Mark schemes

Q1.

(a) 1. Type I do not produce insulin

OR

Type II do produce insulin;

Accept 'Type I lack insulin' or is 'due to an immune response' or 'beta cells nonfunctional'.

Accept 'Type I do not produce enough insulin'.

2. In type II receptors/cells less sensitive/responsive to insulin

OR

In type II receptors/cells are insulin 'resistant';

Accept 'In Type II faulty/fewer receptors'.

3. Weight **not** linked to type I diabetes

OR

Weight linked to type II diabetes;

Accept 'obesity' for 'weight'.

Accept 'diet' and 'exercise' for 'weight' (as weight-loss programme may involve these).

Ignore 'lifestyle'.

2

(b) 1. Computer-generated list **so** no bias

OR

Selection of volunteers was random **so** no bias;

Accept 'generalised' (to the population) for 'representative'.

2. Large sample size **so** representative/reliable;

Accept 'large number of health centres' and accept '380/190' for 'large sample size'.

3. Two years **so** effect (could be) long term;

Accept if answer suggests 4 years.

Accept 'long period of time' for 'two years'.

4. Control **so** comparison possible;

5. (Large) range/variety of ages **so** (age range) representative

OR

(Large) range/variety of ages **so** age is not a factor;

Accept '25-60 years' for '(large) range'.

3 max

(c) Correct answer of 71 = **2 marks**;;

Answer of 142 = **1 mark**

OR

80 **OR** 9 in working = **1 mark**

OR

79.99 **OR** 8.93 in working = **1 mark;**

*Accept for **two marks**, an answer that rounds up or down to 71.*

*Accept for **one mark**, an answer that rounds up or down to 142.*

2

(d) **Max 3 marks from mark points 5 to 9**.

1. Percentage/number in remission **and** percentage/number with weight loss is higher for group P;

Relates to first two rows of data.

2. High percentage with weight loss (≥15 kg) in both groups achieved remission;

Relates to third row of data.

Accept numerical values/% for 'high(er)'.

3. Some with weight gain achieved remission;

Relates to fourth row of data.

Accept '1.9%' for some.

4. Less than 50% in group P achieved remission;

*Accept '**Only** 42.1%' for less than 'half' but not simply '42.1%'. Idea of a 'low' percentage must be conveyed.*

5. Only shows results for volunteers with less than 5 years of diabetes;

6. No results for those **over** 60 years (of age)

OR

No results for those **under** 25 years of age;

7. No statistical test to see if significant <u>difference</u> (in results);

Accept 'difference not due to chance' for 'significant difference'.

Reject 'to see if results are significant'.

Ignore standard deviation/SD.

8. (Only shows remission) not cure

OR

Remission not (necessarily) long term;

9. Mass/weight (of volunteers) at beginning not known;

4 max

[11]

Q2.

(a) 1. Microvilli provide a large surface area

OR

Folded (cell-surface) membrane provides a large surface area;

Ignore 'brush border'.

2. Many channel/carrier proteins for facilitated diffusion;

3. Many carrier proteins for active transport;

3 and 4 Accept sodium-potassium pumps as an alternative to carrier proteins.

4. Many channel/carrier proteins for co-transport;

Accept 'cotransport protein' or 'symport' for type of transport protein.

5. Many mitochondria produce ATP

OR

Many mitochondria for active transport;

Accept co-transport for active transport.

6. Many ribosomes to produce carrier/channel proteins;

Accept abundant rough endoplasmic reticulum for many ribosomes, but abbreviation is not enough.

3 max

(b) Collecting duct **and** distal (convoluted) tubule;

Do not accept DCT for distal convoluted tubule.

1

(c) 1. Has a (specific) tertiary structure/shape;

Accept in context of ADH or receptor.

Ignore 3D.

Reject reference to Antigen or antibody.

1 and 2 Reject reference to active site, enzyme, substrate or induced fit only once.

2. (Structures are) complementary;

2

(d) 1. Aorta

OR

Carotid artery/sinus;

Ignore arteries but reject named incorrect artery.

2. (ADH) increases (re)absorption of water;

Reject if other substances are also absorbed e.g. glucose, ions.

3. Increases volume of (blood) **and** pressure increases

OR

Increases volume of (blood) **and** pressure returns to normal;

3

[9]

Q3.

(a) Correct answer of 8.1 / 8.07 / 8.066 / 8.0658 / 8.06575 × 10^{-3} = **2 marks**;;

Incorrect answer but shows 8 / 8.1 / 8.07 / 8.066 / 8.0658 / 8.06575 = **1 mark**

Correct answer but not in standard form = **1 mark**

Incorrect rounding of correct answer in correct standard form
e.g. 8.06 × 10^{-3} = **1 mark**;

Note. *To award 2 marks × 10^{-3} is required.*
Accept 8 × 10^{-3} for 2 marks but 8.0 × 10^{-3} = 1 mark due to incorrect rounding.

2

(b) 1. For (valid) comparison as rats vary in mass
OR
(So) each rat receives a quantity relative to their mass
OR
(So) concentration in the blood/body is the same;

Accept 'standardisation' for 'comparison'.
Accept 'weight' for mass but ignore size.

1

(c) 1. SDs do not overlap (for blood glucose concentration)
OR
SDs do not overlap (for mass);

2. So significant difference/increase (in blood glucose concentration)
OR
So significant difference/increase (in mass);

Accept 'difference/increase is not due to chance' for significant difference/increase.
Ignore reference to stats test.

3. (Type II diabetes) causes high blood glucose (concentration);

Accept 'associated/linked/have' for causes.

4. Obesity/high body mass is a (risk) factor (in type II diabetes)
OR
High fat (diet) is a (risk) factor (in type II diabetes);

5. (Investigation) done on rats (not humans);

6. (Only shows) results after short-time period
OR
Long-term effects not known;

Accept 1, 2 or 3 weeks.

5 max

(d) 1. (Type II) still produce/release insulin;

*Accept 'type 1 would not produce/release insulin' **or** this would cause type I diabetes.*

2. (Type II) cells/receptors less/not responsive/sensitive to insulin;

Accept involves 'faulty receptors' or 'fewer receptors'.

3. Pancreatic cells not destroyed in (type II diabetes);

Ignore pancreas is not destroyed.

4. Damage to pancreatic cells may affect processes/reactions (in the body);

2 max

[10]

Q4.

(a) Posterior pituitary;

Accept phonetic spelling.

Ignore any other additional wording.

1

(b) 1. Dehydration/thirst;

2. Frequent urination
OR
Increase in volume of urine;

Ignore amount.

Accept increased urination.

3. Less concentrated urine
OR
Dilute urine
OR
Urine paler/lighter in colour;

2 max

(c) 1. (Stimulates) addition of channel proteins into membrane;

Accept aquaporins for channel proteins.

Accept movement for addition.

Accept (stimulates) opening of channel proteins in membrane.

2. Increases permeability to water
OR
(More) water (re)absorbed;

Accept for reabsorbed 'enters blood' or 'leaves collecting duct'.

3. By osmosis;

3

[6]