Mark schemes

1

(a) in the blood(stream)

allow plasma

ignore dissolved or in solution

1

(b) all three plots correct

*accept two correct plots for **1** mark*

2

suitable line drawn

1

(c) 1 hour

1

(d) 230−185

identification of steepest part of graph and correct readings taken

1

= 45

1

(e) line on graph showing extrapolation for person **B**

correct value read from graph (at 130 mg per 100 cm^3)

*allow **1** mark for a value of 4.5–5 hours if no extrapolation shown*

2

[9]

2

(a) tissue → organ → organ system

*one right for **1** mark*

*three right for **2** marks*

2

(b) **Epithelial tissue** → covers the outside and the inside of the stomach

more than one line from a tissue = no mark

1

Glandular tissue → produces digestive juices

1

Muscular tissue → allows food to be churned around the stomach

1

(c) (i) light

ignore dark

1

(ii) moving (to the dark)

1

(iii) any **two** from:

- use more woodlice
- repeat the experiment
- run for a longer time

2

[9]

3 (a) 55%

2 *marks for correct answer alone*

accept 54 − 56

5.5 / 10 × 100 alone gains ***1*** *mark*

2

(b) any **three** from:

- amino acids
- antibodies
- antitoxins
- carbon dioxide
- cholesterol
- enzymes
- fatty acid
- glucose
- glycerol
- hormones / named hormones
- ions / named ions
- proteins
- urea
- vitamins
- water.

ignore blood cells and platelets

ignore oxygen

max 1 named example of each for ions and hormones

allow minerals

3

(c) Marks awarded for this answer will be determined by the Quality of Communication (QC) 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 pathogens with errors or roles confused.
or
the immune response with errors or roles confused.

Level 2 (3 – 4 marks)
There is a description of pathogens **and** the immune response with some errors or confusion
or
a clear description of either pathogens **or** the immune response with few errors or little confusion.

Level 3 (5 – 6 marks)
There is a good description of pathogens **and** the immune response with very few errors or omissions.

Examples of biology points made in the response:

- bacteria and viruses are pathogens
  credit any ref to bacteria and viruses
- they reproduce rapidly inside the body
- bacteria may produce poisons / toxins (that make us feel ill)
- viruses live (and reproduce) inside cells (causing damage).

white blood cells help to defend against pathogens by:

- ingesting pathogens / bacteria / (cells containing) viruses
  credit engulf / digest / phagocytosis
- to destroy (particular) pathogen / bacteria / viruses
- producing antibodies
- to destroy particular / specific pathogens
- producing antitoxins
- to counteract toxins (released by pathogens)
  credit memory cells / correct description
- this leads to immunity from that pathogen.

6

[11]

4 (a) (i) 5.0

1

(5 × 0.8) **or** 4

allow ecf from distance

1

0.4

allow ecf from 10-min volume

1

(ii) increased (rate of uptake)

1

more transpiration / evaporation

1

(b) correct scales

allow reversed axes

1

correctly labelled axes with units

1

correct points

*one plot error = max **1** mark*

2

curved line of best fit

allow correct straight line

1

(c) leaves wilt

1

because plants lose too much water (by evaporation)

1

through the stomata
or
because cells become plamolysed
or
stomata close
controlled by guard cells
to prevent wilting

1

[13]

5 (a) Marks awarded for this answer will be determined by the Quality of Communication (QC) 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)
The method described is weak and could not be used to collect valid results, however does show some understanding of the sequence of an investigation.

Level 2 (3−4 marks)
The method described could be followed and would enable some valid results to be collected, but lacks detail.

Level 3 (5−6 marks)
The method described could be easily followed and would enable valid results to be collected.

