Mark schemes

Q1.

(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

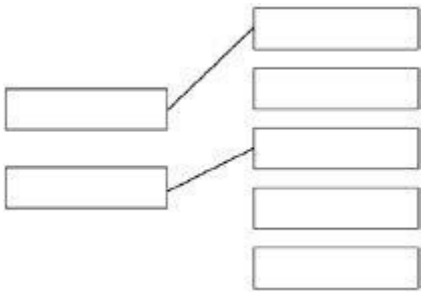
(h) to repair tissues

1

[9]

Q2.

(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 namedhormones e.g. auxin

- ions / minerals

allow magnesium / nitrate

- vitamins

allow named vitamins e.g. vitamin B

- water

allow H_2O / H2O
ignore oxygen / carbon dioxide / agar / nutrients / fertiliser

1

[10]

Q3.

(a) toxins / poisons (secreted by / from / in bacteria)

1

(b) any **two** from:

- wash hands after using toilet / being sick

or

wash hands before preparing / handling food

or *ignore 'washhands' unqualified*
ignore reference to coughing / sneezing

do not prepare food (whilst infected)

- isolate yourself
  allowexamples of how isolation could be achieved

- disinfect clothes / surfaces

- do not share utensils / cutlery / towels

2

(c) antibiotics

allow named examples of antibiotics

1

(d) immune system is damaged / weakened **or** immune system doesn't function properly

allow immunocompromised
allow lack of / no white blood cells

1

white blood cells cannot kill bacteria / *Salmonella* (as effectively)

allow no / fewer antibodies so bacterianot killed
***or** less phagocytosis so bacteria not killed **or** no / fewer antitoxins to counter toxins*

1

(e) any **one** from:

- (give chickens) antibiotics
  allow(givechickens)monoclonal antibodies

- don't sell infected chickens / eggs
  allow don't sell thechickens / eggs
  ignore don't sell chickens / eggs

- keep infected chickens isolated / indoors
  allow keep thechickensindoors
  ignore keep chickens indoors

- slaughter the infected chickens
  ignorevaccination / chlorination / disinfection

1

(f) (cleaning liquid) B
and
greater reduction in number of bacteria (after cleaning) in both locations

ignore fewbacteria inbothlocations
*allow neither / both **and** idea of experimental error*

1

(g) radius (of area with no bacteria growing)

allow diameter(ofthe areawith no bacteria growing)
ignore πr2 unqualified
allow idea of placing agar plate onto graph paper

and counting the squares not covered with bacteria

1

(h) repeat **and** look to see if results are similar

ignore repeat unqualified

*allow repeat **and** look to see if results are different*

allow repeat and see if there are anomalies

ignore repeat and identify anomalies
ignore repeat and compare unqualified

1

(i) any **one** from:

- toxicity / side / health effects

  ignore harmful / dangerous
  allow reference to allergies

- effect on other types of bacteria / pathogens

  allow nottestedonothertypesofbacteria
  ignore germs

- interaction with other cleaners
- ease of use
- dilution factor of each cleaner (vs. cost)

  ignore concentration unqualified

- time cleaner is effective for

  ignore howlong the cleaner lasts for

  allow reference to odour of cleaning liquid

  ignore reference to cost unqualified
  ignore environmental effects / flammability

1

[11]

Q4.

(a) kills microorganisms / bacteria / fungi / viruses / microbes

allow to removemicroorganisms / bacteria / fungi / viruses / microbes

ignore germs

allow so mycoprotein is not contaminated

1

(which) compete for food / oxygen
or
which make toxins

allowsomycoproteinissafe to eat

or
which are pathogens

or *Fusarium*

which might kill the fungus /

1

(b) 30 °C

1

(c) for (aerobic) respiration

*do **not** accept anaerobic*

1

(which) releases energy (for growth)

*do**not** accept produces energy*

allow glucose is used to make other organic substances e.g. protein

1

(d) any **two** from:

so *Fusarium* can

- grow faster / better
- get sufficient food / glucose / minerals

allowmore / enough

- get sufficient oxygen

allowmore / enough

- get rid of sufficient carbon dioxide

allow more / enough
allow waste

- be kept at a (suitable) temperature

allow to avoid 'clumping'

2

(e) 200 grams

1

[8]

Q5.

