Mark schemes

Q1.

(a) (i) (cell) membrane

1

(ii) vacuole

1

(b) any **two** from:

- (cell) wall
- chloroplast(s)
  ignore chlorophyll
- vacuole
  ignore cell sap

2

(c) diffusion

1

[5]

Q2.

(a) A

1

(b) (i) diffusion

1

(ii) respiration

1

(iii) mitochondria

1

(iv) photosynthesis

1

[5]

Q3.

(a) (i) root hair

1

(ii) any **two** from:
ignore food

- water
- ions / minerals / nutrients / salts / correct named eg nitrates
  ignore N,P,K
- oxygen

2

(b) (i) stomata

1

(ii) diffusion

1

[5]

Q4.

(a) (i) 0

1

(ii) osmosis

1

(b) 0.5

1

no change in mass / weight

allow 'chip / it stays the same'

1

or

no (net) osmosis / same amount of water in <u>and</u> out

(c) repeat / use more chips in each solution

allow use of other people's results

*do **not** allow 'get more results' unqualified*

*do **not** allow leave longer / use more concentrations / better instrumentation*

1

[5]

Q5.

(a) **A** nucleus

1

B (cell) membrane

1

C cytoplasm

1

(b) any **two** from:

- (contain mitochondria
- many (mitochondria)
- respiration (occurs in mitochondria)

2

[5]

Q6.

(a) (i) C and D

1

(ii) cell wall

1

(b) (i) A

1

(ii) D

1

(c) respiration

1

[5]

Q7.

(a) B

1

(b) D

1

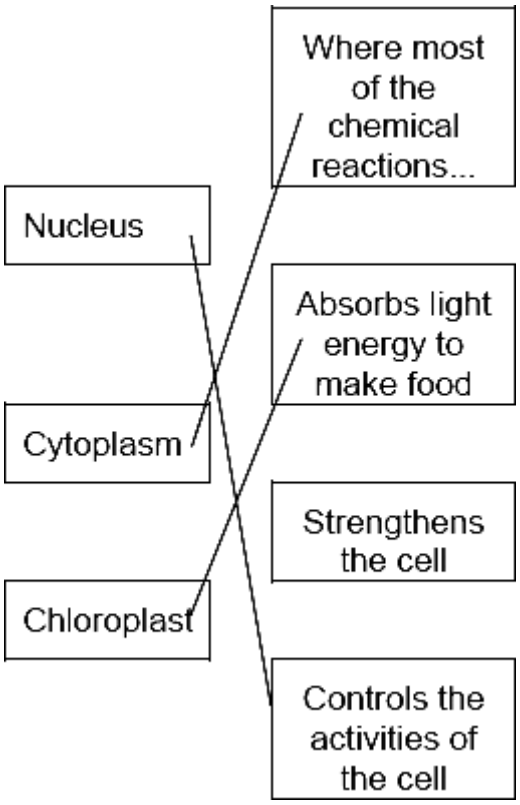
(c) A

1

[3]

Q8.

(a)



***1** mark for each correct line*
mark each line from left hand box
two lines from left hand box cancels mark for that box

3

(b) energy

1

[4]

Q9.

(a) (i) diffusion

1

(ii) A

1

(b) (i) osmosis

1

(ii) R

1

[4]

Q10.

