

Mark schemes

Q1.

- (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
do not prepare food (whilst infected)
ignore 'wash hands' unqualified
ignore reference to coughing / sneezing
 - isolate yourself
allow examples of how isolation could be achieved
 - disinfect clothes / surfaces
 - do not share utensils / cutlery / towels 2
- (c) antibiotics 1
allow named examples of antibiotics
- (d) immune system is damaged / weakened **or** immune system doesn't function properly 1
allow immunocompromised
allow lack of / no white blood cells
- white blood cells cannot kill bacteria / *Salmonella* (as effectively) 1
allow no / fewer antibodies so bacteria not killed
***or** less phagocytosis so bacteria not killed **or** no / fewer antitoxins to counter toxins*
- (e) any **one** from:
- (give chickens) antibiotics
allow (give chickens) monoclonal antibodies
 - don't sell infected chickens / eggs
allow don't sell the chickens / eggs
ignore don't sell chickens / eggs
 - keep infected chickens isolated / indoors
allow keep the chickens indoors
ignore keep chickens indoors

- slaughter the infected chickens
ignore vaccination / chlorination / disinfection
1

- (f) (cleaning liquid) B
and
greater reduction in number of bacteria (after cleaning) in both locations
ignore few bacteria in both locations
*allow neither / both **and** idea of experimental error*
1

- (g) radius (of area with no bacteria growing)
allow diameter (of the area with no bacteria growing)
ignore πr^2 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 not tested on other types of bacteria
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 how long the cleaner lasts for
allow reference to odour of cleaning liquid
ignore reference to cost unqualified
ignore environmental effects / flammability
1

Q2.

(a) a protist

1

(b) lower percentage of people with malaria when using (mosquito) nets

allow converse if clearly describing people who do not use (mosquito) nets

allow fewer people with malaria when using (mosquito) nets

*allow **only** 1.2% of people with malaria when using (mosquito) nets*

ignore reference to data from table unqualified

*do **not** accept incorrectly calculated figures*

1

(c) any **one** from:

- some people who use (mosquito) nets have malaria
allow people can get malaria when they are not sleeping
- data from only one area / part of Africa
- size of group too small **or** sample size too small **or** only 476 people
allow correlation does not imply causation
- only 50 people did not use (mosquito) nets
or
uneven group sizes (nets vs. no nets)
- no other information about people considered
allow examples of information not considered e.g. age, other medical issues such as sickle cell, whether taking anti-malarial medication, vaccination
ignore ref to other factors unqualified
- people may have lied about using (mosquito) nets

1

(d) any value between 88 - 91

allow decimal values

1

(e) any **one** from:

- improved health care
*allow examples of improved health care such as **more / cheaper / new** treatments / vaccinations / antibiotics*
- use of mosquito control methods
*allow descriptions such as spraying of insecticides / repellent **or** draining water holes **or** preventing mosquitoes from breeding*
- changing behaviour to avoid being bitten (by mosquitoes)
*allow descriptions such as wear long clothing **or** avoid going out at dusk*

1

(f) **Level 2:** Scientifically relevant facts, events or processes are identified and

given in detail to form an accurate account.

4-6

Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.

1-3

No relevant content

0

Indicative content

prevents pathogens from entering skin

- tough / dry / dead outer layer
- skin acts as a barrier
- sebum / oil on (surface of) skin
- sebum / oil repels pathogens
- scabs form over cuts **or** scabs form a barrier
- platelets are involved in forming clots / scab

stomach

- contains (hydrochloric) acid
- (HCl) kills bacteria
- in food **or** in swallowed mucus

eyes

- produce tears
- contains enzymes to kill bacteria
- tears are antiseptic

breathing system

- trachea / bronchi / nose produce mucus
- mucus is sticky
- (mucus) traps bacteria
- (mucus) carried away by cilia

defends itself against pathogens inside the body

- immune system / white blood cells (WBCs)
- WBCs engulf pathogens
- antitoxins are produced
- (antitoxins) neutralise toxins / poisons (produced by pathogen)
- antibodies are produced
- (antibodies) help destroy pathogens
- memory cells (are formed)
- (memory cells give a) more rapid response if pathogen re-enters

a **level 2** response should refer to body defence **and** the immune system

[11]

Q3.

