

AQA GCSE Biology Topic 1 Test 1 Mark scheme

Q1.

- (a) any **two** from:
- (microscope) slide
 - cover slip
 - dye / stain
allow named dye / stain
ignore water
 - (mounted) needle
 - pipette / dropper
 - scalpel
ignore knife
 - forceps / tweezers
allow swab (to collect cells)
- 2
- (b) eyepiece / lens
do not accept objective lens
- 1
- (c) to focus (the image / cells)
allow to make the cells / image clear(er)
allow to improve resolution (of the image)
ignore to move the stage up / down
do not accept reference to magnification
- 1
- (d) any **one** from:
- no cells in the field of view
 - slide not in the correct position
 - mirror not in correct position
allow light / microscope not switched on / plugged in
 - (objective) lens not clicked into place
or
(objective) lens dirty
 - (student is) looking at a (large) air bubble
 - (the microscope is) not focussed
allow student did not stain the cells
allow idea of magnification not being high enough
- 1
- (e) **Level 2:** Scientifically relevant features are identified; the way(s) in which they are similar/different is made clear and (where appropriate) the magnitude of the similarity/difference is noted.

4-6

Level 1: Relevant features are identified and differences noted.

1-3

No relevant content

0

Indicative Content

Differences:

- red blood cell has no nucleus **or** plant cell has a nucleus
- red blood cell has no cell wall **or** plant cell has a cell wall
- red blood cell is a biconcave disc **or** there are many different shapes of plant cell
- red blood cell contains haemoglobin **or** plant cells do not contain haemoglobin
- red blood cells do not contain chlorophyll **or** plant cells (may) contain chlorophyll
- red blood cell has no chloroplasts **or** plant cell has chloroplasts
- red blood cell has no (permanent) vacuole **or** plant cell has (permanent) vacuole
- red blood cells are (much) smaller than plant cells

Similarities:

both have:

- cytoplasm
- cell membrane
- pigments (although they are different)

ignore references to mitochondria and ribosomes

for **Level 2**, consideration of both red blood cells and plant cells is required.

(f) water enters (the cells) by osmosis / diffusion

*allow water enters **and** the cell starts to swell*

ignore explanations of osmosis

1

plant cell has a cell wall (which prevents it from bursting)

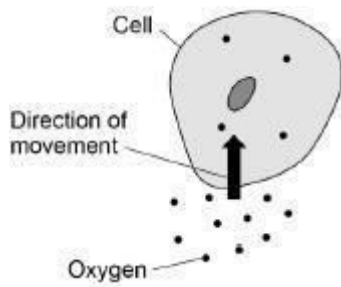
allow red blood cell has no cell wall (so it swells and bursts)

1

[13]

Q2.

(a)



1

(b) water

in this order only

1

mineral ions

allow minerals / ions

1

energy

1

(c) root hair (cell)

ignore root / hair unqualified

1

(d) large surface / area

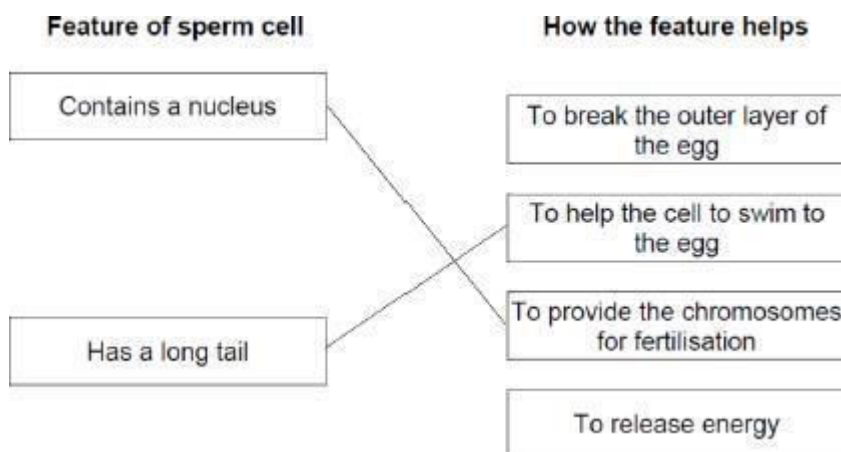
allow it has a long projection

allow the walls are thin

allow it has lots of mitochondria

1

(e)



1

do **not** accept more than one line from a box on the left

1

(f) nerve (cell)

allow neuron(e)

ignore motor / sensory / relay

1

any **one** from:

- long
- has branches
- has insulation

allow myelin / fat

1

[10]

Q3.

