M1. (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]

M2. (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' / □produce' / '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]

M3. (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.

0 marks 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

ignore fights / 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

ignore ref to cost / dangerous or harmful unqualified

1

or may work differently with different bacteria

or disinfectants may be different concentrations

ignore different amounts of disinfectant unless reference to different drop size

or may not last as long

ignore take longer to work

allow reference to anomalous result or not repeated

[9]

M4. (a) any **two** from:

- only one 'chromosome'
  allow one strand of DNA
- 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
  allow 'on average it is 5 / 6 times greater'

1

(ii) increases
Included figures must be correct

1

(iii) overall slight increase
accept 'doesn't change 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
accept straight line or smooth curve

1

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

1

(d) provides immunity / protection (to TB)
ignore 'stops people catching it'
ignore 'resistance'

1

prevents TB <u>spreading</u>
accept ref to herd immunity

1

[13]

M5. (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]

M6. (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]