- (a) controls the (activities of the) cell
*allow contains genetic information / genes / DNA
/ chromosomes*

do not accept brain

*do not accept controls substances entering /
leaving the cell*

1

(b) red blood cell / RBC

allow erythrocyte

ignore blood cell unqualified

ignore platelets

or

bacteria / prokaryote

allow named examples of bacteria

do not accept virus

or

xylem (cell)

1

(c) cell shape is similar to cell in **Figure 1 and** nucleus present

ignore shading

do not accept a cell wall drawn

1

any **two** features correctly identified and labelled:

- nucleus
- (cell) membrane
- cytoplasm
- mitochondria / mitochondrion
- ribosome(s)

allow cell wall if drawn and correctly labelled

do not accept other plant sub-cellular structures

1

(d) any **one** from:

- (cellulose cell) wall
- chloroplast

ignore chlorophyll

- (permanent) vacuole

allow starch grain

1

(e)

an answer of (×) 400 scores 3 marks

an answer of (×) 40 scores 2 marks

24 (mm) **or** 2.4 (cm)

*allow in range 23 to 25 (mm) or in range 2.3 to
2.5 (cm)*

1

24
0.06

or

$$\frac{2.4}{0.06}$$

allow correct calculation from their measurement of X to Y in the range 2.3 cm to 3.5 cm or 23 mm to 35 mm

1

(×) 400

*allow correct magnification derived from their measurement in mm
ignore rounding errors*

1

(f) high(er) magnification

*ignore bigger / zoom
if neither mark awarded allow 1 mark for see smaller objects or see smaller sub-cellular structures*

1

high(er) resolution or high(er) resolving power

*allow see more detail
if neither mark awarded allow 1 mark for see smaller objects or see smaller sub-cellular structures
allow 3D image*

1

[10]

Q4.

(a) any **two** from:

allow proteins / hormones / antibodies / vitamins / minerals / ions / fatty acids / glycerol

- carbon dioxide
- water
- glucose
- amino acids

ignore sugar / enzymes / nutrients / waste

- lactic acid

2

(b) more haemoglobin

max 2 marks if 'more' is not given

1

(therefore) more oxygen can be carried / transported

1

(for) more (aerobic) respiration of muscle (cells)

or

more energy released for muscle (cells)

allow less anaerobic respiration / lactic acid /

oxygen debt / fatigue in muscle (cells)

i.e. addition of 'debt'

*do **not** accept energy produced*

1

(c) pulmonary artery

1

vena cava

1

(d) B

1

(e) any **three** from:

- arteries have a **thicker** layer of muscle (tissue) **or** veins have a **thinner** layer of muscle (tissue)*

- arteries have a **thicker** layer of elastic tissue **or** veins have a **thinner** layer of elastic tissue*

if neither marking points 1 or 2 awarded, allow arteries have a **thick wall **and** veins have a **thin wall***

or

*arteries have a **thicker wall** or veins have a **thinner wall** for **1** mark*

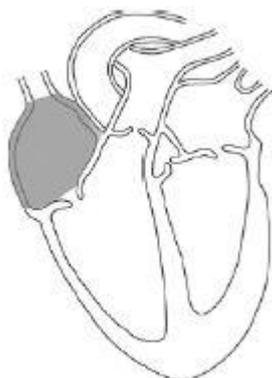
*do **not** accept 'cell wall'*

- arteries have a **narrower** lumen **or** veins have a **wider** lumen
allow descriptions of 'lumen'

- arteries do not have valves **and** veins have valves
*allow **only** veins have valves*

3

(f) allow an X drawn anywhere in grey shaded area below:



if a large X is drawn, award the mark if the intersection touches the grey area

if a label line is used, award marks if the end of the label line touches the grey area

allow label 'pacemaker'

ignore label 'right atrium'

1

- (g) an irregular heart beat
allow arrhythmia
allow fibrillation
ignore heart failure
do not accept cardiovascular disease / heart murmur

1

[13]

Q5.