(a) any **two** from:

- sterilise equipment / surfaces (before use)
- (use) sterilised agar

ignore 'clean' unqualified

ignore wash hands

allow description of how to sterilise equipment

allow description of how to sterilise agar

- secure lid of the Petri dish with (adhesive) tape
- only lift lid of Petri dish a little (when setting up plate) **or** lift lid of Petri dish at an angle (when setting up plate)

2

(b) B

and

it kills the fewest
bacteria **or**

it has the smallest area where no bacteria were growing

allow it has the smallest clear / white area

an incorrect answer for one step does not prevent allocation of marks for subsequent steps

ignore calculation and subtraction of filter paper disc area from total area

1

(c) (correct measurement)

Note: In Exampro, the measurement of 1.1 cm or 2.2. cm will depend on the printing of the exported diagram and should therefore be checked by the teacher/student using this mark scheme.

$r = 1.1$ (cm)

or

$r = 11$ (mm)

allow $d = 2.2$ (cm)

or

$d = 22$ (mm)

allow a tolerance of ± 1 mm

1

(recall of the equation)

πr^2

1

(calculation/substitution)

3.14×1.1^2

or

3.14×11^2

*allow correct calculation / substitution
using an incorrect measurement*

1

= 3.799(4) (from 3.14×1.1^2)

or

= 379.9(4) (from 3.14×11^2)

allow 3.8 allow

380

1

correct unit

(3.7994) cm^2

or

(379.94) mm^2

*do **not** accept unit with no attempt at
working / answer*

1

(d) any **one** from:

- repeat **and** calculate a mean
- repeat **and** eliminate anomalies
- use a control disc

*allow description of control disc e.g.
disc with water / nothing ignore set up a
control*

- use different types of bacteria

1

[9]

Q4.

(a) A

1

(b) chloroplast(s)

ignore chlorophyll

1

(c) guard (cells)

ignore stoma(ta)

1

(d) transpiration stream

ignore transpiration unqualified

- (e) increased humidity 1
- (f) **Level 2:** Scientifically relevant features are identified; the way(s) in which they are similar/different is made clear and (where appropriate) the magnitude of the similarity/difference is noted. 1

Level 1: Relevant features are identified and differences noted. 1–3 4–6

No relevant content. 1–3

Indicative content:

Structure

- xylem is made of dead cells
and
phloem is made of living cells
- phloem cells have pores in their end walls
and
xylem cells do not have pores in their end walls
- xylem is hollow **or** xylem does not contain cytoplasm
and
phloem contains cytoplasm
- xylem contains lignin
and
phloem does not (contain lignin)
- both made of cells
- both tubular

Function

- xylem transports water / mineral ions
and
phloem transports (dissolved) sugars
- xylem is involved in transpiration
and
phloem is involved in translocation
- xylem transports unidirectionally
and
phloem transports bidirectionally
- both transport liquids / substances throughout the stem / leaves / roots / plant

For **Level 2**, students must refer to both structure and function of xylem and phloem tissue.

- (g) (*correct division*)
40 ÷ 7 (in hours) **or**
40 ÷ 420 (in minutes)

allow correct answer from student's readings throughout

1

5.71 (in hours)

or

0.0952...(in minutes)

allow correct division from incorrect reading(s) from the tangent

1

(correct conversion to minutes)

0.0952...

allow correct conversion at any point in the calculation

allow correct conversion of calculated value to minutes

1

(answer in standard form)

$9.5(238) \times 10^{-2}$

allow correct conversion of calculated value to standard form

1

(h) (less water loss at night)

allow converse if clearly describing 12:00

stomata are (almost completely) closed

1

(because) it's cooler / colder

or

(because) there's less / no light

ignore it's dark at night

1

[17]

Q5.

