**Biology Paper 1 Mark Schemes**

**Topics B1 – B4**

**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Class \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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B1 – Cells, Specialised Cells and Microscopes - Mark Schemes

**Q1.**

(a)     **D**

**1**

any **one** from:

•        has chloroplasts

•        has a (large) vacuole

*ignore has a (cell) wall*

**1**

(b)     **B**

**1**

does **not** have a (cell) wall

*allow has only a nucleus, (cell) membrane* ***and*** *cytoplasm*

**1**

(c)     **C**

**1**

any **one** from:

•        genetic material is not in a nucleus

*allow no nucleus*

•        has a single loop of DNA

**1**

**Q2.**

(a)     (i)      A cytoplasm

*accept clear indications*

**1**

         B nucleus

**1**

(ii)     any **two** from:  
**two** required for **1** mark

•        P

•        R

•        T

*accept lower case letters*

**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 energy (for movement / swimming)

*allow supply / produce / provide*

**1**

in respiration

**1**

**[9]**

**Q3.**

(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**

**Q4.**

(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**

(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]**

**Q5.**

(a)     

= 29 ÷ 0.03

**1**

= 967

**1**

*allow 967 with no working shown for* ***2*** *marks*

B1 – Chromosomes, Stem Cells and Cell Division - Mark Schemes

**Q1.**

(a)     46

**1**

(b)     mitosis

**1**

(c)     3

**1**

(d)     differentiation

**1**

(e)     cell membrane

**1**

cytoplasm

**1**

(f)      (stem cells from embryos) can become more types of cell

*allow converse*

*allow (stem cells from embryos) are pluripotent*

**1**

(g)     less risk of rejection of umbilical cord stem cells

**1**

(h)     could cause cancer

**1**

(i)      any **one** from:

•        embryos are created (for this purpose)

•        embryos are destroyed

•        the embryos do not develop into a foetus / child

*ignore religious objections*

**1**

**[10]**

**Q2.**

(a)      (i)     mitosis

*correct spelling only*

**1**

(ii)     replicates / doubles / is copied / duplicates

*accept cloned  
ignore multiplied / reproduced*

**1**

(b)     fertilisation occurs / fusion (of gametes)

*accept converse for asexual, eg none in asexual / just division in asexual*

**1**

so leading to mixing of genetic information / genes / DNA / chromosomes

*genes / DNA / chromosomes / genetic information comes from 1 parent in asexual  
ignore characteristics*

**1**

one copy (of each allele / gene / chromosome) from each parent  
**or**gametes produced by meiosis  
**or**meiosis causes variation

*meiosis must be spelt correctly*

**1**

**[5]**

**Q3.**

(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 / only 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**

B1 – Transporting Substances - Mark Schemes

**Q1.**

(a)     A

**1**

(b)     (i)      diffusion

**1**

(ii)     respiration

**1**

(iii)     mitochondria

**1**

(iv)    photosynthesis

**1**

**[5]**

**Q2.**

(a)     any **two** adaptations with linked descriptions from:

•        many alveoli to provide a large surface area

•        good blood supply to maintain steep diffusion / concentration gradient

•        thin walls so gases do not have far to diffuse / travel

•        well ventilated to maintain steep diffusion / concentration gradient

***1*** *mark for adaptation and* ***1*** *mark for linked description*

*allow to collect oxygen* ***or*** *to bring carbon dioxide to lungs*

**4**

**[4]**

**Q3.**

(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]**

**Q4.**

(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]**

**Q5.**

(a)     (i)      variation in masses / more representative / more typical / more reliable / average / mean / reference to anomalies  
  
**or**one worm to light to measure change

*do not allow more accurate / more precise*

*ignore fair test / valid / repeatable / reproducible*

**1**

(ii)     remove solution / liquid (on outside of worm)

*allow ‘water’*

**1**

(iii)    variable amounts removed from each worm

*ignore reference to length of timing*

**1**

(iv)    equal sizes of worm / more worms (in each group) / wash off all the sand / repeats / use more accurate balance / use smaller concentration intervals

*allow reference to improve blotting technique eg blot before / blot more thoroughly*

**1**

(b)     (i)       different (starting) masses / sizes / weights (at different concentrations)

