

- 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 less than 0.01 / 1% / 1 in 100 / probability of difference not being due to chance more than 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 do 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 2<sup>nd</sup> 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]