(a) bacterium

1

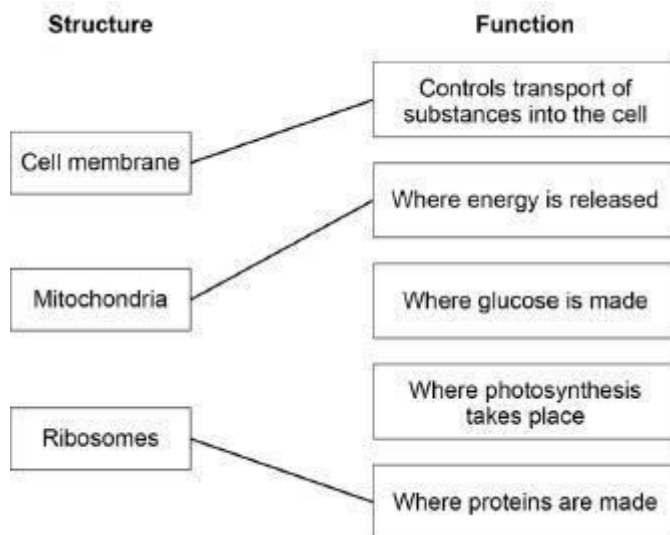
(b) to strengthen the cell

1

(c) chloroplast

1

(d)



additional line from a box on the left negates the mark for that box

3

(e) adjust the focus knob

1

(f) (A =) 15 (mm)

allow a tolerance of ± 1mm

1

(B =) 60 (mm)

1

(g)

$$\frac{60}{15} = 4(.0)$$

allow ecf from question (f)

1

(h)

$$\frac{40}{0.1}$$

1

400

do not accept if a unit is given

1

[12]

Q6.

(a) any **two** from: (both have)

- cytoplasm
- (cell) membrane
- DNA / genetic material

ignore reference to shape

- allow RNA*
ignore genetic information

 - ribosomes
 - if no other mark awarded allow sub-cellular structures for 1 mark*
 - if no other mark awarded allow correct cellular process, e.g. respiration for 1 mark*

2

- (b) any **three** from:
 - allow converse for eukaryotic cells*
 - allow reference to bacterium instead of prokaryotic cell*
 - ignore reference to features not shown in the diagram*
 - prokaryotic cell is smaller
 - prokaryotic cell has no mitochondria
 - prokaryotic cell has no nucleus
 - or** DNA is free in the cytoplasm
 - or** genetic material is free in the cytoplasm
 - if neither mark awarded, allow prokaryotic cell has no membrane-bound organelles*
 - ignore genetic information*
 - prokaryotic cell has a single loop of DNA
 - or** prokaryotic cell has a single loop of genetic material
 - ignore genetic information*
 - prokaryotic cell has plasmids
 - ignore circular / rings of DNA*
 - allow prokaryotic cells have smaller ribosomes*

3

- (c) 1 μm = 0.001 mm **or**
1 mm = 1000 μm **or**
0.05 mm = 50 μm
or 0.05 \times 1000

1

- (1:) 50
 - do not accept if a unit is given*

1

- (d) mitosis
 - correct spelling only*

1

- (e) 35%

1

- (f) (stage 1)

DNA / chromosomes replicate / duplicate

ignore names of the stages of the cell cycle

ignore genetic material ignore DNA / chromosomes double / reproduce

1

mitochondria / ribosomes / sub-cellular structures increase in number **or**
mitochondria / ribosomes / sub-cellular structures replicate

allow cytoplasm increases

ignore cell grows unqualified

1

(stage 2)

one set of chromosomes is pulled / moved to each end of the cell

allow one of each chromosome is pulled

/ moved to each end of the cell

ignore nucleus divides

1

(stage 3)

the cytoplasm **and** cell membrane divides (to form two cells)

*allow cytoplasm divides **and** (new) cell*

membranes form ignore nucleus divides

1

[13]

Q7.