**1**

allows comparisons / shows pattern / shows trend

**1**

(ii)     (+)20

*correct answer =* ***2*** *marks, with or without working*

***or***

*   
for* ***1*** *mark*

**2**

(c)     (i)      graph:

points correct

*allow ± 1 mm*

*–****1*** *mark per error*

*allow ecf from part b(ii)*

**2**

label on x-axis including units – ie Concentration of salt in arbitrary units

**1**

line of best fit = smooth curve / ruled straight line

*anomaly (4.0, –52) either plotted and ignored re. line*

***or*** *not plotted*

*do not allow point to point*

*allow best fit for ecf from 2bii*

**1**

(ii)     on graph:

ring drawn around point at (4.0, –52)

*allow (5.0, –50) if cand. line indicates this*

**1**

(iii)    sensible suggestion – eg used wrong solution / used 5.0% instead of 4.0% / different length of time in solutions / ref to error in blotting / balance not zeroed / error in weighing

*allow some lugworms died*

*allow error in calculation*

**1**

(d)     (i)      2.9 to 3.0 / correct for candidate’s graph ± 0.1

**1**

value of no change in mass / worms in equilibrium with soln / described

*allow small(est) mass change*

**1**

(ii)     water loss

**1**

by osmosis / diffusion

**1**

from dilute region in the worm to more concentrated solution outside

*allow correct description in terms of high to low water concentration / high to low water potential*

*salt solution is hypertonic*

*concentration unqualified = salt concentration*

**1**

**[19]**

B2 – Digestion and Enzymes – Mark Schemes

**Q1.**

(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]**

**Q2.**

(a)     **C**

**1**

(b)     **B**

**1**

(c)     **E**

**1**

(d)     any **one** from:

•        they are too big

•        they are insoluble

**1**

(e)     (pH) 7.5

*allow answers in range 7.4 to 7.6*

**1**

(f)      (enzyme **X**) stomach

(enzyme **Y**) small intestine

**1**

(g)     

**1**

(h)     lock and key

**1**

(i)      (some pH values):

change the shape of the active site

*allow some pH values denature enzymes*

**1**

(so) so substrate will no longer fit / bind to the active site

**1**

**[10]**

**Q3.**

(a)     (i)      stomach

**1**

(ii)     small intestine

**1**

(b)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **salivary glands** | **stomach** | **pancreas** | **small intestine** |
| **amylase** | ✓ | ✕ | ✓ | ✓ |
| **lipase** | ✕ | ✕ | ✓ | ✓ |
| **protease** | ✕ | ✓ | ✓ | ✓ |

***1*** *mark per correct row*

***or***

*if no correct row max* ***1*** *mark for any one correct column*

**2**

(c)     enzyme / protease / pepsin most effective in acid conditions / low pH

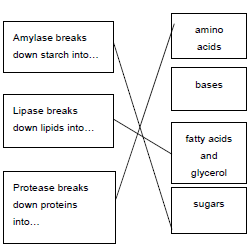
*accept optimum / correct pH*

*do not accept ref to incorrectly named enzymes*

*ignore killing bacteria*

*ignore acid breaks down food*

**1**

(d)            **Enzyme**            **Breakdown products  
**

**3**

**[8]**

**Q4.**

(a)     stomach and pancreas

**1**

(b)     all points plotted correctly

*allow* ***1*** *mark for 3 points correctly plotted*

**2**

smooth curve drawn through all the points

**1**

(c)     as concentration of protein increases the percentage of light passing through decreases

**1**

(because) mixture more cloudy

*allow idea of more particles in suspension*

**1**

(d)     use protein concentrations between 2 and 10 g/dm3

**1**

(e)     any one from:

•        to allow them to reach 37 °C

*to allow them to reach body temperature*

•        so they would be at the optimum temperature

*allow so they would be at the same temperature*

•        so reaction temperature controlled

*allow temperature affects enzyme activity*

**1**

(f)      correctly read concentration at 57% from their graph

**1**

(g)     their value given in part (f) – 0.5

*allow use of different values over straight line portion of graph*

**1**

answer for their value given in



**1**

(h)     (protease from organ **B**) is inactive **or** rate of digestion is zero **and** protease from organ **A** is active

*allow only protease from organ* ***B*** *is inactive*

**1**

any **one** from:

•        enzyme denatured by pH

•        at the wrong pH

•        enzyme not specific for this protein

*allow active site damaged / changed by pH*

**1**

B2 – Food Tests – Mark Schemes

**Q1.**

(a)     biuret

**1**

(b)     purple

**1**

(c)     1:1.6

**1**

(d)     provides amino acids to make new muscle

**1**

(e)     it has a large surface area

**1**

it has a thin surface

**1**

(f)      **C**

**1**

lowest sugar (content)