(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 until 11 hours

*answer must refer to numberof 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 × 108
or
from 11 hours to 14.5 hours

allow (then) increases exponentially

1

then (number of live cells / bacteria) stays at 2.5 × 108

allow (numberoflivecells / bacteria)staysthe same for the next 5 hours

or
stays the same from 15 to 20.5 hours

*ifno othermarkawardedallow 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]

Q6.

(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

allowconversefor 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** acceptanaerobicrespiration*

1

(mitochondria / respiration) release energy

*do **not** acceptenergyproduced / 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]

Q7.

(a) 86

allow this answer only
*do **not** accept 85.7*
if no answer given, check for answer in the table

1

(b) as salt concentration increases, percentage of open stomata (in field of view) decreases (above 0.1 mol / dm3)
or
allow percentage of open stomata stays the same between 0.0 and 0.1 (mol / dm3 then decreases as salt concentration increases)

ignore referencesto numberofopen stomata
allow converse
allow idea that mean concentration (of salt) in guard cells is between 0.3 and 0.4 mol per dm3

1

(c) use concentrations between 0.3 (mol / dm3) and 0.4 (mol / dm3)
or
draw a graph of the data and read off the value at 50% (open stomata)

allow alist ofappropriateconcentrationsi.e.0.32mol / dm), 0.34 (mol / dm3), 0.36 (mol / dm3) etc. 3

1

(d) ($\pi \times 0.18752$) = 0.11 (mm2)

ananswerof36scores ***3*** *marks*

1

$$\frac{4}{0.11}$$

1

36 (per mm2)

*allow 36.22 / 36.23 **or** 36.2 if answer is incorrect allow for **2** marks for sight of number of*
open stomata = 9 per mm2 (diameter used instead of radius)
*if no other marks awarded allow for **1** mark any **one** from:*

- *sight of area = 0.44(mm2) (diameter used instead of radius)*
- *sight of number of open stomata = 9.1 / 9.05 / 9.06 per mm2 (diameter used instead of radius and no rounding)*

1

(e) (potassium) ions increase the concentration of the solution (inside guard cells)
or
(potassium) ions make cell more concentrated / less dilute

allow (potassium) ionsdecreaseconcentrationofwater / water potential (of guard cells)

1

water moves into the (guard) cell by osmosis

1

cell swells unevenly (so stoma opens)

1

as inner wall is less flexible than outer wall **or** thick part of the wall is less flexible than the thin part (of the wall)

1

[10]

Q8.

(a) to kill microorganisms on / in the flask
or
so only microorganisms in the milk caused the results

allow bacteria / fungi / microbes
*do **not** accept viruses*
ignore germs

1

(b) heating

1

to over 100 °C

allow place in oven / pressure cooker
*do **not** accept disinfectant*
allow other suitable method – e.g. use of UV

1

(c) to prevent microorganisms entering from the air

allow bacteria / fungi / microbesformicroorganisms
*do **not** accept viruses*
ignore germs

1

(d)

0	olive-green	**7**
1	olive-green	**7**
2	olive-green	**7**
3	orange-green	**6**

*all correct for **1** mark*

1

(e) (pH meter) – more accurate / more precise

allow more exact
allow can measure to 0.1 pH unit
***or** to smaller intervals of pH*

1

(leaving…6 days) – obtain greater pH change
or
because there was (very) little change in 3 days

allow more acid will be made

1

(f) scale > $\frac{1}{2}$ of x-axis
and
x-axis labelled (time in) days

1

points plotted correctly

*all 7 correct= **2** marks*
*5 or 6 correct = **1** mark*

2

line of best fit = smooth curve through points

*do **not** accept ruled point-to-point*

1

(g) (1st day) too few bacteria

1

(after day 1 more bacteria so more) acid made

1

(days 5-6) sugar / food used up
or
low pH denatures enzymes
or
low pH kills bacteria

allow enzymes donot work
*do **not** accept enzymes killed*

1

(h) (similarity) – same start pH /
pH7 and end pH / pH4.5
or
same pH change / change = 2.5

1

(difference) – faster

1

[16]

Q9.

