Control and co-ordination in plants

Mark Scheme 2

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Control and co-ordination
Sub Topic	Control and co-ordination in plants
Booklet	Theory
Paper Type	Mark Scheme 2

Time Allowed : **81 minutes**

Score : **/ 67**

Percentage : **/100**

Grade Boundaries:

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

CHEMISTRY ONLINE TUITION

1 dormancy ;

embryo ;

aleurone ;

endosperm ;

maltose ;

ATP / energy ;

transcription / expression ; [7]

[Total: 7]

CHEMISTRY ONLINE TUITION

2 active transport **/** diffusion ;

mass ;

phloem ;

dominance ;

decrease / reduce / lower ;

division / mitosis / elongation ;

elongation / division / mitosis ; [7]

[Total: 7]

CHEMISTRY ONLINE
TUITION

3 **(a)** 1. chlorophyll a is primary pigment ;
2. carotenoids / chlorophyll b, is accessory pigment ;
3. arranged in, light harvesting clusters / photosystems ; **A** antenna complex
4. on, grana / thylakoids ;
5. ref. PI and PII ; **A** P700 and P680
6. primary pigment / chlorophyll a, in reaction centre ;
7. accessory pigments / carotenoids / chlorophyll b, surround primary pigment ;
8. light energy absorbed by, accessory pigments / carotenoids / chlorophyll b ;
9. (energy) passed on to, primary pigment / chlorophyll a / reaction centre ;
10. chlorophyll a and b absorb light in red and blue/violet region ;
11. carotenoids absorb light in blue/violet region ;
12. ref. absorption spectrum peaks ;
13. diagram of absorption spectrum ;
14. different combinations of pigments (in different plants) give different spectra ; [8 max]

(b) 15. IAA / plant growth regulator / plant growth substance / plant hormone ;
16. synthesised in, growing tips / apical buds / meristems ;
17. moves by, diffusion / active transport ;
18. from cell to cell ;
19. also, mass flow / in phloem ;
20. stimulates <u>cell</u> elongation ; **R** cell enlargement
21. inhibits, side / lateral, buds / growth ; **A** inhibits branching
22. plant grows, upwards / taller **or** allows stem to grow up to light (instead of sprouting) ; **A** stem elongates
23. auxin not solely responsible for apical dominance **or** there is interaction between auxin and other plant growth regulators ;
24. ref. *idea of* concentration gradient down shoot so effect of dominance decreases ;
25. AVP **;** e.g. role of ABA and lateral bud inhibition / cytokinins antagonistic to IAA / gibberellins enhance IAA *also mp 23* [7 max]

[Total: 15]

CHEMISTRY ONLINE — TUITION —

4 **(a** 1 PII absorbs light ;
2 enzyme (in PII) involved ;
3 to break down water / AW ;
4 $2H_2O \longrightarrow 4\ ^{+} + 4e^{-} + O_2$;
5 <u>oxygen</u> is produced ;
6 used by cells for (aerobic) respiration ;
7 or released (out of plant) through stomata ;
8 protons used to reduce NADP ;
9 with electrons from PI ;
10 reduced NADP used in, light independent stage / Calvin cycle ;
11 to convert GP to TP ;
12 electrons also used in ETC ;
13 to release energy for photophosphorylation ;
14 to produce ATP ;
15 electrons (from PII) go to PI ;
16 ref. re-stabilise PI ; [10 max]

(b) 16 gibberellin is a, plant growth regulator / plant hormone / plant growth substance ;
17 stimulates cell division ;
18 stimulates cell elongation ;
19 detail of cell elongation ; e.g. changes plasticity of cell wall
20 plant grows tall ;
21 apply gibberellin to dwarf plants and they grow taller / gibberellin promotes bolting of some rosette plants ;
22 ref. inactive and active forms ;
23 dwarf plants, lack active form / have inactive form, of gibberellin ;
24 (dominant) allele causes synthesis of enzyme ;
25 (enzyme) catalyses the production of the active form of gibberellin ;
26 recessive allele only inactive form of gibberellin formed / dominant allele results in active form of gibberellins ;
27 AVP ; e.g. ref. to different forms of gibberellins / there is interaction between / gibberellin and other plant growth regulators [5 max]

[Total: 15]

CHEMISTRY ONLINE TUITION

5 **(a** 1 apical bud is source of auxin ;

2 auxin inhibits growth of side shoot ;

3 remove bud and auxin conc falls ;

4 this allows cell, division / elongation, to take place (in side shoots) ; [3 max]

(b) 267 **;;**

accept suitable working for one mark e.g. $\frac{110 - 30}{30}$ (× 100)

or
accept 266.7 for one mark [2]

(c) *days 2 to 8*

D1 no increase in length with paste plus auxin (compared to control) **;**

E2 auxin moves from paste into plants **;**

E3 inhibits growth **;**

days 8 to 13

D4 increase in length occurs (with paste and auxin) **;**

E5 less auxin left **;**

D6 supportive figs ; e.g. two blue points on two days plus units or one red and one blue point on same day plus units

must have at least one D (description) and one E (explanation) to score 3 marks [3 max]

[Total: 8]

CHEMISTRY ONLINE TUITION

6 **(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]

CHEMISTRY ONLINE TUITION