**1**

**[8]**

**Q2.**

(a)     in sequence

starch

**1**

sugar

**1**

protein

**1**

amino acids

**1**

(b)     (too) large **or** insoluble

*do* ***not*** *accept “breaking up”  
do* ***not*** *accept complex*

*accept ‘need to make molecules  
smaller / soluble’ – reverse argument*

**1**

          cannot be absorbed **or**cannot enter blood **or**cannot pass through wall / lining of  
intestine / gut or villi

*“body” not enough****not*** *large intestine*

**1**

(c)     mouth

*accept positive indication*

**1**

(d)     enzymes

*allow catalysts  
do* ***not*** *accept catalase*

**1**

**[8]**

B2 – Breathing System – Mark Schemes

**Q1.**

(a)     (i)      alveoli / alveolus

*allow air sacs*

*allow phonetic spelling*

**1**

(ii)     any **one** from:

•        protection (of lungs / heart)

•        help you breathe / inflate lungs.

**1**

(b)     (i)      diffusion

**1**

(ii)     capillaries

**1**

(iii)    any **two** from:

•        (have many) alveoli

*allow air sacs*

•        large surface / area

•        thin (exchange) surface **or** short diffusion pathway

*accept only one / two cell(s) thick*

•        good blood supply / many capillaries

*allow (kept) ventilated or maintained concentration gradient.*

**2**

**[6]**

**Q2.**

(a)      (i)     capillary

**1**

(ii)     diffusion

**1**

|  |  |  |  |
| --- | --- | --- | --- |
| (iii) | Carbon  dioxide | low(er) | high(er) |

**1**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Oxygen | high(er) | low(er) |

***1*** *mark for each correct row*

**1**

(b)     (i)      red blood cells

**1**

(ii)     haemoglobin

**1**

**[6]**

**Q3.**

(a)     (i)      diffusion

**1**

(iii)    red blood cells

**1**

(b)     70

*if no / incorrect answer then*

*70 000 000*

***or***

*280 x 0.25 gains* ***1*** *mark*

*ignore doubling the answer*

**2**

(c)     allows more gas / oxygen / CO2(exchange)

*do* ***not*** *accept air*

**1**

**[6]**

B2 – Circulatory System – Mark schemes

**Q1.**

(a)     (i)     any **one** from:

•        glucose

•        oxygen

•        carbon dioxide

•        urea

•        water

*allow hormones*

*allow named example of a product of digestion*

**1**

(ii)     (cardiac) muscle

*allow muscular*

**1**

(b)     (i)      **B**

**1**

(ii)     **D** atrium / atria

*ignore references to left or right*

**1**

**E** ventricle(s)

*ignore references to left or right*

**1**

(c)     (i)      a vein

**1**

(ii)      an artery

**1**

**[7]**

**Q2.**

(a)     (**A**) right atrium

**1**

(**B**) right ventricle

**1**

(b)     To take blood from the lungs to the heart

**1**

(c)     keeps the (coronary) artery open / wide

**1**

so the blood can carry glucose and oxygen

**1**

to the heart (muscle)

**1**

for respiration

**1**

*if marking points 2, 3 and 4 not awarded allow* ***1*** *mark for ‘keep a (constant) flow of blood to the heart (muscle)’*

(d)     bar **D** correctly plotted

**1**

bar **E** correctly plotted

**1**

*± 0.5 small squares*

(e)     twice / two times (more likely)

**1**

(f)     **Level 3 (5–6 marks):**

A detailed and coherent evaluation is provided that considers a range of relevant points  
about how well the data correlates with the statement, quoting relevant comparisons and  
comes to a conclusion consistent with the reasoning.

**Level 2 (3–4 marks):**

An attempt to relate relevant points within the data and come to a conclusion. The logic may be inconsistent at times but builds towards a coherent argument.

**Level 1 (1–2 marks):**

Discrete, relevant points made, attempting to apply understanding of the factors involved in development of CHD to the data in the table. The logic may be unclear and the conclusion, if present, may not be consistent with the reasoning.