Examples of the points made in the response:

- bean seedlings of same age
- cut material from same part of each organ (for repeats) e.g. top 1 cm of stem / a whole cotyledon / seed
- equal mass of each organ

  accept weight for mass
- grind / homogenise
- in equal amounts of water / buffer
- equal volumes of hydrogen peroxide solution
- equal concentrations of hydrogen peroxide solution
- same temperature
- temperature maintained in water bath
- quantitative measure of gas production eg height of foam in mm / collect gas in graduated syringe in cm^3
- for same time period
- repetitions (3+ times)
- calculate mean for each.

6

(b) (i) correct answer: 40

1 *mark for 45 as the anomalous result has been included in the calculation*

or

1 *mark for* $\frac{(38 + 41 + 42 + 39)}{4}$

or $\frac{160}{4}$

2

(ii) vertical axis correctly labelled:
'Enzyme activity in arbitrary units'

allow ecf from (b)(i)

1

points plotted correctly ±1 mm

*deduct **1** mark for each incorrect plot*

2

suitable line of best fit

not feathery, not point to point

1

(iii) 6.0 / 6

allow ± 0.1

if 6.0 not given, allow correct for candidate's graph ± 0.1

1

(iv) in range 0 to 14 units

allow correct for candidate's graph

1

(v) enzyme denatured / enzyme (active site) shape changed

allow substrate no longer fits (active site)

ignore reference to temperature

do not allow enzyme dies

1

[15]

6 (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]

7 (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]

8 (a) (i) glycerol

1

(ii) pancreas / small intestine

accept duodenum / ileum

ignore intestine unqualified

1

(b) any **two** from:

- type of milk
- volume / amount of milk
- vol. bile equals vol. water
- volume of lipase
- concentration of lipase
- temperature

ignore time interval

ignore solution unqualified

*do **not** allow pH*

ignore starting pH

ignore volume / amount of bile / water

ignore concentration of bile

accept amount of lipase if neither volume nor concentration given

2

(c) (i) fatty acid (production)

1

(ii) faster reaction / digestion (with bile)
or
pH decreases faster (with bile)
or
takes less time (with bile)
or
steeper fall / line (with bile)

allow use of data

ignore easier

1

(iii) all fat / milk digested
or
same amount of fatty acids present
or
(lower pH) denatures the enzyme / lipase

allow all reactants used up

ignore reference to neutralisation

allow enzyme won't work at low pH

*do **not** allow enzyme killed*

1

[7]

9 (a) 5624

***allow 2 marks** for:*

- *correct HR = 148 **and** correct SV = 38 plus wrong answer / no answer*

or

- *only one value correct **and** ecf for answer*

***allow 1 mark** for:*

- *incorrect values **and** ecf for answer*

or

- *only one value correct*

3

(b) (i) **Person 2** has low(er) stroke volume / SV / described

*eg **Person 2** pumps out smaller volume each beat*

*do **not** allow **Person 2** has lower heart rate*

1

(ii) **Person 1** sends more blood (to muscles / body / lungs)

1

(which) supplies (more) oxygen

1

(and) supplies (more) glucose

1

(faster rate of) respiration **or** transfers (more) energy for use

ignore aerobic / anaerobic

allow (more) energy release

allow aerobic respiration transfers / releases more energy (than anaerobic)

*do **not** allow makes (more) energy*

1

removes (more) CO2 / lactic acid / heat

allow less oxygen debt

or less lactic acid made
or (more) muscle contraction / less muscle fatigue

if no other mark awarded,

allow person 1 is fitter (than person 2) for max 1 mark

1

[9]

10 (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]

11 (a) (i) water / H_2O

accept oxygen

allow H_2O

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

1

(ii) the mineral ions are absorbed by active transport

1

the absorption of mineral ions needs energy

1

(iii) have (many root) hairs

1

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

1

(b) carbon dioxide in
or
oxygen out
or
control water loss

accept gas exchange

ignore gases in and out

ignore gain / lose water

1

(c) (i) guard cells

1

(ii) (stomata are) closed

allow there is no gap / space

1

(iii) plant will wilt / droop

ignore die

1

[9]