Control and co-ordination in mammals

Mark Scheme 3

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Control and co-ordination
Sub Topic	Control and co-ordination in mammals
Booklet	Theory
Paper Type	Mark Scheme 3

Time Allowed : **82 minutes**

Score : **/ 68**

Percentage : **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1 **(a)** *endocrine*

1. hormon **;**
2. chemical messengers **;** **A** chemicals that transfer information
3. ductless glands / (released) into blood **;**
4. target, organs / cells **;**
5. ref. receptors on cell membranes **;**
6. example of named hormone and effect **;**

nervous

7. impulses/ action potentials **;** **R** electrical, signals / current
8. along, axon / neurones / nerve fibres **;** **R** nerves **R** across
9. synapse (with target) / neuromuscular junction **;**
10. ref. receptor / sensory neurones **;**
11. ref. effector / motor neurones **;**

differences – endocrine

12. slow effect / ora **;**
13. long lasting effect / ora **;**
14. widespread effect / ora **;**
15. AVP **;** e.g. extra detail of synapse / hormone changes triggered within cells [8 max]

(b)

16. IAA / plant growth regulator **;** **R** plant hormone
17. synthesised in, growing tips / apical buds / meristems **;** **R** root tip
18. moves by diffusion **;**
19. moves by active transport **;**
20. from cell to cell **;**
21. also, mass flow / in phloem **;**
22. stimulates cell elongation **;** **R** cell enlargement
23. inhibits, side / lateral, buds / growth **;** **A** inhibits branching
24. plant grows, upwards / taller **;** **A** stem elongates
25. auxin not solely responsible or interaction between auxin and other plant growth regulators **;**
26. AVP **;** e.g. role of ABA and lateral bud inhibition
27. AVP **;** e.g. cytokinins antagonistic to IAA / gibberellins enhance IAA [7 max]

[Total: 15]

2 **(a)** – germinal epithelium ;
B – theca / wall of follicle ;
C – follicle cells / granulosa cells / corona radiata ;
D – oocyte ; **R** ovum / egg [4]

(b) 1. (progesterone / oestrogen), reduce the production of, FSH / LH ;
2. negative feedback ;
3. to, hypothalamus / anterior pituitary ;
4. idea of lack of FSH prevents maturation of follicle ;
5. lack of LH prevents ovulation ;
6. cervical mucus, thick / hostile to sperm ;
7. thin uterine lining prevents implantation ; [4 max]

(c) **(i)** 1. blocking gene means no, ZP3 / receptor (for sperm) ;
2. because no, transcription / translation / protein synthesis ;
3. sperm (head) has complementary shape to, ZP3 / receptor ;
4. fertilisation cannot occur ;
5. because sperm cannot bind (to oocyte) ; [3 max]

(ii) 1. idea of giving unwanted side effects ;
2. example ; *any one from*
nausea
mood swings
high blood pressure
risk of blood clots
headaches
weight gain
increased risk of breast cancer
3. to maintain natural hormone balance
or
because pill may reduce subsequent fertility ; [2 max]

(iii) 1. only oocytes affected / no other cells affected ;
2. ref. unknown / undesirable, effects elsewhere in the body ; [2]

[Total:15]

3 **(a (i)** **J** – epidermis/epidermal cell **;**
K – mesophyll (cell) **;**
L – bundle sheath (cell) **;** [3]

(ii) 1 mesophyll cells tightly packed/AW **;**

2 so O_2 cannot reach bundle sheath cells **;**

3 light independent stage/Calvin cycle **or** RuBP, in bundle sheath cells **;**

4 ref. malate shunt **;**

5 maintains high CO_2 concentration (in bundle sheath cells) **;**

6 PEP carboxylase, has high optimum temperature/has higher affinity for CO_2 /doesn't accept O_2 **;**

7 (PEP carboxylase) not denatured **;**

8 photorespiration is avoided **;** [4 max]

(b) 1 reduces water loss/AW **;**

2 wax does not melt **;**

3 shiny surface reflects radiation **;** [2 max]

(c) (i) greater reduction in sorghum than in soybean **;**
use of comparative figures **;** e.g. sorghum 5.5 to 1.2 **or** by 4.3
soybean 5.2 to 1.6 **or** by 3.6 [2]

(ii) *reject 'no' for all points*

1 less surface area **;**

2 less absorption of light **;**

3 less, photophosphorylation / light dependent reaction **;**

4 less chemiosmosis **;**

5 (due to) smaller thylakoid space **or** reduced proton gradient **;**

6 less ATP (produced) **;**

7 less reduced NADP (produced) **;**

8 light-independent reaction / Calvin cycle, slows down **;**

9 less carbon dioxide, fixed / combined with PEP **;** **R** uptake [4 max]

[Total: 15]

4 **(a** 1 receptor or binding site not, complementary/specific, to FSH **;**

2 FSH has shorter β chain than LH **; ora**

3 FSH has different, primary structure/sequence of amino acids **;**

4 FSH has different, tertiary structure/3D shape **;** [3 max]

(b) (i) follicle (cells) **;** **A** granulosa (cells) [1]

(ii) corpus luteal (cells) **;** **A** granulosa (cells) [1]

(c) 1 (binding to a receptor), acts as a signal to the cells/stimulates cells **;**

2 to, start/increase, synthesis of hormone **;** **A** cells start to divide

3 oestrogen secreted **;** **A** mature follicle formed (oestrogen),

4 stimulates thickening of endometrium/inhibits FSH (production) **;** [3 max]

[Total: 8]

5 **(a** 1 nucleus in cell body **;**

2 (long) dendron **; R** plural

3 (shorter) axon **;**

4 many mitochondria (in cell body) **;**

5 many RER/nissl's granules, (in cell body) **;**

6 synaptic knobs **;**

7 detail of synaptic knob **;**

8 (terminal) dendrites **;**

9 Schwann cells **;**

10 detail of myelin sheath **;**

11 nodes of Ranvier **;**

accept points on labelled diagram [7 max]

(b) 12 Na^+ channels open **;** **A** sodium channels

13 Na^+ enter cell **;** **R** enter membrane

14 inside becomes, less negative/positive/+40mV **or** membrane depolarised **;**

15 Na^+ channels close **;** **A** sodium channels

16 K^+ channels open **;** **A** potassium channels

17 K^+ move out (of cell) **;** **R** of membrane

18 inside becomes negative **or** membrane repolarised **;** **A** negative figure

max 5

19 local circuits/description **;**

20 (myelin sheath/Schwann cells) insulate axon/does not allow movement of ions **;**

21 action potential/depolarisation, only at nodes (of Ranvier)/gaps **;**

22 saltatory conduction/AW **;**

23 one-way transmission **;**

24 AVP **;** e.g. hyperpolarisation/refractory period [8 max]

[Total: 15]