**0 marks:**

No relevant content

**Indicative content**

data that supports statement:

•        country A has the highest death rate at 285 deaths per 1000 and the lowest consumption at only 180 kg per person

•        death rate in country E is less than half that in country A (125 compared with 285) and consumption is higher (244 compared with 180)

•        other countries with lower death rates than A have higher consumption (eg country B 250 deaths per 1000 but consumption of 320 kg per person)

arguments against statement:

•        but most of the data on the graph does not show clear correlation between death rates and consumption of data

•        eg death rate in country B is second highest at 250 deaths per 1000 but consumption is highest at 320 kg per person, nearly double that in A where death rate is only 35 per 1000 more

•        differences show no clear pattern – eg in countries where death rate is much lower the consumption is not a similar proportion higher (cf country D death  
rate just under half that in A but consumption not double that in A)

•        there may be other factors affecting death rate that are not reported, such as smoking, obesity, exercise, stress

**6**

**[16]**

**Q3.**

(a)     any **two** from:

•        carbon dioxide / CO2

•        urea

•        protein

•        water / H2O

•        hormones / insulin.

*ignore food / waste / alcohol / drugs / enzymes*

*ignore glucose and oxygen*

*allow* ***two*** *correct hormones for 2 marks*

*allow* ***two*** *correct food components for 2 marks*

*allow antibodies*

*allow antitoxins*

**2**

(b)     (i)      plasma

**1**

platelets

**1**

(ii)     (cardiac) muscle

*allow muscular*

**1**

(c)     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.

**0 marks**No relevant content

**Level 1 (1−2 marks)**There is a description of at least one advantage of the cow tissue valve

**or**

a description of at least one disadvantage of the cow tissue valve.

**Level 2 (3−4 marks)**There is a description of at least one advantage of the cow tissue valve

**and**

at least one disadvantage of the cow tissue valve.

**Level 3 (5−6 marks)**There is a description of the advantages and disadvantages of the cow tissue valve

**or**

a description of several advantages of the cow tissue valve and at least one disadvantage.

**Examples of the points made in the response**

**Advantages of cow tissue valve:**

•        abundant supply of cows

•        so shorter waiting time

*ignore can take many years to find a suitable human donor*

•        no need for tissue typing

•        quicker operation

•        less invasive **or** shorter recovery time

•        cheaper operation costs

•        less operation / anaesthetic risks.

**Disadvantages of cow tissue valve:**

•        made from cow so possible objections on religious grounds

*ignore ethical arguments*

•        new procedure so could be unknown risks

*allow possible transfer of disease from cow*

•        risks of using a stent eg. blood clots, stent breaking or valve tearing

•        not proven as a long term treatment

•        may be rejected

*ignore information copied directly from the table without value added.*

**6**

**[11]**

**Q4.**

(a)     A - atrium

*ignore references to right / left*

**1**

B - ventricle

**1**

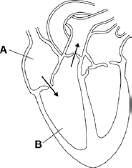
(b)     (i)      muscular

**1**

(ii)     push blood

*accept pump / force*

**1**

(c)       
 

*arrows approx as indicated*

**1**

arrow(s) showing flow from A to B  
from B out / up / to artery

**1**

(d)     (i)       male

**1**

65 and over

**1**

(ii)     fatty deposits / material in (coronary) arteries

*allow correct points made about heart attacks*

**1**

narrows / blocks / reduces flow

**1**

decreases oxygen supply (to heart muscle)

**1**

**[11]**

**Q5.**

(a)     A aorta

*ignore left and right*

**1**

B ventricle

**1**

C atrium

*allow atria*

**1**

D vena cava

**1**

(b)     (i)      (coronary) artery

*allow arteriole*

**1**

(ii)     stent / description

*accept (coronary) by-pass operation*

*allow statins*

*allow diets low in cholesterol*

*allow balloon (angioplasty)*

**1**

(iii)    (stent) keeps artery open

*must relate to (b)(ii)*

**1**

**or**

*ignore reference to capillary / vein*

(by-pass) new blood vessel / vein connecting around narrowed region;

**or**

(statins / low cholesterol diet) remove some of the cholesterol blockage

**or**

(balloon) widens / opens the blood vessel

**1**

which allows (more) blood through or allows blood to go around the blockage

(c)    (i)      F artery

*accept arteriole / branch of pulmonary artery*

**1**

G capillary

**1**

H vein

*H accept venule / branch of pulmonary vein;*

**1**

(ii)     F (Pulmonary artery) has less oxygen / more carbon dioxide / more glucose / sugar

