

GCSE

BIOLOGY

AQA - COMBINED SCIENCE

MARK SCHEME

B1

CELL BIOLOGY

TEST 2

Mark schemes

1

(a) contract / shorten

ignore relax
*do **not** allow expand*

1

to churn / move / mix food

accept peristalsis / mechanical digestion
ignore movement unqualified

1

(b) 400

acceptable range 390-410
allow 1 mark for answer in range of 39 to 41
allow 1 mark for answer in range of 3900 to 4100

2

(c) to transfer energy for use

allow to release / give / supply / provide energy
*do **not** allow to 'make' / 'produce' / 'create' energy*
allow to make ATP
ignore to store energy

1

by (aerobic) respiration **or** from glucose

*do **not** allow anaerobic*
*energy released **for** respiration = max 1 mark*

1

(d) (i) to make protein / enzyme

ignore 'antibody' or other named protein

1

(ii) too small / very small

allow light microscope does not have sufficient magnification / resolution
allow ribosomes are smaller than mitochondria
ignore not sensitive enough
ignore ribosomes are transparent

1

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2

(a) cell membrane

extra ticks negates marks

1

- (b) engulf pathogens 1
- produce antibodies 1
- produce antitoxins 1
- extra ticks negates marks*
- (c) 2050 – 100 1
- = 1950
- allow 1 mark for a correct subtraction of incorrect values*
- an answer of 1950 scores 2 marks* 1
- (d) any **one** from:
- (more) people vaccinated
 - ignore injections / treatments / medicines unqualified*
 - allow vaccine produced*
 - allow (more people given) MMR (vaccine)*
 - do **not** allow antibiotics*
 - ignore less people infected*
 - (more) people immune
 - no new measles strain
- 1
- (e) any **one** from:
- measles is (caused by) a virus
 - allow measles is not caused by a bacterium*
 - viruses cannot be killed / destroyed by antibiotics
 - allow antibiotics **only** kill / destroy bacteria*
 - ignore harmed / treated*
- 1
- (f) any **one** from:
- use of a barrier method of contraception
 - ignore use of diaphragm*
 - use of a condom
 - ignore use protection / safe sex*
 - vaccination / immunisation
 - avoid sexual intercourse / contact
 - do **not** accept less sexual intercourse / contact*
- 1

- (g) any **one** from:
- size / shape/ type of paper disc
ignore paper disc unqualified
 - concentration of antibiotic
allow strength / dosage of antibiotic
 - volume / amount of antibiotic
 - (incubation) time
allow 3 days
 - (incubation) temperature
ignore size of petri dish

1

- (h) to check that the disc / water did not have an effect
or
to make sure it was the antibiotic that had an effect
allow for comparison with the antibiotics
allow as a (experimental) control
*do **not** accept as a control variable*

1

- (i) (antibiotic) **A**
no marks if wrong antibiotic given

1

any **one** from:

- (antibiotic **A**) had the **largest** clear area around it
- (antibiotic **A**) killed the **most** bacteria

1

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3

- (a) any **one** from:
- water on potato would increase mass
allow so only the mass of the potato is measured
 - to control amount of water on potato
allow to remove water from outside of potato
allow liquid / solution / sugar solution for water
allow so you get the correct (starting) mass of the potato
*do **not** accept so that all the pieces of potato weighed the same*

1

- (b) increase in mass

1

increase in length

1

extra ticks negates marks

(c) osmosis

allow diffusion

1

into

allow inside

do not accept through

1

lower

allow low / more dilute / dilute

1

in this order only

(d) any **one** from:

- the concentration (of sugar solution) in the cells is 0.4 (mol/dm³)
- the concentration (of sugar solution) in the cells is the same as the solution (in the tube)

1

allow reference to potato instead of cells

(e) any **two** from:

- has (root) hairs

allow root hair cells

- large surface / area

allow wide surface area

- (root) hairs extend into soil

allow (root) hairs are long / widespread

- (root) hairs have thin walls

2

ignore references to active transport and mineral uptake

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4

(a) to control for the starting mass (of the pieces of carrot)

allow because the pieces of carrot were not all the same mass at the start

do not accept were not all the same size

do not accept as a control variable

1

- (b) suitable scale **and** label for y-axis
allow 5 or 6 per 2 cm
*do **not** accept 5 per 1 cm*

