M1.(a) 1. Release of glucagon;

2. Leads to formation of glucose in liver (cells);

Reject: glucagon breaks down glycogen, or any other biological molecule

3. From non-carbohydrates / amino acids / fatty acids.

Accept: gluconeogenesis / references to glycogen as source of glucose

3

(b) 1. Mutant mice (mRNA suggests) make a lot of (the) enzyme;

Accept: PCK1 made (for enzyme made)

2. Mutant mice use kidney / intestine (cells) to make glucose;

Accept: use other organ (than liver)

3. Normal mice do this much less / normal mice use liver cells.

3

(c) 1. Differences significant;

Reject: references to results being significant once

2. Probability of difference being due to chance <u>less than</u> 0.01 / 1% / 1 in 100 / probability of difference not being due to chance <u>more than</u> 0.99 / 99% / 99 in 100.

Ignore: references to 0.05 / 5% / 5 in 100

2

[8]

M2.(a) 1. Positive correlation between sucrose and dopamine concentrations / higher concentration of sucrose, more dopamine;

***Q** NB question is 'How <u>do</u> these ...', not 'Do these ....*

1. Ignore simple statements of numbers from graph without description of trend

2. So (dopamine) makes them want to drink / eat more (sucrose);

3. Positive feedback because drinking / eating leads to wanting to drink / eat (even) more;

3. It must be a clear statement of why this example is positive feedback, not inferred from points 1 and 2

3

(b) 1. (Refractory period) leads to discrete / separate nerve impulses / time when another nerve impulse can't happen;

OR

(Refractory period) limits number of impulses per second / frequency of nerve impulses;

2. When maximum frequency reached / exceeded, no further increase in information / all (higher) concentrations of sucrose seem the same;

2

(c) 1. (Negative feedback) stops desire / wish to eat / appetite;

1. Accept stops dopamine release (in this context)

1. Accept makes them feel full

2. (This) limits amount eaten / stops eating;

2. Accept prevents constant eating

3. Prevents / reduces risk of obesity / too much energy intake;

3. Accept prevents vomiting

Accept descriptions based on what would happen in absence of the feedback mechanism - or if stomach empty for points 1 and 2

3

[8]

M3. (a) 1. (Acetylcholine) released from / in presynaptic side;

2. Receptors in postsynaptic (side) / binds on postsynaptic (side);

2. Mark for diffusion only awarded in context of unidirectional movement.

2

(b) (i) 1. Rapid response;

2. Short duration;

Specific wording is not important. It is the principles that matter here.

Points may be made by referring to figures.

2

(ii)

	1	2	3
Percentage	80	0	0

Ignore % sign.

1

[5]

M4. (a) (i) Eaten;

Containing carbohydrate / sugar;

Glucose absorbed from intestine / into blood;

Long time after insulin injection / needs more insulin / has not taken insulin;

Does not convert glucose to glycogen / glucose not taken up from blood;

2 max

(ii) Shows positive correlation / directly proportional;

A range of results for a particular value / values (for different colours) overlap;

Urine test only an arbitrary scale / not directly related to concentration / colour is subjective / few colour values;

Accept description

3

(b) Glycogen to glucose / glycogenolysis by activating enzymes;

If name incorrect this disqualifies.

Gluconeogenesis;

Allow explanation in terms of glucose from a

non-carbohydrate / named non-carbohydrate source.

2

[7]

M5.(a) (i) where a change triggers a response which reduces the effect of a change;

1

(ii) e.g. sweating, breathing, defaecating, other valid example;

(reject respiration
evaporation not acceptable as a 2nd mark if sweating or breathing given)

2 max

(iii) hypothalamus;

1

(b) (i) pituitary;

(ignore anterior pituitary)

1

(ii) 1. ADH causes vesicles containing aquaporins / aquaporins to be inserted into membrane / collecting duct wall / plasma;
2. water enters cell through aquaporins;
3. by osmosis / diffusion / down a water potential gradient;
4. (from cell) to capillary;
5. via interstitial fluid;

4 max

(c) (i) excessive urination / drinking / diluted urine / thirst;

1

(ii) because males only have one X chromosome / do not have Y chromosome;
a single copy of the recessive allele will be expressed;

2

(iii) recessive alleles can be carried by individuals without showing effects / dominant allele always expressed;
organism that are carriers more likely to reproduce / affected organism less likely to reproduce;
therefore recessive alleles are more likely to be passed on / dominant alleles less likely to be passed on;

3

[15]

M6. (a) (i) maintaining a constant internal environment;

1

(ii) *one mark for example of factor kept constant; one mark for explaining its importance;*

e.g.
temperature / pH; optimum for enzymes / effect of pH / temperature on enzyme activity;

OR

water potential / blood glucose;
effect of osmotic / blood glucose imbalance on cells;

2 max

(b) cannot interact with / move tropomyosin from binding sites on actin;
(reject active sites)
myosin(heads) do not bind / actinomyosin not formed;
does not activate ATPase / energy not released from ATP;

3

[6]