*accept F (Pulmonary artery) is deoxygenated*

*accept converse for H (Pulmonary vein)*

*‘It’ refers to F*

**1**

**[12]**

B2 – Non-Communicable Diseases – Mark Schemes

**Q1.**

(a)     (i)      64

**1**

(ii)     36

*allow e.c.f from (i) i.e. 100 − answer given in (a)(i)*

**1**

(iii)    any **one** from:

•        only considers 16-year-olds

*ignore lack of evidence*

*allow does not refer to all ages*

•        only about some / 5 countries

*allow does not refer to all countries.*

**1**

(b)     the more exercise done the healthier a person is

*allow the more exercise done the higher the health rating*

*allow the less exercise done the lower the health rating*

**1**

(c)     having a high cholesterol level

**1**

(d)     (i)      antibodies

**1**

(ii)     antibiotics

**1**

**[7]**

**Q2.**

(a)     mitosis

*extra box ticked negates mark*

**1**

(b)     cell division is uncontrolled

*extra box ticked negates mark*

**1**

(c)     any **one** from:

•        smoking / tar

•        alcohol

•        carcinogens

*allow named chemical*

•        viruses (living in cells)

•        (ionising) radiation

*accept UV / X-rays / gamma waves*

**1**

(d)     bar plotted at 78%

*ignore width of bar*

**1**

(e)     testicular

*extra box ticked negates mark*

**1**

(f)     prostate

*extra box ticked negates mark*

**1**

(g)     any **two** from:

•        improved treatment / drugs

•        earlier diagnosis

•        more cancer screening

•        improved patient knowledge (of risk factors)

*allow improved patient diet / lifestyle*

**2**

**[8]**

**Q3.**

(a)     (i)      (as a result of) uncontrolled / abnormal growth / division of cells

*ignore mutation*

*allow cells dividing with no contact inhibition*

**1**

(ii)     benign tumours do not invade / spread to other tissues / do not form secondary tumours

*accept converse for malignant*

*accept benign tumours do not metastasise*

**1**

(b)     via the blood / circulatory system

*accept via lymphatic system*

**1**

(c)     (i)      incidence is increasing

**1**

more rapidly (over the years)

*ignore figures*

**1**

difference between rich and poor areas is getting less

**or**

the incidence is rising fastest in people from poor areas

*accept converse for people from rich areas*

**1**

(ii)     risk factor is UV from sunlight

*ignore ionising radiation*

**1**

more UK citizens going abroad or taking holidays in the Sun

**or**

poorer people can afford holidays in the Sun

**or**

more poorer people are taking holidays in the Sun

**1**

**[8]**

B2 – Plant Systems – Mark Schemes

**Q1.**

(a)     (i)      xylem

**1**

(ii)     phloem

**1**

(iii)    transpiration

**1**

(iv)    stomata

**1**

(b)     (i)      any **one** from:

•        reduce / prevent evaporation of water from flask

•        holds plant shoot in place

•        prevent damage to the plant

**1**

(ii)     same surface area **or** number of leaves

*(because if they used larger / smaller size shoots) there would be a larger / smaller surface area* ***or*** *a larger/ smaller number of leaves*

*allow same number of stomata*

**1**

from which (the same amount of) water evaporates

*(and therefore) more / less water would escape*

*allow from which water escapes*

**1**

(iii)    4.5

*look for answer written in table*

**1**

(iv)    increasing temperature / heat increases (rate of) water loss / evaporation

**1**

(v)     having moving air / a fan increases (rate of) water loss / evaporation

**1**

(c)     (i)      0.3 g

**1**

(ii)     plastic bag reduces air flow across leaves  
**or**air is humid around the leaves

*allow plastic bag stops water (vapour) leaving  
allow air (in plastic bag) becomes saturated (with water)*

**1**

**[12]**

**Q2.**

(a)     guard cells

**1**

(b)     (i)      any **one** from:

•        species / plant

•        length of time

*ignore temperature and size of leaves*

**1**

(ii)     20

*correct answer =* ***2*** *marks*

*accept *

*or          *

*for* ***1*** *mark*

**2**

(c)     less water loss / transpiration / evaporation

**1**

(d)     hot

**1**

*ignore bright / sunny conditions*

dry / low humidity

**1**

wind(y)

**1**

**[8]**

**Q3.**

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response.

**Level 3 (5–6 marks):**

Processes used for obtaining specified materials are given.