- (a) (yes, because) the mass change (of egg 4) is much lower than the others
allow because it / egg 4 has gained (over) 50% less mass than the others
allow it / egg 4 has gained 1.5 g and the others have all gained more than 3 g (unit required)

1

- (b) $\frac{75.7 - 72.4}{72.4} \times 100$
or equivalent

1

4.6 (%)

allow 4.558 / 4.56 (%)
allow any correct rounding of 4.558011049723757

1

an answer of 4.6 / 4.56 / 4.558 scores 2 marks

- (c) (mass increased because) water entered by osmosis

1

from a dilute solution in the beaker to a more concentrated solution in the egg (cell)

allow from an area of high water concentration in the beaker to an area of low water concentration in the egg (cell)
allow ref to water potential
allow ref to 'strong' and 'weak' solutions
ignore along / across concentration gradient
do not accept 'amount' in place of concentration

through a partially permeable membrane

allow semi-permeable / selectively permeable membrane

1

- (d) use five (or more) different concentrations of salt / sugar solution (in beakers)
allow any number of concentrations provided it is more than four

- (by) plotting percentage change (in mass / volume) on / using a graph 1
- determine the concentration where the curve / line crosses the zero percentage change (in mass / volume) 1
- (e) (ions are moved) from an area of low concentration to high concentration
allow against the concentration gradient
allow in terms of solution
do not accept molecules 1
- (by) active transport 1
- (which) requires using energy
do not accept idea of energy being created 1
- [12]

Q6.

- (a) (mouthpiece) has pierced / entered the phloem
or
(the aphid) has been feeding from the phloem 1
- (b) yellow leaves due to lack of chlorophyll
ignore 'chloroplasts'
ignore magnesium is needed to make chlorophyll 1
- (therefore) less / no light absorbed (by chlorophyll) 1
- (therefore) lower rate of / no photosynthesis
do not allow 'energy is produced by photosynthesis' 1
- (therefore) plant makes less / no sugar / glucose 1
- (therefore) plant converts less / no sugar / glucose into protein (for growth, so growth is stunted)
allow less glucose / sugar converted into cellulose (cell wall)
allow less energy for protein synthesis 1
- (c) inject the protein / it into a mouse 1
- combine lymphocytes with tumour / cancer cells to make hybridoma (cells)

*ignore white blood cells
allow T or B lymphocytes
ignore tumour unqualified*

1

find a hybridoma which makes a monoclonal antibody specific to PVY

1

(the scientist) clones (the hybridoma) to produce many cells (to make the antibody)

*do not allow cloning of original stem cells
allow many rounds of cloning / mitosis*

1

[10]

Q7.

(a) (for calcium)

$$\frac{500}{605} \times 1000 = 826.446281 \text{ (cm}^3\text{)}$$

*allow any correct rounding to minimum 3
significant figures
allow alternative route with correct rounding*

1

(for vitamin B-12)

$$\frac{500}{4.5} \times 2.4 = 266.67 \text{ (cm}^3\text{)}$$

allow alternative route with correct rounding

1

560 / 559.8 / 559.78 / 559 (cm³)

*allow only correct answer based on values given
for vitamin B-12 and calcium*

1

*an answer of 560 / 559.8 / 559.78 / 559 (cm³)
scores 3 marks*

*an incorrect answer for one step does not
prevent allocation of marks for subsequent steps*

(b) **Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.

4-6

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1-3

No relevant content

0

Indicative content

Separate Biology Easter Revision 2002 - PAPER 1

- Biuret reagent (allow CuSO_4 and NaOH) tests for protein
- add Biuret reagent to milk
- solution will turn (from blue) to lilac if positive

- iodine solution tests for starch (ignore iodine unqualified)
- add iodine solution to milk
- solution will turn (from orange / brown) to blue / black if positive

- Benedict's reagent tests for sugars
- add Benedict's reagent to milk and boil / heat (allow any temperature above 60°C)
- solution will turn (from blue) to (brick) red / brown / orange / yellow / green if positive

for **level 2**, reference to all three food tests is required

- (c) lipase breaks down fat into fatty acids (and glycerol)
do not accept if 'glycerol' is contradicted 1
- (and) fatty acids lower the pH 1
- (and when) fatty acids cause the pH to be below 10 (the indicator becomes colourless) 1
- (d) observation of colour change is subjective / based on opinion
ignore human error unqualified
ignore experimental error or examples of this 1
- (e) bile emulsifies fats
allow a correct description of emulsification (i.e. breaks fat from large droplets into smaller droplets)
do not accept a description of chemical breakdown 1
- creates a larger surface area (of fat) 1
- (so) lipase can break down fat (to produce fatty acids) more quickly / effectively
allow fatty acids produced by action of lipase more quickly 1

[16]