1

all points plotted correctly
allow $\pm \frac{1}{2}$ a square
allow 1 mark for 4 correct points

2

line of best fit

conc. ...	percentage (%) change...
0.0	+24
0.2	+12
0.4	+1
0.6	-8
0.8	-15

1

- (c) value from student's line of best fit
allow $\pm \frac{1}{2}$ a square

1

(d) mass decreased

1

(due to) **loss of water** by **osmosis**

ignore diffusion

1

through a partially / selectively / semi permeable membrane

1

*a clear reference to concentration of water or
concentration of sugar is required for the fourth mark*

(as) concentration of sugar solution is greater than concentration of sugar (solution)
inside cells / carrot

*allow (as) concentration of sugar solution inside cells /
carrot is lower than the concentration of sugar solution
(in the tube or around the carrot)*

or

(as) the concentration of water is less outside the cells / carrot than the concentration
inside the cells / carrot

*allow answers in terms of dilute and concentrated
solutions*

1

(e) the (partially permeable / cell) membrane was damaged

*allow idea that cell membrane is no longer intact
or is more permeable / leaky*

allow the membrane is denatured

ignore cells are dead

1

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5

(a) any **one** from:

- meristem(s)
- **tip** of shoot
ignore stem and embryo
- **tip** of root

1

(b) to produce large numbers of identical plants

1

(c) 6×10^{-12} (grams)

1

(d) $\frac{28}{360} \times 15$

or

1.166666666(r)

allow $\frac{7}{90} \times 15$

allow correct rounding

allow 1.16

1

1.17 (hours)

allow **1** mark for 1 hour 10 minutes **or** 1 and 1/6 hours
or 70 minutes **only** if units given

1

an answer of 1.17 (hours) scores **2** marks

(e) **stage 1**

cell growth

or

increase in number of organelles

allow increase in named organelle e.g. ribosomes /
mitochondria

1

DNA replicates*

or

two copies of each chromosome form*

*allow DNA duplicates / doubles

*ignore genetic information replicates

*if this statement given as part of stage 2 allow **max 4**
marks

1

stage 2 / mitosis

one set of chromosomes moves to each end of cell

allow chromosomes separate or are pulled apart

1

nucleus divides

allow nucleus splits into two

1

stage 3

cytoplasm / cell membrane divides to form two (genetically) identical cells

allow cytokinesis

1

max 4 if correct sequence but no reference to stage
numbers

max 4 marks if no stage numbers given

ignore names of phases

marks can be awarded for labelled diagrams

(f) any **two** from:

advantages:

- may be used to cure / treat (current / future) diseases
or
cure medical conditions
or
produce replacement cells / tissues / organs
allow example e.g. diabetes / paralysis
ignore used for medical treatments
- cells / tissues of any type could be produced
allow cells differentiate into many types
- cells / tissues of any type could be produced
ignore identical cells are produced unqualified
- many cells produced
- cells produced could be used for research
- would reduce waiting time for organ transplants

2

any **two** from:

ignore references to cost
ignore unethical unqualified
ignore references to religion / beliefs

disadvantages:

- potential life is killed / destroyed
allow embryo is destroyed
ignore cells destroyed or wasted
- shortage of donors / eggs
- egg donation / collection has risks
- do not yet know risks /side effects of the procedure on the patient
allow may cause tumours / cancer
- may transfer (viral) infection
- poor success rate to produce viable eggs / embryo