**and**

correctly linked to the vessels that the materials are transported in

**or**

correctly linked to a description of the direction of movement of the materials.

**For full credit**, in addition to the above descriptors at least **one** of the processes must be linked to the vessel that the material is transported in **and** the direction of the movement of the material.

**Level 2 (3–4 marks):**

At least **one** process for obtaining a specified material is given

**and**

is correctly linked to the vessel that the material is transported in

**or**

correctly linked to a description of the direction of movement of the material

**Level 1 (1–2 marks):**

At least **one** process (P) for obtaining a material is given

**or**

at least **one** vessel (V) and the material it carries is given

**or**

there is a description of the direction of movement (M) for at least **one** material

**0 marks:**

No relevant points are made

**examples of points made in the response Ions:**

(P) taken up by diffusion or active transport

•        from an area of high to low concentration (diffusion) **or** an area of low to high concentration (active transport)

(V) travels in the xylem

(M) to the leaves **or** from the roots / soil

**Water:**

(P) taken up by osmosis

•        from an area of low to high concentration

*allow high concentration of water to low concentration of water*

*allow from high water potential to low water potential*

*ignore along a concentration gradient*

(V) travels in the xylem

(M) to the leaves **or** from the roots / soil

(P) transpiration stream

•        movement replaces water as it evaporates from leaves

(V) in the xylem

**Sugar:**

(P) made during photosynthesis

(V) travels in the phloem

(M) to other parts of the plant **or** to storage organs **or** travels up and down

**[6]**

B3 – Communicable Disease and Defence Systems – Mark Schemes

**Q1.**

(a)     any **one** from (bacterial cell):

•        has a cell wall

•        has plasmids

*allow converse*

•        has a single DNA loop

•        has no nucleus

•        is much smaller

**1**

(b)     14.50 × 3 = 43.5

**1**

43.5 + 14.50 = 58

**or**

14.50 × 4 = 58

*allow 58 for* ***2*** *marks*

**1**

(58 / 100000 =)

0.00058 or 0.058%

*an answer of 0.00058 or 0.058% scores* ***3*** *marks*

**1**

(c)     decreased (from 2006 to 2014)

**1**

(d)     improved hygiene (for food preparation)

*allow stricter food hygiene regulations*

**1**

vaccination of poultry

**1**

(e)     any **one** from:

•        warmer weather so number of bacteria increases faster

•        more cold / precooked food (rather than hot food) being eaten

•        food not cooked properly on barbeques

**1**

**[8]**

**Q2.**

(a)     a disease that can be spread from one person to another

**1**

(b)     gonorrhoea

**1**

(c)     antibiotics

**1**

(d)     painkillers

*allow aspirin, paracetamol, ibuprofen and other correct brand names*

**1**

(e)

|  |  |
| --- | --- |
| **Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account. | 3-4 |
| **Level 1:** Facts, events or processes are identified and simply stated but their relevance is not clear. | 1-2 |
| No relevant content | 0 |
| **Indicative content**  •   skin stops the bacterium (entering the body)  •   blood clots to stop bacteria entering (through cuts)  •   stomach acid will kill the bacterium (if it is in food)  •   nose / trachea have mucus to trap the (tuberculosis) bacteria  •   nose / trachea have cilia / hair to move mucus out  •   white blood cells destroy the bacteria if infected  •   by phagocytosis  •   by antibodies  •   by antitoxins |  |

**4**

**[8]**

**Q3.**

(a)     (i)      lives inside cells

**1**

(ii)     inactive

**1**

(iii)     antibodies

**1**

(b)     (i)      1950

**1**

(ii)     8 (years)

**1**

(iii)     any **one** from: eg

•        disease could be reintroduced (from abroad)

*disease might come back insufficient*

•        disease would spread if it came back

•        protection on holiday abroad

•        high proportion of immune people needed to prevent epidemic

**1**

**[6]**

**Q4.**

(a)     antibiotics do not kill viruses

*allow antibiotics only kill bacteria*

*allow flu is not caused by a bacterium*

**or**

antibiotics are not effective against viruses

*allow antibiotics cannot reach viruses inside cells*

**1**

(b)     Inactive viruses

**1**

(c)     Conclusion:  
people 65 years and older had the highest percentage vaccinated.

*ignore references to figures unless qualified*

**1**

Reason:  
more worried about becoming ill  
**or**had more time to go to the doctor.

**OR**

Conclusion:  
children aged 3-years had the lowest percentage vaccinated.