(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]

Q10.

(a) **C**

1

(b) cytoplasm **and** cell membrane dividing
*accept cytokinesis for **1** mark*

1

to form two identical daughter cells

1

(c) stage 4

1

only one cell seen in this stage

1

(d) (4 / 36) × 16 × 60

1

107 / 106.7

1

110 (minutes)
*allow 110 (minutes) with no working shown for **3** marks*

1

(e) binary fission
*do **not** accept mitosis*

1

(f) shortage of nutrients / oxygen

1

so cells die
or

death rate = rate of cell division

1

[11]

Q11.

Level 3 (5–6 marks):
A detailed and coherent explanation is provided with most of the relevant content, which demonstrates a comprehensive understanding of the human circulatory system . The response makes logical links between content points.

Level 2 (3–4 marks):
The response is mostly relevant and with some logical explanation. Gives a broad understanding of the human circulatory system. The response makes some logical links between the content points.

Level 1 (1–2 marks):
Simple descriptions are made of the roles of some of the following: heart function, gas exchange, named blood vessels, named blood cells. The response demonstrates limited logical linking of points.

0 marks:
No relevant content.

Indicative content

- dual / double circulatory system which means that it has higher blood pressure and a
- greater flow of blood to the tissues heart made of specialised (cardiac) muscle cells which have long protein filaments that can slide past each other to shorten the cell to bring about contraction for pumping blood heart pumps blood to lungs in pulmonary artery so that oxygen can diffuse into blood from air in alveoli blood returns to heart via
- pulmonary vein where muscles pump blood to the body via aorta oxygen carried by
- specialised cells / RBCs which contain haemoglobin to bind oxygen and have no
- nucleus so there is more space available to carry oxygen arteries carry oxygenated
- blood to tissues where capillaries deliver oxygen to cells for respiration and energy
- release thin walls allow for easy diffusion to cells large surface area of capillaries to
- maximise exchange waste products removed eg CO2 diffuse from cells into the blood
- plasma
- blood goes back to the heart in veins which have valves to prevent backflow
- cardiac output can vary according to demand / is affected by adrenaline

accept annotated diagrams

[6]

Q12.

(a) (i) small amounts of dead pathogens

1

(ii) decrease

1

by 60 (%)

allow from 70(%) to 10(%)
allow other correct data treatment

1

(b) (i) penicillin

1

(ii) any**two** from:
- antibiotics only kill bacteria
- *allow antibiotics do not kill viruses*
- some bacteria are resistant (to antibiotics)
- *allow MRSA not killed by antibiotics*
- (correct) antibiotics not always used
- *allow course not completed*

deficiency disease(s) not caused by bacteria **or** cannot be treated by antibiotics
inherited disease(s) not caused by bacteria **or** cannot be treated by antibiotics
'lifestyle' diseases not caused by bacteria **or** cannot be treated by antibiotics
eg heart disease / cancer
*if no other mark given allow **1** mark for not all diseases are caused by bacteria **or** some diseases are caused by viruses*