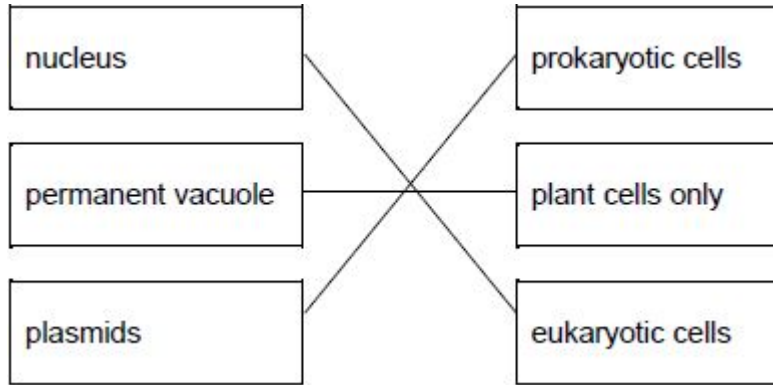
2

ignore references to cost

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6

(a)



allow 1 mark for one or two correct links

2

(b)

vacuole	ribosome	cell wall
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tick box takes precedence

if no tick is given, look at both the figure and the circling of words in the table

if writing is seen on the figure and in the table both must be correct

1

(c) turn the (fine focusing) knob until the cells are in focus

allow focus it

do **not** accept increase magnification

ignore decrease magnification

ignore clear

ignore references to resolution / illumination

ignore zoom in / out

1

(d) (rotate the) nosepiece / objective lens

allow change the (objective / eyepiece) lens

1

to a higher power (lens)

allow (to) increase the magnification

a comparator is required

ignore change / adjust the magnification

allow stronger or more powerful lens

ignore references to resolution / illumination unqualified

ignore zoom in / out

ignore references to an electron microscope

1

- (e) conversion of units:
 (112 mm →) 112 000 (μm)
or
 (280 μm →) 0.28 (mm)

1

$$(\text{magnification} =) \frac{112}{0.28}$$

or

$$(\text{magnification} =) \frac{112000}{280}$$

allow 1 mark for no conversion of units 112 / 280

or

incorrect value from step 1 correctly substituted

1

400 (x)

*do **not** accept if units are given*

if no other mark scored allow 1 mark for:

$$\text{magnification} = \frac{\text{size of image}}{\text{size of real object}}$$

a triangle with words or letters in is insufficient, as the correct rearrangement is needed

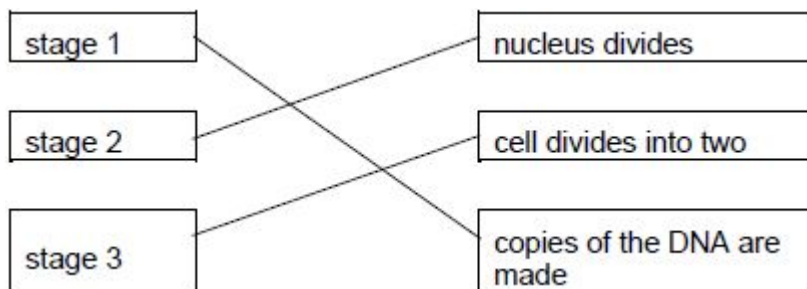
1

an answer of 400 (x) scores 3 marks

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7

(a)



allow 1 mark for 1 or 2 correct

credit can be given where students have matched the boxes correctly, for example numbering the boxes

2

(b) 6 picograms

1

(c) meristem cells in plants can differentiate throughout the life of the plant

1

(d) any **two** from:

- may cure / treat diseases
or
cure medical conditions
or
produce replacement cells / tissues / organs
allow example e.g. diabetes / paralysis
allow cells can be stored for future use
ignore used in medical treatments
ignore patient makes / grows cells / tissues / organs
- cells unlikely to be **rejected** by patient)
ignore same genetic information
- cells / tissues of any type can be produced
ignore differentiated into most types of cells
- many cells produced
- cells produced could be used for research
- would reduce waiting time for transplants

2

ignore references to cost
ignore all reference to producing babies / IVF

(e) any **two** from:

- (potential) life is killed / destroyed
allow embryo is killed
ignore embryo is destroyed
ignore embryo is a life / becomes a baby
- shortage of donors / eggs
- egg donation / collection has risks
- do not yet know risks / side effects of the procedure on the patient
ignore long term effects are not well understood
allow may cause tumours / cancer
- may transfer (viral) infection
- poor success rate
allow in terms of viable egg / embryo / cell / tissue / organ production

2

ignore references to cost
ignore unethical unqualified
Ignore reference to religion / beliefs

[8]