Reason:  
parents didn’t have time to take them to the doctor  
**or**they had been vaccinated when 2-years old.

**1**

**[4]**

**Q5.**

(a)     dead / inactive form of virus introduced into body

**1**

white blood cells stimulated to produce antibodies

**1**

correct antibodies rapidly made if the body is infected with the virus

**1**

(b)     the percentage of children vaccinated fell to zero in 1995

**1**

but the number of children developing autism rose and fell  
during the period when % vaccinations was falling

**1**

number of children developing autism peaked after MMR  
vaccination had ceased

**1**

which suggests that something other than MMR vaccination  
was causing autism

**1**

**[7]**

B3 – Drugs – Mark Schemes

**Q1.**

(a)     (i)      4 / four (years)

**1**

(ii)     any **one** from:

•        animals

*allow suitable examples eg rats*

*do* ***not*** *allow humans / plants*

•        (living) cells

*allow human cells*

*do* ***not*** *allow plant cells*

•        (living) tissues

*allow human tissues*

*do* ***not*** *allow plant tissues*

**1**

(b)     (i)      9 (years)

*allow* ***1*** *mark for 13 – 4*

***or***

*2 + 3 + 4*

**2**

(ii)     see if the drug has side effects

**1**

(iii)    neither the volunteers nor the doctors

**1**

**[6]**

**Q2.**

(a)     testing for toxicity / see if it is safe /see if it is dangerous / to see if it works

*ignore side effects unqualified*

**1**

(b)     (i)     testing for side effects / testing for reactions (to drug)

*ignore to see if it works*

*do* ***not*** *accept dosage*

**1**

(ii)    any **one** from

*ignore immune system*

•        dose too low to help patient

•        higher risk for patient

•        might conflict with patient’s treatment / patient on other drug

•        effect might be masked by patient’s symptoms / side effects clearer

**1**

(c)     to find optimum dose

*allow testing on larger sample* ***or*** *it makes results more reliable*

*allow to find out if drug is effective /find out if drug works on ill people (not just if drug works)*

**1**

(d)     (i)     (tablet / drug / injection) that does not contain drug

*allow control / fake / false*

*allow tablet / injection that does not affect body*

*do* ***not*** *accept drug that does not affect body*

**1**

(ii)     neither patients nor doctors

**1**

**[6]**

**Q3.**

(a)     any **one** from:

•        not all deaths recorded

•        not all causes of deaths recorded

*allow cause may not be known*

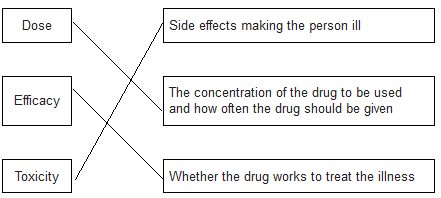
**1**

(b)     antibiotics do not kill viruses

*allow antibiotics only kill bacteria*

**1**

(c)



*all correct for* ***2*** *marks*

*1 or 2 correct for* ***1*** *mark*

**2**

(d)     any **one** from:

•        to prevent false claims

•        to make sure the conclusions are correct / valid

•        to avoid bias

**1**

**[5]**

B4 – Photosynthesis – Mark Schemes

**Q1.**

(a)     (i)      LHS = water

*accept H2O*

*do* ***not*** *accept H2O / H2O*

**1**

RHS = oxygen

*accept O2*

*do* ***not*** *accept O / O2 / O2*

**1**

(ii)     light / sunlight

*ignore solar / sun / sunshine*

*do* ***not*** *allow thermal / heat*

**1**

(iii)    chloroplasts

*allow chlorophyll*

**1**

(b)     (i)      20

**1**

(ii)     any **one** from:

•        light (intensity)

•        temperature.