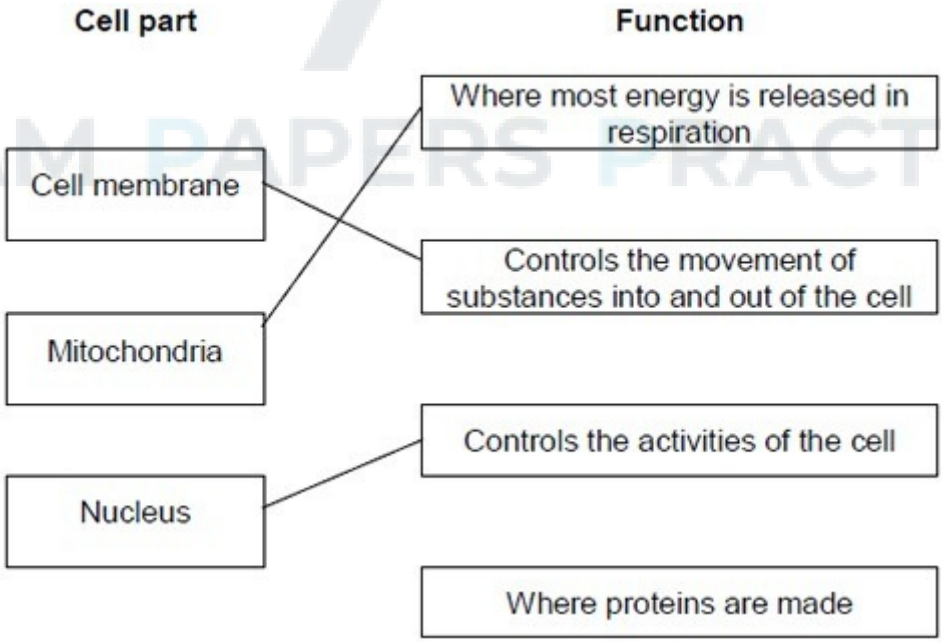
2

(c) bacteria grow faster
allowthis is body temp (at which pathogens grow)

1

[7]

Q13.



(a)

extra lines cancel

3

(b) Cell wall

in either order

1

Chloroplast

allow (permanent) vacuole

1

[5]

Q14.

(a) a catalyst / speeds up a reaction

ignoreitisnotusedup

1

it is a protein **or** it is specific / described **or** it has an active site

allow it only acts on one molecule

1

(b) cytoplasm

1

(c) **Advantage:**

any **one** from:

- heat would denature proteins in milk
- heat alters texture or flavour of milk
- catalase / enzyme is specific **or** only affects hydrogen peroxide
- less energy / fuel / lower temperature used so less expensive **or** less pollution

1

Disadvantage:

any **one** from:

- (some pathogens may survive) causing illness
- catalase / enzyme left in milk **or** may cause allergies **or** may alter taste

1

[5]

Q15.

(a) (i) nucleus

1

(ii) diffusion

1

(b) increases / larger surface area (for diffusion)

ignorelargesurfaceareatovolume ratio

1

(c) (i) sugar / glucose

acceptamino acids / other named monosaccharides

1

(ii) against a concentration gradient

or

from low to high concentration

1

(iii) (active transport requires) energy

1

(from) respiration

1

(d) minerals / ions

accept named ion ignore nutrients
***do not accept** water*

1

[8]

Q16.

(a) A (inoculating / wire) loop

1

B Petri dish

allow (agar) plate
ignore ref to culture medium

1

(b) (i) to kill (unwanted) bacteria / microorganisms / microbes

allow fungi
ignore viruses / germs

1

(ii) Using a flame

1

(iii) any **one** from:

- so bacteria / microorganisms / microbes / pathogens / fungi (growing in dish) do not get out
  ignore reference togases
  ignore viruses / germs
- so bacteria / microorganisms / microbes / pathogens / fungi (from the air) do not get in.
  ignoreviruses / germs

1

(c) 25 °C

1

[6]

Q17.

(a) **A** = nucleus

allow phonetic spelling

1

B = (cell) membrane

1

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

ignorenewcells / skin

1

(c) (i) embryos

1

(ii) paralysis

1

[5]

Q18.

(a)

Structure	Organ	Organ system	Tissue
Stomach	✓		
Cells lining the stomach			✓
Mouth, oesophagus, stomach, liver, pancreas, small and large intestine		✓	

all 3 correct = 2 marks
2 correct = 1 mark
1 or 0 correct = 0 marks

2

(b) (i) diffusion

allow phonetic spelling

1

(ii) glucose

1

(iii) mitochondria

1

[5]

Q19.

