MARK SCHEME

GCSE

BIOLOGY

AQA - TRIPLE SCIENCE

B 4 - TEST 3

BIOENERGETICS

Intermediate

1.

(a) any **one** from:

- continuous readings
- do not need to be there

  allow automatic readings
- (more likely to be) accurate

  allow greater resolution

  *do **not** allow valid*
- reduces human error

  allow easier to read

1

(b) (i) microorganisms

allow microbes / bacteria / fungi / decomposers for microorganisms, throughout

1

(microorganisms) respire

1

respiration / decay / microorganisms releases carbon dioxide

ignore carbon released

1

(ii) all grass decomposed / decayed / rotted

*allow idea that all microorganisms dead (due to accumulation of waste **or** lack of oxygen)*

allow lack of / no oxygen (for respiration of microorganisms)

1

[5]

2.

(a) (i) <u>rate of</u> chemical reaction<u>s</u> (in the body)

1

(ii) any **two** from:

- heredity / inheritance / genetics
- proportion of muscle to fat **or** (body) mass

  allow (body) weight / BMI
- age / growth rate
- gender

  accept hormone balance or <u>environmental</u> temperature

  ignore exercise / activity

2

(b) (i) 77

*correct answer with or without working gains **2** marks*

*allow **1** mark for 70 / 56 **or** 1.25 **or** 5*

2

(ii) increase exercise

accept a way of increasing exercise

1

reduce food intake

accept examples such as eat less fat / sugar

*allow go on a diet **or** take in fewer calories*

ignore lose weight

ignore medical treatments such as gastric band / liposuction

1

[7]

3. (a) LHS = water

1

RHS = glucose

1

(b) any **three** from:

- (measure) temperature

  ignore reference to fair test
- to check that the temperature isn't changing
- rate of reaction changes with temperature
- temperature is a variable that needs to be controlled

  allow lamp gives out heat

3

(c) (i) 10

*correct answer = **2** marks*

*allow **1** mark for:* $\frac{(10+9+11)}{3}$

*allow **1** mark for correct calculation without removal of anomalous result ie 15*

2

(ii) graph:

*allow ecf from **(c)(i)***

label on y-axis as 'number of bubbles per minute'

1

three points correct = **1** mark

allow ± 1 mm

four points correct = **2** marks

2

line of best fit = smooth curve

1

(iii) as distance increases, rate decreases – pro

allow yes between 20 – 40

1

but should be a straight line / but line curves – con / not quite pro

allow not between 10 – 20

if line of best fit is straight line, allow idea of poor fit

1

(d) any **four** from:

- make more profit / cost effective
- raising temp. to 25 °C makes very little difference at 0.03% CO_2
- (at 20 °C) with CO_2 at 0.1%, raises rate
- (at 20 °C with CO_2 at 0.1%) → >3x rate / rises from 5 to 17
- although 25 °C → higher rate, cost of heating not economical
- extra light does not increase rate / already max. rate with daylight

accept ref to profits c.f. costs must be favourable

4

[17]

4. (a) (i) 50

1

(ii) 4

accept 3.9 − 4.0

1

(b) (i) glucose

1

oxygen

1

(ii) to release more energy

1

(c) correct readings from graph:

a = 120

b = 60

allow 60 - 61

1

calculation correct for candidate's figures:

e.g. a − b = 60

1

level of fitness correct for candidate's figures:

e.g. very fit

1

(d) any **four** from:

- higher heart rate (at 16 km / h) (so takes longer to slow to normal)
- more energy needed
- not enough O_2 supplied / more O_2 needed / reference to O_2-debt
- (more) anaerobic respiration
- (more) lactic acid made / to be broken down / to remove / to oxidise
- higher blood flow needed to deliver (the required amount of) oxygen.

'more' must be given at least once for full marks

do not allow more energy produced

allow higher blood flow to remove lactic acid / remove (additional) CO_2

4

[12]

5. (a) (i) without <u>oxygen</u>

allow not enough oxygen

ignore air

ignore production of CO_2

ignore energy

1

(ii) more / high / increased lactic acid (at end)

allow approximate figures (to show increase)

ignore reference to glucose

1

(b) (i) 1.5

allow only 1.5 / 1½ / one and a half

1

(ii) increases at first **and** levels off

ignore subsequent decrease

1

suitable use of numbers eg
rises to 10 / by 9 (dm^3 per min)
or
increases up to 1.5 (min) / levels off after 1.5 (min) (of x axis timescale)
allow answer in range 1.4 to 1.5
or
after the first minute (of the run)

1

(iii) supplies (more) oxygen

1

supplies (more) glucose

1

need 'more/faster' once only for full marks
*allow removes (more) CO_2 / lactic acid / heat as an alternative for either marking point one **or** two, **once** only*

for (more) respiration

1

releases (more) energy (for muscle contraction)
*do **not** allow energy production or for respiration*

1

[9]

6. (a) A

no mark - can be specified in reason part
if B given - no marks throughout
if unspecified + 2 good reasons = 1 mark

high(er) pressure in A
allow opposite for B
*do **not** accept 'zero pressure' for B*

pulse / described in A
accept fluctuates / 'changes'
allow reference to beats / beating
ignore reference to artery pumping

2

(b) (i) 17

1

(ii) 68
accept correct answer from student's (b)(i) × 4

1

(c) oxygen / oxygenated blood

allow adrenaline

ignore air

glucose / sugar

extra wrong answer cancels - eg sucrose / starch / glycogen / glucagon / water

allow fructose

ignore energy

ignore food

2

[6]

7. (a) anaerobic respiration

allow phonetic spelling

1

(b) (i) 4.4

4.2, 4.3, 4.5 or 4.6 with figures in tolerance (6.7 to 6.9 and 2.3 to 2.5) and correct working gains 2 marks

4.2, 4.3, 4.5 or 4.6 with no working shown or correct working with one reading out of tolerance gains 1 mark

correct readings from graph in the ranges of 6.7 to 6.9 ***and*** *2.3 to 2.5 but no answer / wrong answer gains 1 mark*

2

(ii) more energy is needed / used / released

do ***not*** *allow energy production*

(at 14 km per hour)

ignore work

1

not enough oxygen (can be taken in / can be supplied to muscles)

allow reference to oxygen debt

do ***not*** *allow less / no oxygen*

1

so more anaerobic respiration (to supply the extra energy) **or** more glucose changed to lactic acid

allow not enough aerobic respiration

1

[6]

8. Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also apply a 'best-fit' approach to the marking.

Level 3 (5–6 marks):
A description of how the apparatus is used to measure the **rate** of photosynthesis at different light **intensities** is given.

For full marks reference must be made to a control variable
or
repeats

Level 2 (3–4 marks):
A description of how the apparatus is set up
and
a description of how photosynthesis can be measured.
or
a description of how light intensity is varied
or
a control variable **or** any other relevant point

Level 1 (1–2 marks):
A partial description of how the apparatus is set up
or
a description of how light is supplied
or
a simple description of how photosynthesis can be measured.
or
a control variable

0 marks:
No relevant content.

examples of the points made in the response:

- apparatus set up:
  – weed in water in beaker
  – light shining on beaker
- method of varying the light intensity–eg changing distance of lamp from plant
- method of controlling other variables
  – use same pond weed **or** same length of pond weed
  – temperature: water bath or heat screen
  – CO_2
- leave sufficient time at each new light intensity before measurements taken
- method of measuring photosynthesis – eg counting bubbles of gas released or collecting gas and measuring volume in a syringe
- measuring **rate of photosynthesis** by counting bubbles for set period of time
- repetitions

extra information:

allow information in the form of a diagram

[6]