

- to provide more oxygen
- to remove carbon dioxide faster
- (as) more energy required
- (so) increased respiration
- (so) more energy transferred
- for movement or contraction of muscles
- some energy warms the body
- (sweating) cools the body down
- (by) evaporation of sweat

5.

(a) any **two** from:

or allow converse for outdoors

- constant speed
 - *variable speed*
- constant effort
 - *variable terrain*
- constant temperature
 - *traffic conditions*

 - *variable temperature*
 - *wind (resistance)*
 - *rain / snow*
allow weather

allow pollution only if qualified by effect on body function but ignore pollution unqualified

if no other marks obtained allow variable conditions outdoors

2

(b) Brain

1

(c) (i) 20 800

correct answer with or without working gains 2 marks

if answer incorrect, allow 1 mark for use of 1200 and 22 000 only

2

(ii) oxygen

apply list principle

1

*do **not** accept other named substances eg CO₂ water*

glucose / sugar

allow glycogen

ignore food / carbohydrate

1

(iii) respire aerobically

1

(iv) carbon dioxide

1

lactic acid

1

- (d) increased heart rate
ignore adrenaline / drugs
accept heart beats more but not heart pumps more

1

[11]

6.

- (a) (LHS) water / H₂O
allow H₂O
do not accept H²O

1

- (RHS) glucose / sugar / C₆H₁₂O₆
allow starch / carbohydrate
allow C₆H₁₂O₆
do not accept C⁶H¹²O⁶

1

- (b) (i) 1 arbitrary unit
extra box ticked – cancel

1

- (ii) 210

1

- (iii) carbon dioxide / CO₂ / CO₂
or
 temperature / heat / warmth
do not accept CO²
ignore mineral ions
ignore water

1

[5]

7.

- (a) carbon dioxide/CO₂

1

- (b) through the roots/root hairs
do not accept leaves

1

- (c) oxygen

1

sugar/glucose/other named sugar/starch/carbohydrate

1

(d) award one mark for each mark point

n.b. accept chloroplast for chlorophyll

*n.b. credit the candidate who answers **in** terms of the white areas of the leaf*

chlorophyll is green

e.g. green areas have chlorophyll

1

chlorophyll/green is needed for photosynthesis

e.g. it is only in green areas that photosynthesis can take place

after this point do not penalise a candidate if they do not refer to photosynthesis

1

light is needed

*e.g. it does not happen in the dark
do **not** accept sunshine/sun*

1

photosynthesis produces/makes starch

e.g. starch is made

so

e.g. 'you need light to make starch' scores 3rd and 4th marking points

'you need chlorophyll and light for photosynthesis' scores on the 2nd and 3rd marking points

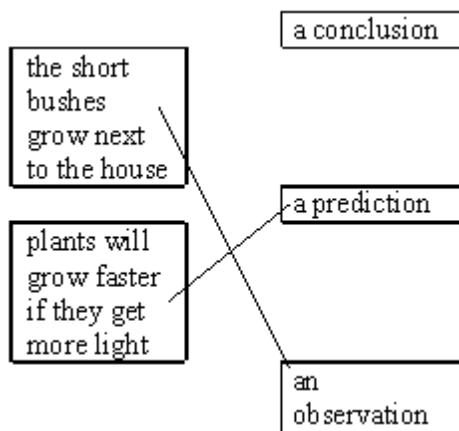
'photosynthesis makes starch and you need green leaves and light for it to work' scores

on the 2nd, 3rd and 4th marking points

1

[8]

8. (a) (i)



both correct = 2 marks

one correct = 1 mark

extra line from a statement cancels the mark

2

- (ii) 1st space: carbon dioxide
allow CO₂ (ignore superscript)
*do **not** allow CO alone*

1

2nd space: glucose / sugar / starch / carbohydrate

1

- (b) (i) any **one** from:

- move lamp or change distance between lamp and plant
ignore measure the distance
- change wattage / power of (light) bulb
*do **not** accept just "change bulb"*
- change voltage / power supply to the (light) bulb
- change the number of lamps
- put translucent material between lamp and plant
accept examples, eg tracing paper / filters
*do **not** accept coloured filters*

1

- (ii) rises

1

levels off

ignore numbers

1

(iii) idea that it levels off

or

does not increase at all light intensities

or

it only increases to a certain amount

*answers should relate to photosynthesis and **not** to bubbling*

1

[8]

9.

(a) glucose

1

oxygen

1

extra ticks negates marks

(b) count the number of bubbles produced in 1 minute

1

measure the volume of gas produced in 30 seconds

1

extra ticks negates marks

(c) any **one** from:

- to control the temperature

allow so pondweed / solution did not warm up

- temperature affects the rate of photosynthesis

allow correct description of effect of temperature on rate

allow high temperatures denature enzymes

ignore references to limiting factors

1

ignore reference to 'it'

(d) 52

1

(e) all points plotted correctly

allow $\pm \frac{1}{2}$ a square

allow 1 mark for three points correctly plotted

2

smooth curve drawn through all points

ignore extensions of line / curve unless inconsistent with line / curve drawn

1

(where a bar chart has been plotted)

allow 1 mark for all bars plotted correctly

if points are plotted as well as bars, ignore bars

(f) any **one** from:

- the nearer the light source to the pondweed the faster the rate of photosynthesis

allow the nearer the light source to the pondweed the faster the bubbles produced

- the greater the light intensity the faster the rate of photosynthesis

allow the greater the light intensity the faster the bubbles produced

allow the closer the light source the more the plant photosynthesises

ignore more bubbles are produced with no reference to rate

allow oxygen for bubbles

*do **not** accept carbon dioxide*

1

allow converse statements for all marking points

[10]