

# MARK SCHEME

# GCSE

## BIOLOGY

## AQA - TRIPLE SCIENCE

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B 1 - TEST 4

CELL BIOLOGY

Intermediate

## Mark schemes

**1.** (a) a fungus

1

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

Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.

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

Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.

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

Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

**Level 0**

No relevant content

### Indicative content

	defence	description of defence
<b>animals</b>	skin  nose  trachea / bronchi  stomach  white blood cells	sebum / oils to kill microbes dead layer difficult to penetrate  hairs keep out dust and microbes  mucus traps microbes cilia moves mucus  (hydrochloric) acid kills bacteria  produces antibodies produces antitoxins engulf microbes / phagocytosis
<b>plants</b>	cell wall  waxy cuticle  dead cells / bark  production of antibacterial chemicals	tough / difficult to penetrate  tough / difficult to penetrate  fall off, taking pathogens with them  kill bacteria
<b>fungi</b>	antibiotic production	kill bacteria

6

- (c) any **three** from:
- sterilise agar (before use)
  - sterilise (Petri) dish before use
  - disinfect bench (before use)
  - pass inoculating loop (through flame)
  - secure lid with (adhesive) tape
  - minimise exposure of agar / culture to air / lift and replace lid as quickly as possible

*allow:*

- *dip loop into ethanol (after flaming)*
  - *keep the lid on the plate for as long as possible*
- or**
- minimise exposure of agar to air*
- or**
- *only tilt the lid off (rather than remove it)*
  - *flame the neck of the bottle*

3

- (d) to prevent the growth of a harmful pathogen

1

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2.

- (a) an undifferentiated / unspecialised cell

1

that can differentiate / become / change into (many) other cell types

1

- (b) (malignant tumours) invade / spread to other tissues via the blood (benign don't)

**or**

(malignant tumours) form secondary tumours in other organs

*ignore cancer unqualified*

*allow converse*

*allow metastasises*

1

- (c) mitosis

*correct spelling only*

1

- (d) glucose

*answers in any order*

*ignore sugar*

1

protein / amino acids

1

(e) no need to wait for a donor  
**or**  
can be done immediately 1

(so) no risk of rejection  
**or**  
no need for immunosuppressant drugs  
*if no other marks awarded, allow for 1 mark idea of ethics  
surrounding the use of tissue from another / dead person* 1

(f) stent opens up the trachea 1

allowing air to flow through  
**or**  
allowing patient to breathe 1

(g) **Level 3 (5-6 marks):**  
A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.

**Level 2 (3-4 marks):**  
Some logically linked reasons are given. There may also be a simple judgement.

**Level 1 (1-2 marks):**  
Relevant points are made. They are not logically linked.

**Level 0**  
No relevant content

### **Indicative content**

#### **embryos advantages**

- can create many embryos in a lab
- painless technique
- can treat many diseases / stem cells are pluripotent / can become any type of cell (whereas bone marrow can treat a limited number)

#### ***embryos disadvantages***

- *harm / death to embryo*
- *embryo rights / embryo cannot consent*
- *unreliable technique / may not work*

**bone marrow advantages**

- no ethical issues / patient can give permission
- can treat **some** diseases
- procedure is (relatively) safe / doesn't kill donor
- tried and tested / reliable technique
- patients recover quickly from procedure

**bone marrow disadvantages**

- *risk of infection from procedure*
- *can only treat a few diseases*
- *procedure can be painful*

**both procedures advantage**

can treat the disease / problem

**both procedures disadvantages**

- *risk of transfer of viral infection*
- *some stem cells can grow out of control / become cancerous*

[16]

3.

(a) any **three** from:

- (water through a) partially permeable  
*accept 'semi permeable' / selectively permeable*
- membrane
- from dilute to (more) concentrated solution  
*allow 'from a high concentration of water to a lower concentration (of water)'*  
*allow 'from high water potential to low water potential'*  
*allow 'down a concentration gradient of water'*  
*do **not** accept 'along a concentration gradient of water'*
- (it's a) passive (process)  
*allow requires no energy*

3

(b) (there are) many hairs **or** thin hairs **or** hairs are one cell thick

1

(which gives) large / increased surface area **or** short diffusion pathway

1

(so there is) more diffusion / osmosis (of water into the root)

*ignore absorption*

1

[6]

4.

