**M1.**(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 outside’*

*ignore along / across gradient*

**1**

(c)     a tissue

**1**

**[6]**

**M2.**(a)     (i)      A = (cell) membrane

**1**

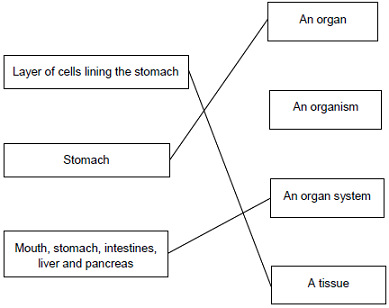
B = cytoplasm

*do* ***not*** *accept cytoplast*

**1**

(ii)     To control the activities of the cell

**1**

(b)       
 

extra lines cancel

**3**

**[6]**

**M3.**(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]**

**M4.**          (a)     it has many chloroplasts.

**1**

(b)     (has) cell wall

**1**

          (has) vacuole **or** large / permanent vacuole

*do* ***not*** *allow chloroplasts*

*assume plant cell throughout  
accept converse for animal cell*

**1**

**[3]**

**M5.**          (a)     **A**       nucleus

**1**

**B**       (cell) membrane

**1**

**C** cytoplasm

**1**

(b)     any **two** from:

•        (contain mitochondria

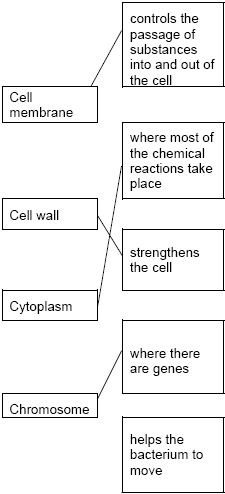
•        many (mitochondria)

•        respiration (occurs in mitochondria)

**2**

**[5]**

**M6.**          (a)



*all four correct =* ***4*** *marks*

*three correct =* ***3*** *marks*

*two correct =* ***2*** *marks*

*one correct =* ***1*** *mark*

*extra line from a statement cancels the mark*

**4**

(b)     any **two** from:

•        nucleus

•        no cell wall

•        separate chromosomes

**2**

(c)     A

**1**

(d)     diffusion

**1**

**[8]**

**M7.**(a)     (i)      A = cytoplasm

**1**

B = (cell) membrane

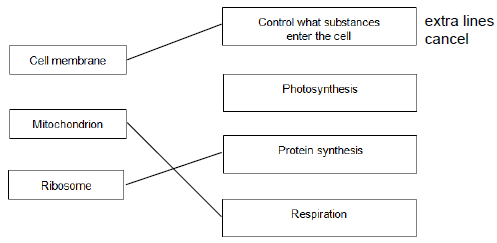
**1**

(ii)     nucleus

*accept chromosome / DNA / genes*

*accept phonetic*

**1**

(b)

**3**

**[6]**

**M8.**(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

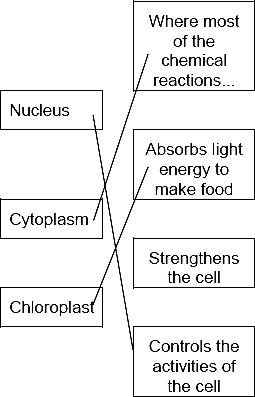
**1**

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

*ignore absorption*

**1**

**[6]**

**M9.**          (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]**

**M10.**          (a)     **award one mark for each key idea**

          energy released **or** energy transferred **or** respiration

*allow provides* ***or*** *gives*

*do* ***not*** *allow produces* ***or*** *makes*

**3**

          near to the site of movement **or**energy available quickly **or** more  
energy

*accept allows more mitochondria to fit in*

          (mitochondria) packed (around  
filament) **or** efficient arrangement **or**spiral arrangement

(b)     contains chromosomes **or** genes **or**DNA

***not*** *genetic material*

**1**

          (which) contribute half (the genes) to  
the fetus **or** offspring

*23 chromosomes* ***or*** *half the genes****or*** *reference to X,Y chromosome determining sex (if the notion of halfness is there)  
nucleus contains half genes for the offspring = 2 marks*

**1**

**[5]**

**M11.**          (a)     (cell) wall  
(cell) membrane  
cytoplasm  
vacuole

*for 1 mark each*

**4**

(b)     (i)      A

(ii)     B

*for 1 mark each*

**2**

(c)     diffusion          (*reject* osmosis)

*for 1 mark*

**1**

**[7]**

**M12.**(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’ / ߢproduce’ / ‘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**

**[8]**

**M13.**(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*** *mix routes. If both routes given award marks for the greater.*

**1**

ribosomes produce protein

*accept amylase / 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]**

**M14.**(a)     more concentrated

*must be a comparison*

**1**

than the cell / cytoplasm

*accept more salty / solutes / ions*

*accept cell is less concentrated than solution for* ***2*** *marks*

**1**

(b)     (i)      turgid

**1**

(ii)     plasmolysed

*accept flaccid*

**1**

(c)     any **four** from:

•        water left the cells (in A)

•        by osmosis

•        from dilute to more concentrated solution

*accept high to low water potential or from high to low water concentration*

•        via partially permeable membrane

•        so cell membrane shrank away from cell wall

**4**

(d)     water enters the cells (by osmosis)

