



# **GCSE Biology**

## **Photosynthesis**

### **Mark Scheme**

**Time available: 65 minutes**

**Marks available: 59 marks**

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## Mark schemes

- 1.**
- (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]

2.

(a)  $6\text{H}_2\text{O}$

*in the correct order*

1

$\text{C}_6\text{H}_{12}\text{O}_6$

1

(b) (i) control

**do not accept** 'control variable'

*allow:*

*to show the effect of the organisms*

**or**

*to allow comparison*

**or**

*to show the indicator doesn't change on its own*

1

(ii) snail respire

1

releases  $\text{CO}_2$

1

(iii) turns yellow

1

plant can't photosynthesise so  $\text{CO}_2$  not used up

1

but the snail (and plant) still respire so  $\text{CO}_2$  produced

1

[8]

3. (a) (i) LHS = water  
accept  $H_2O$   
do **not** accept  $H^2O / H2O$  1
- RHS = oxygen  
accept  $O_2$   
do **not** accept  $O / O^2 / O2$  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]
4. (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  $\pm 1$  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<sub>2</sub>
- (at 20 °C) with CO<sub>2</sub> at 0.1%, raises rate
- (at 20 °C with CO<sub>2</sub> 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]

5.

(a) (i) chloroplast

1

(ii) cell wall

1

- (b) (i) osmosis  
*accept diffusion* 1
- (ii) cell wall (prevents bursting) 1
- (c) (i) carbon dioxide  
*allow correct formula* 1
- glucose  
*allow sugar / starch* 1
- (ii) any **two** from:
- light sensitive spot detects light
  - tells flagellum to move towards light
  - more light = more photosynthesis
- 2
- (d) (cell has) larger SA:volume ratio 1
- short (diffusion) distance  
*allow correct description* 1
- (diffusion) via cell membrane is sufficient / good enough
- or**
- flow of water maintains concentration gradient 1

[11]