(a) contract / shorten

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

1

to churn / move / mix food

acceptperistalsis / 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** allowanaerobic*
*energy released **for** respiration = max 1 mark*

1

(d) (i) to make protein / enzyme

ignore'antibody'orother 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

[8]

Q20.

(a) (i) chloroplast

1

(ii) cell wall

1

(b) (i) osmosis

accept diffusion

1

(ii) cell wall (prevents bursting)

1

(c) (i) carbon dioxide

allowcorrect formula

1

glucose

allow sugar / starch

1

(ii) any**two** from:

- light sensitive spot detects light
- tells flagellum to move towards light
- more light = more photosynthesis

2

(d) (cell has) larger SA:volume ratio

1

short (diffusion) distance

allowcorrectdescription

1

(diffusion) via cell membrane is sufficient / good enough

or

flow of water maintains concentration gradient

1

[11]

Q21.

(a) (i) xylem

1

(ii) water

1

minerals / ions / named example(s)

ignore nutrients

1

(b) (i) movement of (dissolved) sugar

allow additional substances, eg amino acids / correct named sugar (allow sucrose / glucose)

allow nutrients / substances / food molecules if sufficiently qualified

ignore food alone

1

(ii) sugars are made in the leaves

1

so they need to be moved to other parts of the plant for respiration / growth / storage

1

(c) (i) mitochondria

1

(ii) for movement of minerals / ions

Do not accept 'water'

1

against their concentration gradient

1

[9]

Q22.

(a) any**two** from:

- only one 'chromosome'
  allowonestrandofDNA
- circular
  allow loop
- may have plasmids
- not in a nucleus / no nucleus

2

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

- London is much higher
- *or converse*

more variable / wider range

1

(ii) increase
allow'onaverageitis5 / 6times greater'
Included figures must be correct

1

(iii) overall slight increase
accept'doesn'tchange much'

1

variable / goes up and down

1

(c) (i) both axes correctly labelled

x = Year

y = Number of cases

1

correct points
*all correct = **2** marks*
*1-2 errors = **1** mark*
*> 2 errors = **0** marks*

2

suitable line of best fit
acceptstraightline or smooth curve

1

(ii) doesn't fit the pattern / line of best fit

1

(d) provides immunity / protection (to TB)

ignore 'stopspeoplecatching it'

ignore 'resistance'

1

prevents TB spreading

acceptrefto herd immunity

1

[13]

Q23.

(a) (i) Chromosomes

1

(ii) Characteristics

1

(iii) Classify

1

(b) Plants

ignore algae

1

[4]

Q24.

(a) (i) A = (cell) membrane

1

B = cytoplasm

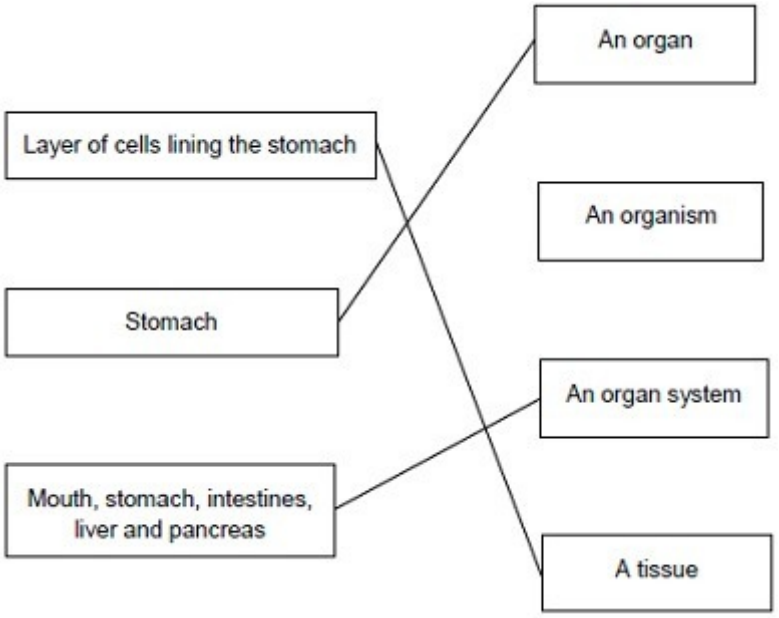
*do **not** accept cytoplast*

1

(ii) To control the activities of the cell

1

(b)



extra lines cancel

3

[6]

Q25.