*allow* ***1*** *mark for:*

**1**

they burst / lyse / lysis occurs

*water leaves and cell shrinks (if they think it is hypertonic solution)*

**1**

animal cells have no cell wall **or** plant cells have a cell wall

**1**

cell wall prevents lysis / bursting / allows turgidity

*allow correct description*

**1**

**[12]**

**M15.**(a)     (i)      chloroplast

**1**

(ii)     cell wall

**1**

(b)     (i)      osmosis

*accept diffusion*

**1**

(ii)     cell wall (prevents bursting)

**1**

(c)     (i)      carbon dioxide

*allow correct 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

*allow correct description*

**1**

(diffusion) via cell membrane is sufficient / good enough

**or**

flow of water maintains concentration gradient

**1**

**[11]**

**M16.**(a)     (i)      nucleus

**1**

(ii)     diffusion

**1**

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

*ignore large surface area to volume ratio*

**1**

(c)     (i)      sugar / glucose

*accept amino 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]**

**M17.** (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]**

**M18.** (a)     more concentrated

*must be a comparison*

**1**

than the cell / cytoplasm

*accept more salty / solutes / ions*

*accept cell is less concentrated than solution for* ***2*** *marks*

**1**

(b)     (i)      turgid

**1**

(ii)     plasmolysed

*accept flaccid*

**1**

(c)     any **four** from:

•        water left the cells (in A)

•        by osmosis

•        from dilute to more concentrated solution

*accept high to low water potential or from high to low water concentration*

•        via partially permeable membrane

•        so cell membrane shrank away from cell wall

**4**

(d)     water enters the cells (by osmosis)

*allow* ***1*** *mark for:*

**1**

they burst / lyse / lysis occurs

*water leaves and cell shrinks (if they think it is hypertonic solution)*

**1**

animal cells have no cell wall **or** plant cells have a cell wall

**1**

cell wall prevents lysis / bursting / allows turgidity

*allow correct description*

**1**

**[12]**

**M19.** 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 apply a ‘best-fit’ approach to the marking.

**0 marks**

No relevant content.

**Level 1 (1 – 2 marks)**

An example is given of a named substance  
**or**a process  
**or**there is an idea of why diffusion is important eg definition.

**Level 2 (3 – 4 marks)**

At least one example of a substance is given  
**and**correctly linked to a process in either animals or plants.

**Level 3 (5 – 6 marks)**

There is a description of a process occurring in either animals or plants that is correctly linked to a substance  
**and**a process occurring in the other type of organism that is correctly linked to a substance.

**examples of points made in the response**

**Importance of diffusion:**

•        to take in substances for use in cell processes

•        products from cell processes removed

**Examples of processes and substances:**

•        for gas exchange / respiration: O2 in / CO2 out

•        for gas exchange / photosynthesis: CO2 in / O2 out

•        food molecules absorbed: glucose, amino acids, etc

•        water absorption in the large intestine

•        water lost from leaves / transpiration

•        water absorption by roots

•        mineral ions absorbed by roots

***extra information***

***Description of processes might include:***

*•        movement of particles / molecules / ions*

*•        through a partially permeable membrane*

*•        (movement of substance) down a concentration gradient*

*•        osmosis: turgor / support / stomatal movements*

**[6]**

**M20.**          (a)    water enters (funnel / sugar solution) **or** water diffuses in (to the funnel)

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

**1**

membrane partially / selectively / semi permeable **or** by osmosis

*allow description*

**1**

because concentration (of sugar) greater  
inside funnel than outside / water / in beaker

*assume ‘concentration’ refers to sugar unless candidate indicates otherwise  
the position of the solutions may be implied*

**1**

(b)     (level / it) rises more slowly **or** levels out earlier **or** does not rise as much

*accept inference of less steep gradient (of graph)*

*allow less / slower osmosis / diffusion / less water passes through or less water enters funnel*

*allow water enters / passes through slower*

**1**

less difference in concentration (between solution / funnel and water / beaker)

*accept due to lower diffusion / concentration gradient / described*

**1**

**[5]**

**M21.** (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]**

**M22.**          only 24 students tested **or** only one test **or** reference to lack of controls eg gender / age

**1**

students could drink as much water as they wanted

**or**

some students drank more water than others

**or**

some students drank water and beer

**1**

differences only slight

*ignore effects of beer or promotion of beer drinking*

**1**

**[3]**

**M23.**          (a)    Marks awarded for this answer will be determined by the quality of communication as well as the standard of the scientific response.

**0 marks**No relevant content

**Level 1 (1–2 marks)**The method described is basic but shows some understanding of the sequence of an investigation.

**Level 2 (3–4 marks)**The method described is clear and will enable valid results to be collected.

**Level 3 (5–6 marks)**The method described is clear and detailed will; enable valid results to be collected.

**examples of biology points made in the response:**•        use of scalpel to cut chips to same dimensions  
•        use of range of sodium chloride concentrations  
•        use of forceps to transfer chips  
•        use of balance to measure mass of chips before immersion  
•        use of balance to measure mass of chips after immersion  
•        chips left in solutions for same length of time

**6**

(b)     (i)     *y*-axis: labelled ‘Change in length of cylinders in mm’

**1**

points or bars plotted correctly to within ± 1 mm

*deduct one mark for each incorrect plot up to a maximum of 2*

**2**

suitable line of best fit drawn on graph

**1**

(ii)     0.3

*allow correct reading from student graph*

**1**

(iii)    there is a higher concentration of solutes outside the cylinders than inside

*allow higher concentration of water inside cylinders than outside*

**1**

so water molecules will move through partially permeable membranes  
(by osmosis)

**1**

from the potato cylinder to the outside (solution)

**1**

**[14]**