(a) controls the (activities of the) cell

allow contains genetic information / genes / DNA / chromosomes

*do **not** accept brain*

*do **not** accept controls substances entering / leaving the cell*

1

(b) red blood cell / RBC

allow erythrocyte

ignore blood cell unqualified

ignore platelets

or

bacteria / prokaryote

allow named examples of bacteria

*do **not** accept virus*

or

xylem (cell)

1

(c) cell shape is similar to cell in **Figure 1 and** nucleus present

ignore shading

*do **not** accept a cell wall drawn*

1

AQA Biology GCSE - Cell Structure

any **two** features correctly identified and labelled:

- nucleus
- (cell) membrane
- cytoplasm
- mitochondria / mitochondrion
- ribosome(s)
allow cell wall if drawn and correctly labelled
do not accept other plant sub-cellular structures

1

(d) any **one** from:

- (cellulose cell) wall
- chloroplast
ignore chlorophyll
- (permanent) vacuole
allow starch grain

1

(e)

an answer of (×) 400 scores 3 marks
an answer of (×) 40 scores 2 marks

24 (mm) **or** 2.4 (cm)

allow in range 23 to 25 (mm) or in range 2.3 to 2.5 (cm)

1

$$\frac{24}{0.06}$$

or

$$\frac{2.4}{0.06}$$

allow correct calculation from their measurement of X to Y in the range 2.3 cm to 3.5 cm or 23 mm to 35 mm

1

(×) 400

allow correct magnification derived from their measurement in mm
ignore rounding errors

1

(f) high(er) magnification

ignore bigger / zoom
if neither mark awarded allow 1 mark for see smaller objects or see smaller sub-cellular structures

1

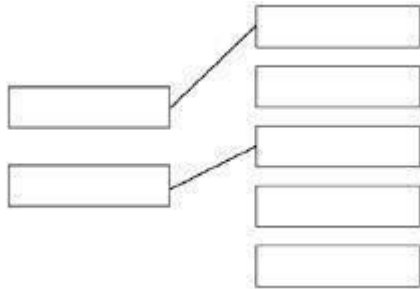
high(er) resolution **or** high(er) resolving power

allow see more detail
if neither mark awarded allow 1 mark for
see smaller objects or see smaller
sub-cellular structures
allow 3D image

1
 [10]

Q8.

(a)



additional line from a level of
organisation negates the mark for that
level of organisation

2

(b) palisade mesophyll

1

(c) $\frac{50}{8}$

1

6 / 6.25 / 6.3 (micrometres)

1

an answer of 6 / 6.25 / 6.3 scores 2 marks

(d) they have no chloroplasts / chlorophyll
allow they are underground
allow they don't get (access to) light
allow (because) photosynthesis needs light
allow they can't absorb light
ignore 'sun'
ignore 'it is dark'

1

(e) differentiation

1

(f) to protect endangered plants from extinction

1

(g) plants can be produced quickly

1

- (h) any **one** from:
- glucose / sugars / starch
 - amino acids / protein
 - hormones
allow named hormones e.g. auxin
 - ions / minerals
allow magnesium / nitrate
 - vitamins
allow named vitamins e.g. vitamin B
 - water
allow H₂O / H2O
ignore oxygen / carbon dioxide / agar / nutrients / fertiliser

1
[10]

Q9.

(a)

x	✓	✓
✓	x	✓

1 mark for each correct row if no other marks awarded allow a mark for one correct column

2

(b) a bacterial cell

1

(c) make / synthesise / produce protein
allow produce enzymes

1

(d) 0.0015 (mm)
allow 1.5×10^{-3} (mm)

1

(e) mitochondria are longer / bigger (than the cell)
allow too big

1

(f)

2₄

an answer of 16 scores 2 marks
allow $2 \times 2 \times 2 \times 2$ or a correct list showing doubling at each time interval

1

16

allow 90 mins = 8 for 1 mark

1

- (g) (number of live cells / bacteria) stays level / the same until 11 hours
answer must refer to number of live cells / bacteria
(not the shape of the graph)
allow (number of cells / bacteria) is very low until 11
hours allow number in the range 10-11 hours 1
- then (number of live cells / bacteria) increases rapidly to 2.5×10^8
or
 from 11 hours to 14.5 hours
allow (then) increases exponentially 1
- then (number of live cells / bacteria) stays at 2.5×10^8
allow (number of live cells / bacteria) stays the
same for the next 5 hours
or
 stays the same from 15 to 20.5 hours
if no other mark awarded allow for 1 mark the idea
that the graph is level, then increases, then levels
off again 1
- (h) any **one** from:
- lack of food / nutrients / oxygen / space
or
 competition for space
 - build-up of toxins
allow ethanol
 - temperature too high
- 1
[12]

Q10.