- (a) (i) variation in masses / more representative / more typical / more reliable / average / mean / reference to anomalies

**or**

one worm to light to measure change

*do not allow more accurate / more precise*

*ignore fair test / valid / repeatable / reproducible*

1

- (ii) remove solution / liquid (on outside of worm)

*allow 'water'*

1

- (iii) variable amounts removed from each worm

*ignore reference to length of timing*

1

- (iv) equal sizes of worm / more worms (in each group) / wash off all the sand / repeats / use more accurate balance / use smaller concentration intervals

*allow reference to improve blotting technique eg blot before / blot more thoroughly*

1

- (b) (i) different (starting) masses / sizes / weights (at different concentrations)

1

allows comparisons / shows pattern / shows trend

1

- (ii) (+)20

*correct answer = 2 marks, with or without working*

**or**

$$\frac{7.5 \times 100}{37.5} \quad / \quad \frac{7.5}{37.5} \quad / \quad \frac{(45.0 - 1) \times 100}{37.5}$$

*for 1 mark*

2

- (c) (i) graph:

points correct

*allow  $\pm 1$  mm*

*-1 mark per error*

*allow ecf from part b(ii)*

2

label on x-axis including units – ie Concentration of salt in arbitrary units

1

line of best fit = smooth curve / ruled straight line  
*anomaly (4.0, -52) either plotted and ignored re. line  
or not plotted  
do not allow point to point  
allow best fit for ecf from 2bii*

1

(ii) on graph:

ring drawn around point at (4.0, -52)  
*allow (5.0, -50) if cand. line indicates this*

1

(iii) sensible suggestion – eg used wrong solution / used 5.0% instead of 4.0% /  
different length of time in solutions / ref to error in blotting / balance not zeroed /  
error in weighing

*allow some lugworms died  
allow error in calculation*

1

(d) (i) 2.9 to 3.0 / correct for candidate's graph  $\pm 0.1$

1

value of no change in mass / worms in equilibrium with soln / described  
*allow small(est) mass change*

1

(ii) water loss

1

by osmosis / diffusion

1

from dilute region in the worm to more concentrated solution outside

*allow correct description in terms of high to low water concentration  
/ high to low water potential*

*salt solution is hypertonic*

*concentration unqualified = salt concentration*

1

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5.

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

- 6.** (a) 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 one of the stages (pre-inoculation, inoculation, post-inoculation).

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

There is a simple description of at least two stages and an explanation of at least one of them.

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

There is a clear description of all three stages and an explanation of at least two of them.

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

***Pre-inoculation***

- Petri dish and agar sterilised before use
- to kill unwanted bacteria
- inoculating loop passed through flame / sterile swab
- to sterilise / kill (other) bacteria

***Inoculation***

- loop/swab used to spread/streak bacterium onto agar

*Allow other correct methods, eg bacterial lawns*

- lid of Petri dish opened as little as possible
- to prevent microbes from air entering

***Post-inoculation***

- sealed with tape
- to prevent microbes from air entering
- incubate
- to allow growth of bacteria

(b) (i) bacteria killed / destroyed  
*ignore fights / attacks / stops growth / got rid of*

1

(ii) *Might be correct*

largest area / space where no bacteria are growing  
*allow most bacteria killed*

1

*Might not be correct*

(need more evidence as) D may be harmful to people / animals / surfaces  
*ignore ref to cost / dangerous or harmful unqualified*

1

**or** may work differently with different bacteria

**or** disinfectants may be different concentrations

*ignore different amounts of disinfectant unless reference to different drop size*

**or** may not last as long

*ignore take longer to work*

*allow reference to anomalous result or not repeated*

[9]

7.

(a) because water enters (the cell / it / named cell)

*do **not** accept salt / sugar / solution entering*

1

by osmosis / diffusion

*if osmosis / diffusion not given accept concentration inside cell greater than outside cell*

*assume concentration refers to solute concentration unless answer indicates otherwise*

*allow water goes up the concentration gradient*

*allow water goes down its concentration gradient*

*do **not** accept if diffusion of salt / sugar*

1

through a partially permeable membrane

*allow semi / selectively permeable membrane **or** description*

1

(b) (plant cells) have (cell) wall

*accept animal cells have no (cell) wall*

*ignore reference to cell membrane*

*do **not** accept reference to other organelles **or** any implication that animal cells have a cell wall eg plant cells have a thicker cell wall*

1

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