MARK SCHEME

GCSE

BIOLOGY

AQA - TRIPLE SCIENCE

B 5 - TEST 6

HOMEOSTASIS

Advanced

1. (a) to prevent water affecting the direction of root growth

1

(b) gravity acts evenly on all sides

allow cancel out the effect of gravity

*do **not** accept there is no gravity*

1

(c) (mean) includes the (anomalous) result for seedling 4

allow (mean) includes the (anomalous) result which only grew 1 mm

1

(d) calculate (mean) from just seedlings 1, 2, 3 and 5

or

repeat the investigation **and** recalculate (a new mean)

allow omit seedling 4 from (mean) calculation

1

(e) uneven distribution of hormone in (root / seedling of) A

allow reference to auxin

allow more hormone at bottom

*do **not** accept more hormone at the top*

1

even distribution of hormone in B

allow B does not have an uneven distribution of hormone

1

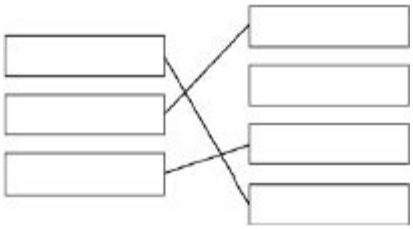
(so) top grows fast(er) (than bottom) in (root / seedling of) A (and equal growth in B)

allow (more) cell elongation or cell division on top of A

allow converse for lower surface

1

(f)



extra line for a hormone cancels mark for that hormone

1
1
1

[10]

2. (a) any **three** from:

- a (chemical) messenger
  or
  an organic substance
  allow correct named example – e.g. protein / modified amino acid / catecholamine / steroid
- made by the endocrine system / an endocrine gland / endocrine organ
  allow made by / released from a (ductless) gland
- affects (a) specific / target organ(s) / tissue(s)
- released into the blood
  allow carried by the blood

3

(b) insulin **and** glucagon
*both required for **1** mark correct spelling only for glucagon*

1

(c) **Level 2 (3-4 marks):**
Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.

Level 1 (1-2 marks):
Relevant points (reasons / causes) are identified, and there are attempts at logically linking. The resulting account is not fully clear.

No relevant content (0 marks)

Indicative content

- (0−0.5 h:) glucose from meal enters blood
  or
  increase in blood glucose (to 6.5 mmol / dm^3)
- glucose detected by pancreas
- pancreas secretes insulin
- (insulin causes) glucose to move (out of blood) into cells / liver
- liver converts glucose to glycogen
- causing a fall in blood glucose (after 0.5h)
- low blood glucose (< 5.0 mmol / dm^3) detected by pancreas
- pancreas releases glucagon
- liver converts glycogen to glucose (which enters blood)
- blood glucose rises (after 1 h **or** to 5.2 mmol / dm^3 (at 1.5 h))

[8]

3. (a) pupils dilated (at **B**)
*allow converse for **A***

1

in dim light / low light levels

1

because circular muscles (in iris) relax

1

(and) radial muscles contract

1

(b) figure 2 shows myopia where light does not focus on the retina

allow refraction

1

in figure 3 the lens bends the light so that light focuses on the retina

1

[6]

4. (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]

5. (a) **A** sensory (neurone)

ignore nerve

1

B motor (neurone)

ignore nerve

1

C spinal cord / central nervous system / white matter

accept grey matter

1

(b) by chemical / substance

allow transmitter

1

(c) muscle

allow extensor

ignore muscle names

1

[5]

6. (a) (i) respiration

1

(ii) 9600

if correct answer, ignore working / lack of working

$\frac{80 \times 12000}{100}$ *for **1** mark*

2

(b) any **three** from:

- dilates / widens **or** muscle in wall relaxes **or** sphincter opens

  *do **not** accept expands or just gets bigger*
- more blood flows near skin surface **or** more blood through capillaries
- heat lost by radiation / convection / conduction

  ignore evaporation
- heat loss from blood / cools blood

3

(c) hypothalamus / brain

1

[7]

7. (a) immune system

allow white blood cells / lymphocytes

ignore phagocytes

1

produces antibodies

1

(which) attack the antigens on the transplanted organ / pancreas

*allow transplanted organs have foreign antigens at start of explanation **and** linked to attacking the organ*

1

(b) (i) change / rise detected by the sensor

1

information used to calculate how much insulin she is going to need (bring her blood glucose back to normal)

1

(pump delivers) insulin into the blood

1

(causing) glucose to move into cells

allow (liver) converts glucose to glycogen

1

max 2 if no ref. to artificial pancreas

(ii) any **one** from:

- it is more accurate **or** less chance of human error
- (glucose) level will remain more stable **or** no big rises and falls in blood sugar levels
- you don't forget to test and / or inject insulin
- if ill or in coma insulin is still injected

ignore continuous and automatic unqualified

1

[8]

8. (a) semi / selectively / partially / differentially permeable

1

separates blood and dialysis fluid

1

(b) any **four** from:

blood cells cannot pass through membrane

glucose retained in blood

to stop water passing into blood / osmosis

no (net) diffusion

urea removed from blood by diffusion

accept excreted

4

(c) problem may be temporary **or** has minor infection **or** problem could be cured by other means

1

operation / transplants carry risk

accept rejection

1

[9]