M1.   (a)   1.   Add Benedict's;
                        Hydrolyse with acid negates mp1

           2.   Heat;
                        Accept warm, but not an unqualified reference to water bath

           3.   Red / orange / yellow / green (shows reducing sugar present);
                        Accept brown

                                                                                    3

       (b)   (i)   1.   Starch hydrolysed / broken down / glucose / maltose produced;
                              Neutral: Sugar produced

                  2.   Lower water potential;

                  3.   Water enters by osmosis;

                                                                                    3

              (ii)   Only 2 pHs studied / more pHs need to be tested;
                          Accept: different amylase may have a different optimum pH

                                                                                    1

                                                                                    [7]

M2.   (a)   1.   Haemoglobin carries oxygen / has a high affinity for oxygen / oxyhaemoglobin;

           2.   Loading / uptake / association in lungs;

           3.   at <u>high p.O_2</u>;

           4.   Unloads / dissociates / releases to respiring cells / tissues;

           5.   <u>at low p.O_2</u>;

           6.   Unloading linked to higher carbon dioxide (concentration);
                        *6. Ignore reference to incorrect pH in relation to effect of higher
                        carbon dioxide concentrations for marking point*

                                                                                    6

       (b)   1.   Allows comparison;
                        Do not credit 'temperature affects results' on its own;

           2.   (Different temperature) affects enzymes;
                        2. Allow reference to denaturation of enzymes.

           3.   (Different temperature) affects respiration / metabolism;

           4.   (Different temperature) affects amount of dissolved oxygen;

                                                                                    2 max

       (c)   1.   Increases then levels out / stops increasing / fluctuates slightly;

           2.   At 5 (cm^3 dm^{-3}) / 320 (cm^3 $g^{-1}h^{-1}$);
                        *Allow description of 'fluctuates slightly' in terms of candidate
                        quoting figures after 320.*

                                                                                    2

(d) 1. *Chronimus longistylus* has high<u>er</u> uptake at low (oxygen) concentrations;
Chronimus longistylus has higher uptake to (oxygen concentration of) 2 / lower uptake after 2; (= 2 marks)

2. (Higher uptake) up to 2 cm^3 dm^{-3};
2. Award mark if candidate uses figures from table e.g. higher at concentration 1 (220) <u>or</u> concentration 2 (285).
Higher uptake at concentration 1 <u>or</u> 2 = 2 marks.

2

(e) (i) More (than in African) lost via gills in Australian lungfish / less (than African) lost via lungs in Australian lungfish;

1

(ii) 1. More / most exchange is via lungs (in African lungfish);
1. Allow converse for first point.

2. Gills will not function / function less efficiently (in air);
2. Allow water is required for gills to function.

2

[15]

M3. (a) (i) 1. Sex;

2. Lifestyle;
Stress, smoking, diet etc are examples of lifestyle.

3. Body mass;
3. Allow weight for mark point 3.

4. Health;
Reject: height.

5. Ethnicity;

6. Genetic factors / family history;

2 max

(ii) 1. Large sample / number / 410 000;
Reject: random

2. Long time period / 8.5 / many years;

3. Different countries / more than one country;

2

(b) Correct answer of 209 / 209.1 = 2 marks;
Answer of 210 = one mark

Incorrect answer but multiplies by 8.5 = 1 mark;

2

(c) Age affects risk of cancer;
Must relate to cancer not just to illness

1

(d) 1. Correlation does not mean causal relationship;
   1. Reject casual for point 1.
   Reference to 'due to other factors' on its own is not enough for a mark

2. Tea / coffee contains other substances / different amounts of caffeine / estimated intake (of tea / coffee);

3. No control group;

4. Only one type of cancer studied / further studies required / only one investigation / study / group;

4

(e) (i) 1. Treated the same;
   2. Accept decaffeinated

2. No caffeine;
   2. Reject placebo.

2

(ii) 1. Absorb different amounts;
   Reject: Different body masses

2. Broken down by enzymes / digested;

3. Different blood volumes;

4. Differences in metabolism;

5. Caffeine from a different source;

1 max

(iii) 1. Less oxygen / glucose to (cancer) cells;
   'Reduces cell division' on its own should not be credited.

