M1. (a) if too high <u>insulin</u> released from pancreas

1

so glucose is moved into cells

allow glucose is stored

1

if too low, <u>glucagon</u> is released (from pancreas)

1

causes glycogen to be converted to glucose <u>and</u> released into the blood

1

(b) type 1 not enough / no insulin produced

1

whereas type 2 cells do not respond to insulin

1

type 1 is treated with injections of insulin

1

whereas type 2 is treated with diet and exercise
or
loss of weight
or
drugs

1

(c) $(3.45 \times 10^6) + (5.49 \times 10^5) = 3.999 \times 10^6$
or
3 450 000 + 549 000 = 3 999 000

allow 3.999 × 10^6 ***or*** *3 999 000 with no working shown for* ***1*** *mark*

1

$$\frac{3.999 \times 10^6}{6.5 \times 10^7} \times 100$$

or

$$\frac{3\,999\,000}{65\,000\,000} \times 100$$

= 6.15

*allow 6.15 with no working shown for **2** marks*
*allow for **1** mark for a calculation using either:*

$$\frac{3.45 \times 10^6}{6.5 \times 10^7}$$

or

$$\frac{3\,450\,000}{65\,000\,000}$$

or

$$\frac{5.49 \times 10^6}{6.5 \times 10^7}$$

or

$$\frac{549\,000}{65\,000\,000}$$

1

6.2

*allow 6.2 with no working shown for **3** marks*

1

*allow ecf from second step correctly rounded for **1** mark*

(d) could be other reasons for glucose in urine
or
blood test gives current / immediate result, urine levels might be several hours old
or
not always glucose in urine

1

(e) results not affected by glucose from food
or
8 hours is sufficient time for insulin to have acted on any glucose from food eaten

or
so that there is a low starting point to show the effect

1

(f) (patient **A**)

*no mark for identifying **A***

glucose level much higher (than **B**)

1

and remains high / does not fall

1

[15]

M2. (a) Pancreas

allow phonetic spelling

1

(b) any **three** from:

***max 2** if any one process goes on in wrong organ*

- (amino acids) broken down
- (amino acids) form urea
- (amino acids broken down / converted **or** urea formed) in liver
- (urea / broken down amino acids) removed / filtered by kidney

  *do **not** allow amino acids filtered / removed by kidney*
- (urine / urea / broken down amino acids) stored / held in bladder

  *do **not** allow amino acids stored / held in bladder*

3

[4]

M3. (a) (i) 1 hour 15 mins / 1.25 hours / 75 mins

allow 1:15

ignore 1.15 hours

1

(ii) increase in (core / body) temperature

ignore numbers

1

(due to an) increase in <u>respiration</u> **or** more <u>muscle</u> contraction

1

releasing energy (as a waste product)

allow produces 'heat'

*do **not** allow making energy*

1

skin temperature decreases

1

(because there is) sweating

1

(which) evaporates and cools the skin

ignore references to vasodilation or vasoconstriction

1

(iii) (there is) dilation of vessels (supplying skin capillaries)

allow vasodilation

allow blood vessels widen

ignore expand

*do **not** accept dilating capillaries or moving vessels*

1

(so) more blood flows (near skin) (surface) **or** blood is closer (to the skin)

ignore ref to heat

1

(c) pancreas detects (low) blood glucose

1

produces glucagon

*do **not** allow glucagon made in the liver*

1

(so) glycogen is converted to glucose

allow adrenaline released which increases conversion of glycogen to glucose

or

reduced insulin production so less glucose into cells / less glucose converted to glycogen

for 1 mark

1

[12]

M4. 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 on page 5, 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 kidney function including a mention of pituitary gland **or** hormones but roles may be confused.

Level 2 (3 – 4 marks)
There is a clear description of kidney function in relation to fluctuations in blood water levels and the roles of the pituitary gland **or** hormone is mentioned with correct role.

Level 3 (5 – 6 marks)
There is a clear and detailed scientific description of kidney function in relation to fluctuations in blood water levels and of the roles of the pituitary gland and ADH.

examples of biology points made in the response:

- if water content too low, ADH released
- from pituitary gland
- into the blood
- (causing) kidney reabsorbs more water
- more concentrated / small volume urine produced
- if water content too high, ADH lowered / not produced
- less water reabsorbed by kidney
- more dilute / larger volume urine produced

full marks may be awarded for detailed description of <u>either</u> water loss or gain

[6]

M5. (a) (the kidney) filters the blood

ignore refs to hormones and drugs

1

(and then) reabsorbs <u>all</u> of the glucose

1

reabsorbs some of the ions

allow salts

ignore minerals

1

reabsorbs some of the water

1

releases urea (in urine)

1

(b) (i) should fall from 28 (to the end of dialysis)

ignore any line drawn after end of dialysis

allow + / - 0.5 square

graph line must fall to / below

below 15

1

(ii) should stay level at about 6 throughout

ignore slight variations

allow + / - 1 square

ignore any line drawn after end of dialysis

1

(c) (i) immune system

allow white blood cells / lymphocytes

1

(produces) antibodies

1

(which) attack the antigens (on the transplanted kidney)

non-matching antigens insufficient

1

(ii) any **one** from:

- tissue typing (to find match)
- treating with drugs that suppress the immune system

accept treat with immunosuppressants.

1

[11]

M6. (a) Too much thyroxine is released into the blood

1

which raises BMR

1

causing increase in formation of glycogen / lipids / proteins
or
increase in rate of respiration
or
increase in breakdown of excess proteins

1

(b) FSH causes eggs to mature and stimulate ovaries to produce oestrogen

1

LH stimulates the egg to be released

1

(c) (missing a dose causes a) dip / drop in progesterone levels

1

(therefore) FSH is not inhibited anymore

1

(therefore) LH is not inhibited anymore

1

(and consequently) an egg is matured and released
allow (and consequently) an egg is available to be fertilised

1

[9]