(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.

0marks
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

6

(b) (i) bacteria killed / destroyed

ignorefights / 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

ignorereftocost / dangerousorharmfulunqualified

1

or may work differently with different bacteria

or disinfectants may be different concentrations

ignoredifferentamountsofdisinfectantunless reference to different drop size

or may not last as long

ignore takelonger to work

allow reference to anomalous result or not repeated

[9]

Q26.

(a) (i) A = nucleus

1

B = (cell) membrane

1

(ii) any **two** from:

ignoreshape

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

2

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

allow 'more / a lotof oxygenmoleculesoutside'
ignore along / across gradient

1

(c) a tissue

1

[6]

Q27.

(a) (i) mitochondrion / mitochondria

mustbephoneticallycorrect

1

(ii) carbon dioxide / CO2

1

water / H2O

1

in either order
*accept CO2 but **not** CO2*
*accept H2O **or** HOH but not H2O*

(iii) diffusion

1

high to low concentration

allowdownaconcentration gradient

1

through (cell) membrane **or** through cytoplasm

*do **not** accept cell wall*

1

(b) ribosomes make proteins / enzymes

1

using amino acids

1

part A / mitochondria provide the energy for the process

allow ATP
*do **not** accept produce or make energy*

1

[9]

Q28.

(a) **A** sperm

1

B egg

1

C fertilised egg

1

D embryo

1

(b) insert into mother

ignorefertilise / check fertilisation / check viability

1

womb / uterus

1

(c) (i) one quarter

1

(ii) no / little chance of success over 42

1

reference to table of only two women in the age bracket 40-42 years became pregnant

*thestatement'only 2out of53 40-42 yearold women became pregnant / had babies' gains **2** marks*

1

(iii) so fewer twins / multiple births
or
multiple births more dangerous

1

[10]

Q29.

(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]

Q30.

(a) **B**

*no mark for "B" alone, the mark is for B **and** the explanation.*

large(r) surface / area **or** large(r) membrane

accept reference to microvilli

ignore villi / hairs / cilia

accept reasonable descriptions of the surface eg folded membrane / surface

*do **not** accept wall / cell wall*

1

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

- (salivary) amylase
- carbohydrase

1

(ii) many ribosomes

*do**not** mixroutes. If both routes given award marks for the greater.*

1

ribosomes produce protein

acceptamylase / enzyme / carbohydrase is made of protein

or

(allow)

many mitochondria (1)

mitochondria provide energy to build / make protein (1)

accept ATP instead of energy

1

[4]

Q31.

(a) both parents **Aa**

*accept other upper and lower case letter without key **or***

symbols with a key
allow as gametes shown in Punnett square

1

aa in offspring correctly derived from parents
or
aa correctly derived from the parents given

ignore other offspring / gametes
for this mark parents do not have to be correct

1

offspring **aa** identified as having cystic fibrosis

maybethe onlyoffspringshown ***or*** *circled / highlighted / described*

1

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

acceptconverse if clear, eg if you (only) took one it might have cystic fibrosis / might not be fertilised

- (more) sure / greater chance of healthy / non-cystic fibrosis egg / embryo / child
  acceptsome mayhave the allele
  reference to 'suitable / good embryo' is insufficient
- greater chance of fertilisation

1

(ii) **advantages**

togain 3 marks both advantage(s) and disadvantage(s) must be given

max 3

any **two** from:

ignorereferences to abortion unless qualified by later screening

- greater / certain chance of having child / embryo without cystic fibrosis / healthy
- child with cystic fibrosis difficult / expensive to bring up
- cystic fibrosis (gene / allele) not passed on to future generations

disadvantages

any **two** from:

- operation dangers / named eg infection
  ignore risk unqualified
- ethical or religious issues linked with killing embryos
  accept wrong / cruel toembryosacceptrighttolifeargument
  ignore embryos are destroyed

- (high) cost of procedure
- possible damage to embryo (during testing for cystic fibrosis / operation)

plus

conclusion

a statement that implies a qualified value judgement
eg it is right because the child will (probably) not have cystic fibrosis even though it is expensive
or
eg it is wrong because embryos are killed despite a greater chance of having a healthy baby

***note**:theconclusion mark cannot begivenunless a reasonable attempt to give both an advantage and a disadvantage is made*

*do **not** award the mark if the conclusion only states that advantages outweigh the disadvantages*

1

(c) any **three** from:

- osmosis / diffusion

  *do**not**acceptmovement of ions / solution by osmosis / diffusion*

- more concentrated solution outside cell / in mucus

  assume concentration isconcentration ofsolute unless answer indicates otherwise or accept correct description of 'water concentration'

- water moves from dilute to more concentrated solution

  allowcorrect references tomovementofwaterinrelation to concentration gradient

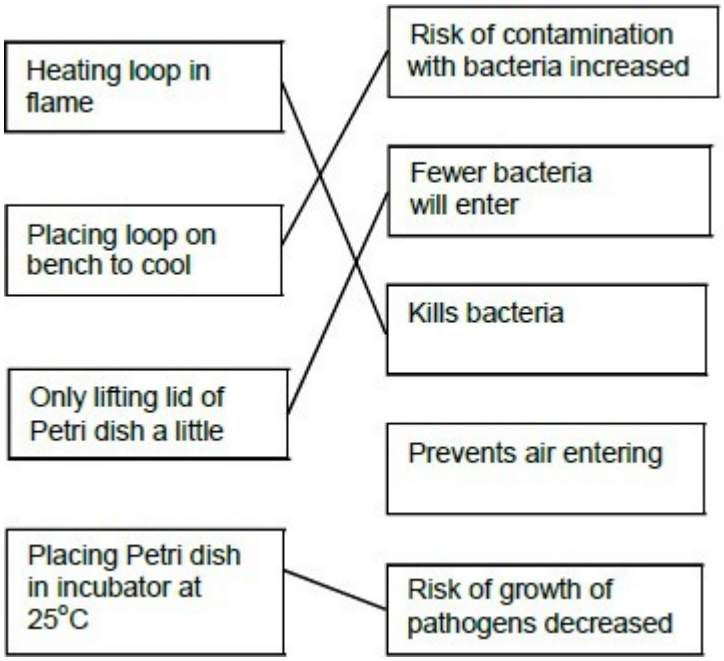
- partially permeable membrane (of cell)

  allowsemi / selectivelypermeable

3

[11]

Q32.



any box on the left joined to > 1 other box - cancel

[4]

Q33.

(a) (i) A = (cell) wall

ignorecellulose

1

B = cytoplasm

1

(ii) any **one** from:

accepthas DNA instead of a nucleus, but not just has DNA

- bacterial cell / it has no nucleus
  allow no mitochondria
- DNA free in cytoplasm
  ignore size
- has no vacuole / no vesicles
  ignore strands of DNA

1

(b) (i) yeast grows best / better / well **or** optimum temperature for yeast / more yeast present

allowyeastworksbest / better / well

1

(yeast) makes CO_2 **or** respires / respiration

allow fermentation

1

(ii) bacterium grows best / better / well / more bacteria present **or** optimum

temperature for bacterium

ignore microorganisms / microbes

allow works / respires best / better / well

1

(bacterium) makes (lactic) acid

*do **not** allow wrong acid*

1

[7]

Q34.

(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 itsDNA / geneticmaterialisnotenclosed / ithasno 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

allowcorrect reference to other named parts of the female reproductive system

1

(Mitochondria) release energy (for movement / swimming)

allowsupply / produce / provide

1

in respiration

1

[9]