(a) (i) A = cytoplasm

1

B = (cell) membrane

1

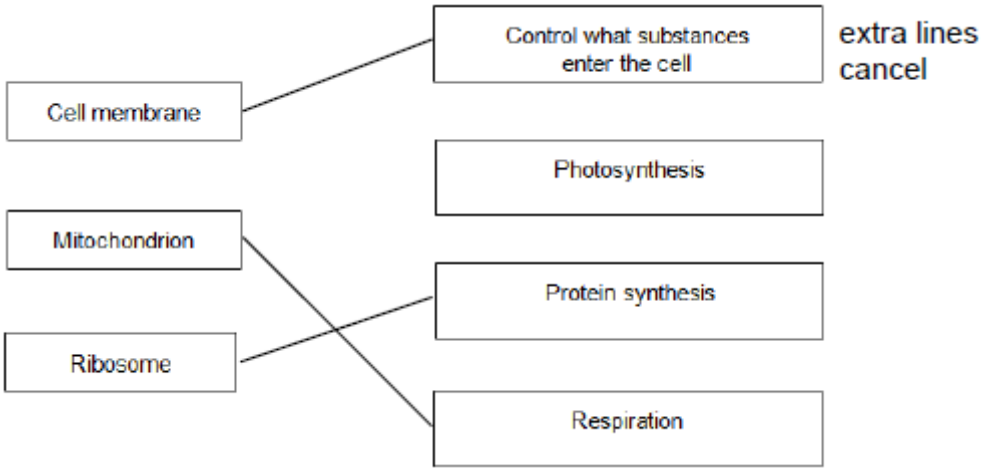
(ii) nucleus

accept chromosome / DNA / genes

accept phonetic

1

(b)

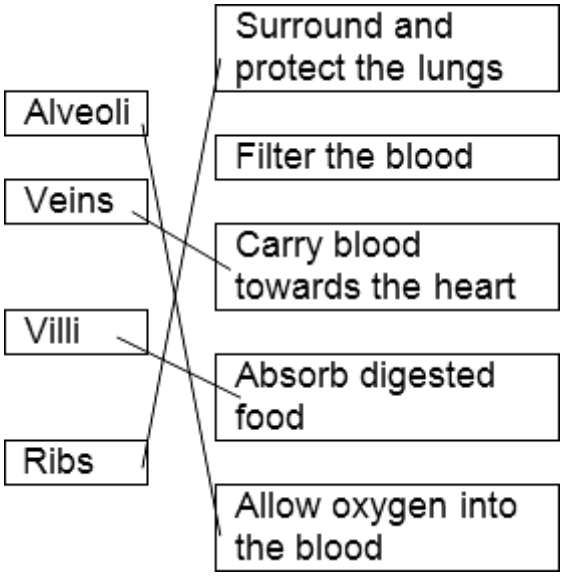


3

[6]

Q11.

(a)



*4 correct = **4** marks*
*3 correct = **3** marks*
*2 correct = **2** marks*
*1 correct = **1** mark*
extra line from a structure cancels the mark

4

(b) diffusion

1

[5]

Q12.

(a) (i) A = nucleus

1

B = (cell) membrane

1

(ii) any **two** from:

ignore shape

- no (cell) wall
- no (large / permanent) vacuole
- no chloroplasts / chlorophyll

2

(b) because high to low oxygen / concentration **or** down gradient

allow 'more / a lot of oxygen molecules <u>outside</u>'
ignore along / across gradient

1

(c) a tissue

1

[6]

Q13.

(a) *comparisons are **not** required but should be credited*

accept a clear indication of the statement even if incomplete

can develop into most other types of cell

1

each cell divides every 30 minutes

1

low chance of rejection by the patient's immune system

1

(b) any **three** from:

- cheaper / <u>only</u> costs £1000
  *this **must** be comparative*
  ignore costs £1000
- can collect many (stem) cells
- adults give permission for their own bone marrow to be collected
  comparisons are not required but should be credited
- safe

3

[6]

Q14.

(a) (i) **A** − (cell) wall

1

B − cytoplasm

1

C − plasmid

1

(ii) bacterium cell has cell wall / no nucleus / no mitochondria / plasmids present

accept its DNA / genetic material is not enclosed / it has no nuclear membrane

it = bacterium cell

accept converse for animal cell

ignore flagella

1

(iii) any **one** from:

- chloroplast
  ignore chlorophyll
- (permanent) vacuole

1

(b) (Long tail) moves the sperm / allows the sperm to swim

1

towards the egg

allow correct reference to other named parts of the female reproductive system

1

(Mitochondria) release <u>energy</u> (for movement / swimming)

allow supply / produce / provide

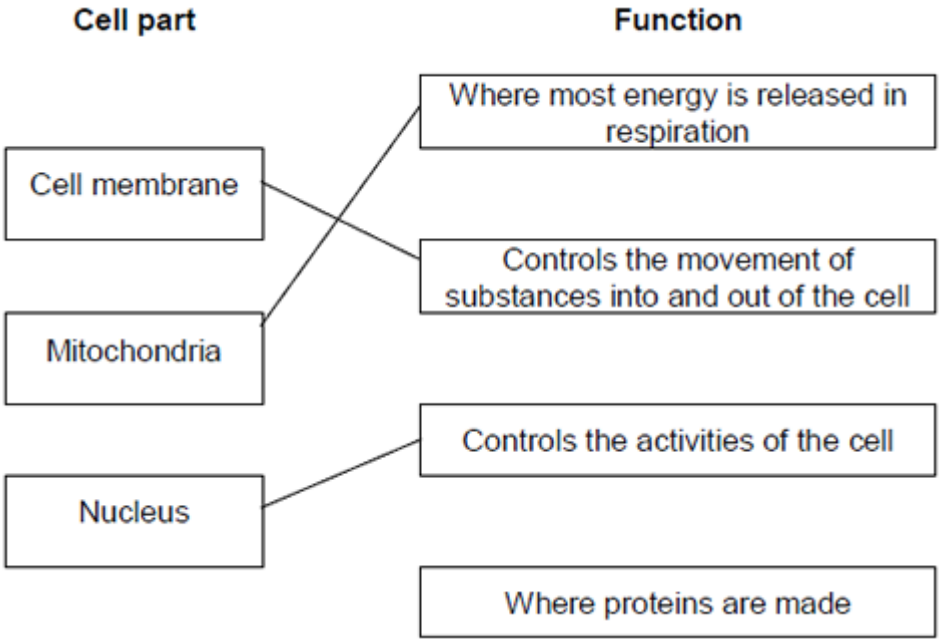
1

in respiration

1

[9]

Q15.



(a)

extra lines cancel

3

(b) Cell wall

in either order

1

Chloroplast

allow (permanent) vacuole

1

[5]

Q16.

(a) (i) diffusion

apply list principle

1

(ii) **A**

apply list principle

1

(b) (i) osmosis

apply list principle

1

(ii) **R**

apply list principle

1

[4]

Q17.

(a) (i) **C** and **D**

no mark if more than one box is ticked

1

(ii) any **one** from:

*do **not** allow if other cell parts are given in a list*

- (have) cell wall(s)
- (have) vacuole(s)

1

(b) (i) **A**

apply list principle

1

(ii) **D**

apply list principle

1

(c) respiration

apply list principle

1

[5]

Q18.

(a) osmosis

1

partially permeable

1

(b) (i) any **two** from:

allow correct answers in terms of A

- vacuole is small(er)
- cytoplasm has shrunk

  allow cytoplasm is smaller
- gap between cytoplasm and cell wall
- cell wall curves inwards

  allow cell B is flaccid or cell A is turgid
- the (cell) membrane has moved away from the wall

2

(ii) any **one** from:

- water will move / diffuse in
- (cells) will swell
- (cells) will burst

  ignore turgid

1

(c) villi give the small intestines a large surface area

1

villi have many blood capillaries

1

[7]

Q19.

(a) **A** = nucleus

allow phonetic spelling

1

B = (cell) membrane

1

(b) for repair / growth **or** to replace cells

ignore new cells / skin

1

(c) (i) embryos

1

(ii) paralysis

1

[5]

Q20.

(a) (i) water / H_2O

accept oxygen

allow H_2O

*do **not** allow H^2O or H2O*

1

(ii) the mineral ions are absorbed by active transport

1

the absorption of mineral ions needs energy

1

(iii) have (many root) <u>hairs</u>

1

(which) give a large surface area (for absorption)

1

(b) carbon dioxide in
or
oxygen out
or

control water loss

accept gas exchange

ignore gases in and out

ignore gain / lose water

1

(c) (i) guard cells

1

(ii) (stomata are) closed

allow there is no gap / space

1

(iii) plant will wilt / droop

ignore die

1

[9]

Q21.

