

# MARK SCHEME

# GCSE

## BIOLOGY

## AQA - COMBINED SCIENCE

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B 2 - TEST 3

Organisation

Intermediate

1.

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response.

**Level 3 (5–6 marks):**

Processes used for obtaining specified materials are given.

**and**

correctly linked to the vessels that the materials are transported in

**or**

correctly linked to a description of the direction of movement of the materials.

**For full credit**, in addition to the above descriptors at least **one** of the processes must be linked to the vessel that the material is transported in **and** the direction of the movement of the material.

**Level 2 (3–4 marks):**

At least **one** process for obtaining a specified material is given

**and**

is correctly linked to the vessel that the material is transported in

**or**

correctly linked to a description of the direction of movement of the material

**Level 1 (1–2 marks):**

At least **one** process (P) for obtaining a material is given

**or**

at least **one** vessel (V) and the material it carries is given

**or**

there is a description of the direction of movement (M) for at least **one** material

**0 marks:**

No relevant points are made

**examples of points made in the response ions:**

(P) taken up by diffusion or active transport

- from an area of high to low concentration (diffusion) **or** an area of low to high concentration (active transport)  
(V) travels in the xylem  
(M) to the leaves **or** from the roots / soil

**Water:**

(P) taken up by osmosis

- from an area of low to high concentration  
*allow high concentration of water to low concentration of water*  
*allow from high water potential to low water potential*  
*ignore along a concentration gradient*  
(V) travels in the xylem  
(M) to the leaves **or** from the roots / soil  
(P) transpiration stream
- movement replaces water as it evaporates from leaves  
(V) in the xylem

**Sugar:**

(P) made during photosynthesis

(V) travels in the phloem

(M) to other parts of the plant **or** to storage organs **or** travels up and down

2. (a) (i) liver 1
- (ii) on diagram:  
 'X' on liver  
*must be unambiguous (eg not overlapping gall bladder)*  
*intersection of X in liver* 1
- (b) stomach 1
- small intestine  
*accept duodenum or ileum*  
*extra wrong answers cancel the mark,*  
*eg small intestine (colon) = no marks* 1
- (c) amylase not produced by stomach  
*accept no starch digesting enzymes in the stomach*  
*accept correct enzyme not in stomach*  
*accept only proteases in stomach*  
*do **not** accept protease does not digest starch* 1
- acid / low / wrong pH in stomach **or** enzyme would be denatured in stomach **or** amylase only works in neutral / alkaline conditions  
*incorrect extra information cancels mark*  
*do **not** accept amylase does not work in the stomach* 1

3. (a) (i) water loss  
*extra substance(s) cancel*  
*if transpiration stream described max 1 mark* 1
- as a vapour / by evaporation  
*ignore stomata* 1
- (ii) stomata / stoma / guard cells  
*ignore epidermis* 1
- (b) (i) 2.8  
*correct answer with or without working gains 2 marks*  
*if answer incorrect:*  
*allow 1 mark for  $(8.6 - 0.2) \div 3$  **or**  $8.4 \div 3$*  2

- (ii) warmer at 16:00 / gets cooler  
*or reverse argument for 19.00*

1

faster diffusion / evaporation  
*accept sun setting as equivalent to heat or light marking points*

**or**

lighter at 16:00 / gets darker (1)  
*if no environmental factor still allow reason mark*

stomata open / more open (1)  
*eg 'stomata close later in the day'*

**or**

(more) windy at 16:00 / gets less windy (1)  
removal of (more) water vapour / steeper gradient (1)

**or**

air is less humid at 16.00 (1)  
*allow rain at 19.00*

faster diffusion or steeper gradient (1)

1

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4.

- (a) (i) amino acid(s)  
*accept peptide(s)*  
*do not allow polypeptide(s)*

1

- (ii) protease

1

- (b) (i) 2

1

- (ii) repeat  
*do not allow other enzyme / substrate*

1

using smaller pH intervals between pH1 and pH3  
*allow smaller intervals on both sides of / around pH2*  
*allow smaller intervals on both sides of / around answer to (b)(i)*

1

(iii) enzyme / pepsin denatured / shape changed

do **not** allow enzyme killed

allow enzyme 'destroyed'

1

enzyme / pepsin no longer fits (substrate)

allow enzyme / pepsin does not work

1

(c) hydrochloric (acid)

allow phonetic spelling

accept HCl

allow HCL

ignore hcl

do **not** allow incorrect formula –e.g.  $H_2Cl$  /  $HCl_2$

1

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5.

(a) (i) (as a result of) uncontrolled / abnormal growth / division of cells

ignore mutation

allow cells dividing with no contact inhibition

1

(ii) benign tumours do not invade / spread to other tissues / do not form secondary tumours

accept converse for malignant

accept benign tumours do not metastasise

1

(b) via the blood / circulatory system

accept via lymphatic system

1

(c) (i) incidence is increasing

1

more rapidly (over the years)

ignore figures

1

difference between rich and poor areas is getting less

**or**

the incidence is rising fastest in people from poor areas

accept converse for people from rich areas

1

- (ii) risk factor is UV from sunlight  
*ignore ionising radiation*

1

more UK citizens going abroad or taking holidays in the Sun

**or**

poorer people can afford holidays in the Sun

**or**

more poorer people are taking holidays in the Sun

1

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6.