2. Less carcinogens;

3. Reduces spread of cancer (cells);

1 max

[15]

M4. (a) (i) where mitosis / division / growing / occurs
   (reject growing cells)

1

(ii) to distinguish chromosomes / chromosomes not visible without stain;

1

(iii) to let light through / thin layer;

1

(b) (i) 74 + 18 / 982;
   = 9.4% / 9%;

2

   (allow 1 mark for identifying prophase & metaphase i.e.92 or correct method using wrong figures)

(ii) genetic differences / different types of garlic;
time of day;
chance;
age of root tip;
water availability;
temperature;
nutrient availability;

(environmental factors = 1 but cannot be awarded in addition to a named environmental factor)

2 max

[7]

M5. (a) (To diagnose AIDS, need to look for / at)

1. (AIDS-related) symptoms;

2. Number of <u>helper</u> T cells;
Neutral: 'only detects HIV antibodies' as given in the question stem

2

(b) 1. HIV antibody is not present;
Accept HIV antibodies will not bind (to antigen)

2. (So) second antibody / enzyme will not bind / is not present;

2

(c) 1. Children receive (HIV) antibodies from their mothers / maternal antibodies;

2. (So) solution will always turn blue / will always test positive (before 18 months);
Allow 1 mark for the suggestion that the child does not produce antibodies yet <u>so</u> test may be negative

2

(d) (Shows that)

1. Only the enzyme / nothing else is causing a colour change;

2. Washing is effective / all unbound antibody is washed away;

2

[8]

M6. (a) 1. Uses energy / ATP;

2. Against concentration gradient / low to high concentration;

3. Does not use channel proteins / <u>only</u> uses carrier proteins;
Assume "it" refers to active transport.
1. Facilitated diffusion is passive - neutral
2. Along / across concentration gradient - neutral
Accept up / down concentration gradient
Accept AT does not need concentration gradient.

2 max

(b) (i) To see the effect of the drug / effect not due to anything else in the tablet;
Neutral "to compare results"

1

(ii) Placebo / dummy drug / tablet without drug;

(Otherwise) treated the same;
No drug - neutral
Accept: Example e.g. tablet given at same time

2

(c) Decrease for 3 hours;
Accept decreases from 1 - 4 hours

1

[6]

M7. (a) To prevent contamination of apparatus with other microorganisms / bacteria;
To prevent personal contact with bacteria;
To prevent release of bacteria into air;

max 2

(b) (i) Diffuses slowly;

1

(ii) B;
Produces inhibition zone greater than the minimum diameter;

2

[5]

M8. (a) (i) 1.08;
Must be to 3 significant figures, as in the table

1

(ii) Allows comparison / shows proportional change;
Neutral: sizes / amounts

Idea that discs had different starting masses / weights;
Neutral: different masses

2

(iii) (Allows)
Accept: outliers instead of anomalies

Anomalies to be identified / effect of anomalies to be reduced / effect of
variation in data to be minimised;
*Reject: idea of not recording anomalies / preventing anomalies
from occurring*

A <u>mean</u> to be calculated;
Neutral: average

2

(b) (i) Plot (sodium chloride) concentration against ratio / draw line of best fit;
Reject: if wrong axes or type of graph

Find (sodium chloride concentration from the graph) where the ratio is 1 / there is no change in mass;

2

(ii) Line / curve of best fit is more reliable / precise;
Neutral: graph

Intercept / point where line crosses axis is more reliable / precise;
Reject: references to 'more accurate'

OR

Can plot SD values / error bars;

(To show) variability about the mean / how spread out the results are;

2

[9]