- (a) electron (microscope) 1
- (b) $\frac{30000}{200}$
an answer of 150 (μm) scores 2 marks 1
- 150 (μm)
if answer is incorrect allow for 1 mark sight of 0.015
/ 0.15 / 1.5 / 15
allow ecf for incorrect measurement of line X for
max 1 mark 1
- (c) **either**
 large surface area

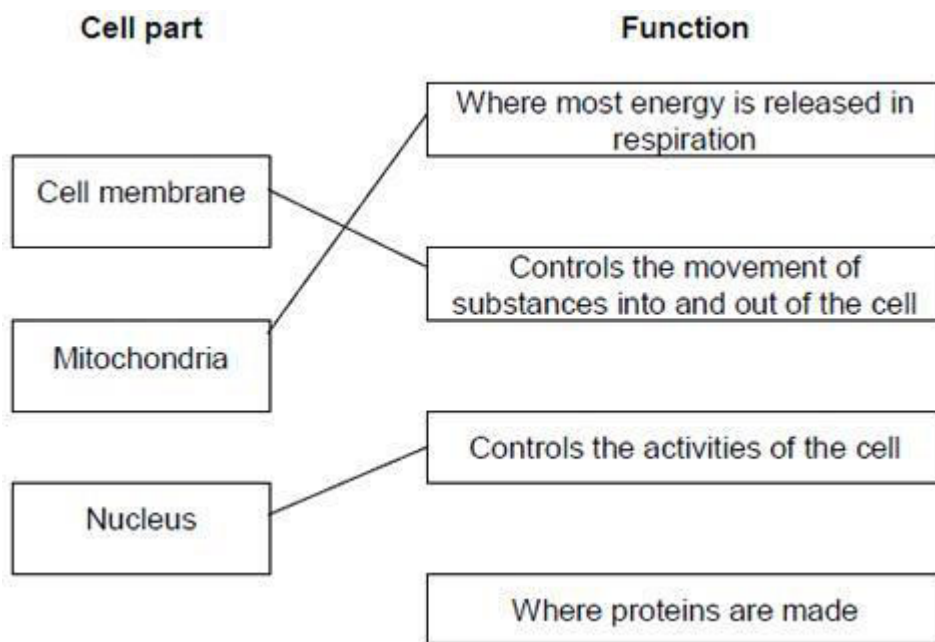
- allow (vacuole contains) cell sap that is more concentrated than soil water (1)* 1
- for more / faster osmosis
create / maintain concentration / water potential gradient (1)
- or**
- allow thin (cell) walls
for short(er) diffusion distance 1
- (d) (on hot day) more water lost
allow converse for a cold day if clearly indicated 1
- more transpiration
or
more evaporation 1
- so more water taken up (by roots) to replace (water) loss (from leaves) 1
- (e) (aerobic) respiration occurs in mitochondria
do not accept anaerobic respiration 1
- (mitochondria / respiration) release energy
do not accept energy produced / made / created 1
- (energy used for) active transport 1
- to transport ions, against the concentration gradient
or
from a low concentration to a high concentration 1
- [12]

Q11.

- (a) nucleus labelled correctly 1
- cell membrane labelled correctly 1
- (b) mitosis 1
- (c) electron (microscope)

- (d) higher magnification 1
- (e) 45 (mm) 1
- 45 / 250 or 0.18 (mm)
allow ecf 1
- 180 (µm) 1
- allow 180 (µm) with no working shown for 3 marks*
- (f) 0.2 µm 1
- [9]**

Q12.



- (a) *extra lines cancel* 3
- (b) Cell wall 1
- in either order*
- Chloroplast 1
- allow (permanent) vacuole*
- [5]**