(a) the movement of particles from a high concentration to a low concentration

1

(b) (gills) have (many) projections

allow description of projections
allow have lots of / five gills

1

(for) large(r) surface / area

or

(gills) are on the outside of the body (1)

for good access to water (1)

1

(c) differentiation

1

(d) mitosis

*do **not** accept meiosis*

1

(e) hair

1

(f) axolotls are cheap to feed

1

axolotls are easy to breed

1

(g) D

1

(h) trachea

allow windpipe
allow cartilage (ring)

1

(i) pulmonary artery

1

[11]

Q22.

(a) 300

1

(b) suitable scale on *y*-axis

1

label *y*-axis

1

4 bars drawn correctly

*allow **1** mark for 3 correct bars*

2

(c) increases from 50 to 500

1

then decreases from 500 to 0

1

(d) carbohydrates broken down / digested into sugars

1

broken down by carbohydrase or amylase

1

(e) absorption of glucose

1

into blood

1

by active transport

allow diffusion

1

[12]

Q23.

(a) nucleus labelled correctly

1

cell membrane labelled correctly

1

(b) mitosis

1

(c) electron (microscope)

1

(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]

Q24.

(a) movement of particles from (an area of) high concentration to (an area of) low concentration

allow movement of particles down a concentration gradient

*do **not** accept along / across a concentration gradient*

1

(b) oxygen

allow O_2

carbon dioxide

allow CO_2

in this order only

*both needed for **1** mark*

1

(c) less diffusion

allow less gas will enter / leave the blood

allow ecf from (b)

1

(because of the) reduced / smaller surface area

1

(d) (**B**) very low birth mass

1

(**C**) extremely low birth mass

1

(e) any **one** from:

- men would be included in the study (can't be pregnant)
- children / older (post-menopausal) women would be included in the study

ignore reference to cost

1

(f) any **three** from:

- higher percentage of pregnant women have never smoked (compared with non-pregnant women)
- higher percentage of pregnant women are ex-smokers (compared with non-pregnant women)
- lower percentage of pregnant women currently smoke (compared with non-pregnant women)
- in both pregnant and non-pregnant women, the highest percentage of women have never smoked

allow converse throughout

allow appropriate use of correct figures throughout

3

(g) scatter graph

1

(h) **B**

1

(i) there is no correlation (between the variables)

allow (all) the points are widely scattered

allow idea that the person with the longest birth time does

not have the highest risk

1

[13]

Q25.

(a) diffusion

1

(b) A

1

(c) B

1

(d) (earthworm) can absorb more oxygen (in a given time)
or
increases / more gas exchange

allow get / obtain / take in more oxygen
ignore easier absorption of oxygen
ignore references to food

1

(e) lipase

1

(f) more oxygen (in soil with earthworms)

allow earthworms bring oxygen to soil

1

(for) more (aerobic) respiration

*do **not** accept anaerobic respiration*

1

(of) bacteria / fungi / microorganisms / microbes / decomposers

1

reference to more is only needed once for the first two marking points

(g) fertilisation

ignore sexual reproduction

1

(h) asexual (reproduction)

allow cloning

1

[10]

Q26.

(a)

✗	✓	✓
✓	✗	✓

***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)

2^4

*an answer of 16 scores **2** marks*

allow 2 × 2 × 2 × 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 <u>until 11 hours</u>

*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]

Q27.

(a) nucleus

1

(b) gene(s)

allow allele(s)

1

(c) copying of chromosomes

1

(d) mitochondria

1

(e) 60 − 45
or
120 − 105

1

15 (minutes)

1

*an answer of 15 (minutes) scores **2** marks*

(f) C

1

(g) 8

1

(h) to repair tissues

1

[9]