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

- same result at pH 7 and 7.5  
**or**  
could be any pH between 7 and 7.5  
**or**  
not tested at pH 7.25  
**or**  
need to test at smaller pH intervals (between 7 and 7.5)
- accuracy of result only to nearest 0.5 minutes
- no repeats
- difficult to determine end point (colour)

2

- (b) 2.7 / 5

1

0.54 (units per minute)

*allow 0.52 with no working shown for 2 marks*

1

*allow 1 mark for 0.52 **or** 0.56*

- (c) (after 10 minutes) solution goes black

1

(after 60 minutes) solution stays the same

**or**

does not go black

**or**

goes slightly orange

1

- (d) steeper curve

1

levels off at 11.8 units **and** before 45 minutes

1

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7.

(a) any **one** from:

*ignore 'check temperature'*

- add a water bath
- heat screen
- use LED
- low energy bulb / described

1

(b) (i) rate / number of bubbles decreases

*accept converse with reference to increasing light **or** shorter distance*

**or**

less oxygen / gas released

*ignore reference to rate of photosynthesis*

1

(ii) temperature / CO<sub>2</sub> (concentration)

*accept 'it was too cool' **or** not enough CO<sub>2</sub>*

*accept number of chloroplasts / amount of chlorophyll*

*allow heat*

*allow CO<sub>2</sub>*

*do **not** allow CO<sup>2</sup>*

1

(c) 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 refer to the information in the [Marking guidance](#), and apply a 'best-fit' approach to the marking.

**0 marks**

No relevant content.

**Level 1 (1-2 marks)**

There is a brief description of at least 1 tissue **or** at least 1 function of an indicated part of the leaf.

The account lacks clarity or detail.

**Level 2 (3-4 marks)**

There is a clear description which includes at least 1 named tissue and at least 1 correct function described for an indicated part of the leaf.

**Level 3 (5-6 marks)**

There is a detailed description of most of the structures and their functions.

**Examples of responses:**

- epidermis
- cover the plant
- mesophyll / palisade
- photosynthesises
- phloem
- xylem
- transport.

**The following points are all acceptable but beyond the scope of the specification:**

- (waxy) cuticle – reduce water loss
- epidermis – no chloroplasts so allows light to penetrate
- stomata / guard cells – allow CO<sub>2</sub> in (and O<sub>2</sub> out) **or** controls water loss
- palisade (mesophyll) – many chloroplasts to trap light  
– near top of leaf for receiving more light
- spongy (mesophyll) – air spaces for rapid movement of gases

6

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8.

(a) (i) 5.0

1

(5 × 0.8) **or** 4

*allow ecf from distance*

1

0.4

*allow ecf from 10-min volume*

1

(ii) increased (rate of uptake)

1

more transpiration / evaporation

1



- (b) correct scales  
*allow reversed axes* 1
- correctly labelled axes with units 1
- correct points  
*one plot error = max 1 mark* 2
- curved line of best fit  
*allow correct straight line* 1

- (c) leaves wilt 1
- because plants lose too much water (by evaporation) 1
- through the stomata  
**or**  
 because cells become plamolysed  
**or**  
stomata close  
 controlled by guard cells  
 to prevent wilting 1

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9.

- (a) Marks awarded for this answer will be determined by the Quality of Communication (QC) as well as the standard of the scientific response. Examiners should also refer to the information in the Marking guidance and apply a 'best-fit' approach to the marking.

**0 marks**

No relevant content.

**Level 1 (1–2 marks)**

The method described is weak and could not be used to collect valid results, however does show some understanding of the sequence of an investigation.

**Level 2 (3–4 marks)**

The method described could be followed and would enable some valid results to be collected, but lacks detail.

**Level 3 (5–6 marks)**

The method described could be easily followed and would enable valid results to be collected.

**Examples of the points made in the response:**

- bean seedlings of same age
- cut material from same part of each organ (for repeats) e.g. top 1 cm of stem / a whole cotyledon / seed
- equal mass of each organ  
*accept weight for mass*
- grind / homogenise
- in equal amounts of water / buffer
- equal volumes of hydrogen peroxide solution
- equal concentrations of hydrogen peroxide solution
- same temperature
- temperature maintained in water bath
- quantitative measure of gas production eg height of foam in mm / collect gas in graduated syringe in cm<sup>3</sup>
- for same time period
- repetitions (3+ times)
- calculate mean for each.

6

(b) (i) correct answer: 40

*1 mark for 45 as the anomalous result has been included in the calculation*

*or*

*1 mark for  $\frac{(38 + 41 + 42 + 39)}{4}$*

*or  $\frac{160}{4}$*

2

(ii) vertical axis correctly labelled:  
'Enzyme activity in arbitrary units'

*allow ecf from (b)(i)*

1

points plotted correctly  $\pm 1$  mm

*deduct 1 mark for each incorrect plot*

2

suitable line of best fit

*not feathery, not point to point*

1

(iii) 6.0 / 6

*allow  $\pm 0.1$*

*if 6.0 not given, allow correct for candidate's graph  $\pm 0.1$*

1

(iv) in range 0 to 14 units

*allow correct for candidate's graph*

1

(v) enzyme denatured / enzyme (active site) shape changed

*allow substrate no longer fits (active site)*

*ignore reference to temperature*

*do not allow enzyme dies*

1

**[15]**