**1**

(c)     (i)      To increase the rate of growth of the tomato plants

**1**

(ii)     Because it would cost more money than using 0.08%

**1**

Because it would not increase the rate of photosynthesis of the tomato plants any further

**1**

**[9]**

**Q2.**

(a)     temperature

**1**

carbon dioxide concentration

*allow type of pondweed*

*allow mass of pondweed*

**1**

(b)     

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

**

**2**

****

= 16(.0) (bubbles per minute)

*allow ecf from incorrect mean*

**1**

(c)     2.3(333)

**1**

(d)     place different coloured filters over the lamp bulb

**or**

use different coloured light bulbs

**1**

keep the lamp the same distance from the pondweed each time

**1**

**[8]**

**Q3.**

(a)     6H2O

*in the correct order*

**1**

C6H12O6

**1**

(b)     (i)      control

***do not accept*** *‘control variable’*

*allow:*

*to show the effect of the organisms*

***or***

*to allow comparison*

***or***

*to show the indicator doesn’t change on its own*

**1**

(ii)     snail respires

**1**

releases CO2

**1**

(iii)    turns yellow

**1**

plant can't photosynthesise so CO2 not used up

**1**

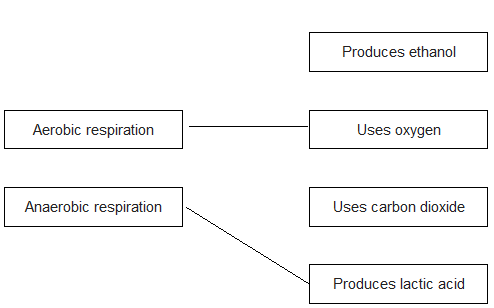
but the snail (and plant) still respires so CO2 produced

**1**

B4 – Respiration and Exercise – Mark Schemes

**Q1.**

(a)



*an extra line from a LH box negates that mark*

**2**

(b)     any **one** from:

•        not enough oxygen present (for aerobic respiration)

•        more energy required for exercise (than can be transferred by aerobic respiration)

**1**

*allow named example for exercise*

(c)     produces carbon dioxide

**1**

produces ethanol

**1**

plus any **two** from:

•        (carbon dioxide) makes bread rise

•        (carbon dioxide) makes beer / cider / (some) wines fizzy

*allow for alcoholic drinks / named drink*

•        (ethanol) is the alcohol in beer / cider / wine / spirits

**2**

**[7]**

**Q2.**

(a)     (i)    without oxygen

*allow not enough oxygen*

*ignore air*

*ignore production of CO2*

*ignore energy*

**1**

(ii)     more / high / increased lactic acid (at end)

*allow approximate figures (to show increase)*

*ignore reference to glucose*

**1**

(b)     (i)      1.5

*allow only 1.5 / 1½ / one and a half*

**1**

(ii)     increases at first **and** levels off

*ignore subsequent decrease*

**1**

suitable use of numbers eg

rises to 10 / by 9 (dm3 per min)

**or**

increases up to 1.5 (min) / levels off after 1.5 (min) (of x axis timescale)

*allow answer in range 1.4 to 1.5*

**or**

after the first minute (of the run)

**1**

(iii)     supplies (more) oxygen

**1**

supplies (more) glucose

**1**

*need ‘more/faster’ once only for full marks*

*allow removes (more) CO2 / lactic acid / heat as an alternative for either marking point one* ***or*** *two,* ***once*** *only*

for (more) respiration

**1**

releases (more) energy (for muscle contraction)

*do* ***not*** *allow energy production or for respiration*

**1**

**[9]**

**Q3.**

(a)    40 – 60 hours

**1**

(b)    (i)      decrease

**1**

1st slowly then faster / appropriate detail from the graph – e.g. from 7.8 to 0 / faster after 4 – 10h

**1**

(ii)     oxygen after glucose

*extra box ticked cancels 1 mark*

**1**

oxygen less than glucose

**1**

(iii)    respiration

**1**

**[6]**

**Q4.**

(a)     LHS – glucose

**1**

RHS – water

*allow H2O / H2O*

**1**

(b)     so the earthworms’ body temperature would change to 20°C

**1**

(c)     (i)      56 or 55 or 54

*if incorrect answer given accept 60 - 5 for* ***1*** *mark*

*or 60 – 6 for* ***1*** *mark*

*or 60 – 4 for* ***1*** *mark*

**2**

(ii)     one-tenth of answer to (c)(i) eg 5.5

**1**

(at 10°C / lower temperature):

lower rate of respiration

*allow chemical reactions slower or enzymes less active*

*ignore breathing*

*do not allow anaerobic*

**1**

worms less active / worms release less energy / worms use less energy

**1**

(d)     (i)      anomalous result / not in line with other data / does not fit the pattern

**1**

(ii)     more representative / more reliable / can check ‘repeatability’ / see if get similar values / identify anomalies

*ignore valid / more fair*

*ignore reproducible*

*ignore ‘to remove’ anomalies*

*do not accept more accurate or more precise*

**1**

**[10]**