

MARK SCHEME

GCSE

BIOLOGY

AQA - TRIPLE SCIENCE

B 4 - TEST 2

BIOENERGETICS

Beginner

Mark schemes

1.	plants	1	
	carbohydrates		
	<i>accept oxygen</i>	1	
	carbon dioxide		
	<i>accept water</i> <i>(these words must be in this order)</i>	1	
			[3]
2.	(a) no oxygen (is used)	1	
	(b) muscles become fatigued / stop contracting	1	
	because not enough energy is transferred	1	
	(c) carbon dioxide	1	
	(d) count the bubbles or measure volume of gas	1	
	in a given time	1	
	(e) brewing / bread making <i>allow other suitable use of fermentation in food industry</i>	1	
			[7]
3.	(a) The damaged alveolus has a smaller surface area.	1	
	(b) Less oxygen is taken in.	1	
			[2]

4. (a) (i) LHS = water
accept H₂O
do not accept H²O / H2O 1
- RHS = oxygen
accept O₂
do not accept O / O² / O2 1
- (ii) light / sunlight
ignore solar / sun / sunshine
do not allow thermal / heat 1
- (iii) chloroplasts
allow chlorophyll 1
- (b) (i) 20 1
- (ii) any **one** from:
 - light (intensity)
 - temperature.1
- (c) (i) To increase the rate of growth of the tomato plants 1
- (ii) Because it would cost more money than using 0.08% 1
- Because it would not increase the rate of photosynthesis of the tomato plants any further 1

[9]

5.	(a) any two from:	
		<i>or allow converse for outdoors</i>
	<ul style="list-style-type: none"> • constant speed <ul style="list-style-type: none"> • <i>variable speed</i> • constant effort <ul style="list-style-type: none"> • <i>variable terrain</i> • constant temperature <ul style="list-style-type: none"> • <i>traffic conditions</i> • <i>variable temperature</i> • <i>wind (resistance)</i> • <i>rain / snow</i> 	
		<i>allow weather</i>
		<i>allow pollution only if qualified by effect on body function but ignore pollution unqualified</i>
		<i>if no other marks obtained allow variable conditions outdoors</i>
		2
	(b) Brain	1
	(c) (i) 20 800	
		<i>correct answer with or without working gains 2 marks</i>
		<i>if answer incorrect, allow 1 mark for use of 1200 and 22 000 only</i>
		2
	(ii) oxygen	
		<i>apply list principle</i>
		1
		<i>do not accept other named substances eg CO₂ water</i>
		<i>glucose / sugar</i>
		<i>allow glycogen</i>
		<i>ignore food / carbohydrate</i>
		1
	(iii) respire aerobically	1
	(iv) carbon dioxide	1
		<i>lactic acid</i>
		1

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

1

[11]

6.

- (a) chlorophyll is needed for photosynthesis

1

light is needed for photosynthesis

1

- (b) increases

1

levels off / reaches a maximum / remains constant / stays the same / plateaus
*do **not** allow stops / stationary / peaks*
allow stops increasing

1

goes up to / reaches a maximum / levels off at (a rate of) 200 (arbitrary units)
or
levels off at 225 – 240 (light units)

ignore references to other numerical values

1

- (c) (i) higher light intensity does not increase rate of photosynthesis
accept the graph stays level (above this value)

allow stops increasing

allow the rate of photosynthesis stays the same (above this value)

1

- (ii) any **two** from:

- carbon dioxide (concentration)
- temperature / heat
- (amount of) chlorophyll / chloroplasts

allow water

allow ions / nutrients

ignore ref to surface area of the leaf

2

[8]

7.

- (a) oxygen passes from the air/lungs into the body
gains 1 mark

but

oxygen passes from the air/lungs into the blood
gains 2 marks

carbon dioxide passes from the body into the air/lungs
gains 1 mark

but

carbon dioxide passes from the blood into the air/lungs
gains 2 marks

4

- (b) increased/5% more
gains 1 mark

but

6 times more (in air breathed out)
gains 2 marks

2

[6]

8.

- (a) rate of photosynthesis increases
or
number of bubbles produced (in one minute) increases
or
volume of gas / oxygen produced (in one minute) increases
allow decreases / stays the same throughout

1

- (b) light intensity

1

- (c) reduces the effect of heat from the lamp
or
prevents temperature affecting photosynthesis

1

- (d) 52

1

- (e) should be 62
or
is to 3 s.f. / not rounded

allow inconsistent number of significant figures / decimal places

1

- (f) the numbers of bubbles at each distance are similar 1
- (g) x-axis correctly labelled (colour of light) **and** bars identified as correct colour
bars can be identified by labels beneath the x-axis or with a key 1
- bars plotted correctly
all 4 correct = 2 marks 3 correct = 1 mark
if wrong type of graph drawn, max 2 marks 2
- (h) blue light gives highest (rate of) photosynthesis
allow ecf from candidate's graph allow blue light is best 1
- green light gives the lowest (rate of) photosynthesis
allow green light is worst 1
- (i) energy
in this order only 1
- cell wall(s)
allow cell
*do **not** accept (cell) membrane* 1
- starch / fat / oil / lipid 1

[14]

9.

- (a) more water vapour
accept more water 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]