Homeostasis in plants

Mark Scheme 1

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Homeostasis
Sub Topic	Homeostasis in plants
Booklet	Theory
Paper Type	Mark Scheme 1

Time Allowed : **58 minutes**

Score : **/ 48**

Percentage : **/100**

Grade Boundaries:

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

1 **(a** *self-pollination **ora** for cross-pollination*

1 gamete / alleles / genes / DNA, come(s) from one parent **;**

2 gives, less genetic variation / more genetic uniformity **;**

3 results in inbreeding **;**

4 increases homozygosity / decreases heterozygosity **;** [max 3]

(b) anthers and stigma / stamens and carpels, closer together **;** [1]

(c) 1 range of flower size in original population **;**

2 genetic variation (affecting flower size) in original population **; I** mutation

3 change in environment / selection pressure,
is absence of, bees / insect pollination (in greenhouse) **;**

4 plants with small, flowers / petals, are,
selected for / reproduce / at a selective advantage **; ora**

5 <u>alleles</u> for small size passed to offspring **; ora I** gene

6 frequency of, advantageous / smallness, allele increases **; ora**

7 directional selection **;**

8 temperature / irrigation / space / competition, different in field and glasshouse **;**

9 small size explanation linked to factor in mp8 **;** [max 5]

[Total: 9]

2 **(a** stomata in, pits / cavities / chambers / crypts **;** **I** sunken stomata

no stomata on upper surface **;**

few stomata **;**

hairs / trichomes **;**

thick (waxy) cuticle **;**

thick walled epidermal cells **;**

several layers of, upper epidermis / hypodermis **;** [max 3]

(b) 300 **;;**

(18 000 / 60 or 19 000 / 60 or 20 000 / 6)

allow one mark
if correct measurement is divided by magnification but incorrect conversion factor is used if answer not to nearest 100 μm [2]

(c) **1** loss of water vapour from, leaves / aerial parts of the plant **;**

2 water evaporates from, walls / surface, of mesophyll cells **;**

3 into air spaces **;**

4 water vapour diffuses(out to atmosphere) **;** **A** water *if mp2 awarded*

5 through open stomata (to atmosphere) **;**

6 down a water potential gradient **;**

A *idea that* water potential gradient established [max 4]

[Total: 9]

3 **(a** (guard cell) thicker inner / unevenly thickened, cell wall ; **ora**

ref. to differences in, size / shape ; [1 max]

(b) (i) (receptors) on plasma / cell surface, membrane (of guard cells) ; [1]

(ii) K^+ / potassium ; [1]

(iii) (guard cell has) higher water potential than epidermal cell ; **ora** [1]

(iv) decrease ; [1]

(c) (i) provides carbon dioxide ; [1]

(ii) 0.1 ;
% per minute ; *reject plural* [2]

(iii) 0 – 10 mins / initially, rate for **B** is faster than rate for **A** ;

10 – 20 mins / AW, rate decreases for **B** and not for **A** / rate decreases more for **B** ;

paired figs ; *A & B % at same time (minutes)* [2 max]

(iv) no, photosynthesis / light dependent reaction ;

oxygen used up in respiration ; [2]

(v) temperature ; [1]

(d) reduced NADP ;

ATP ; [2]

[Total: 15]

4 **(a)** *accept ABA for abscisic acid*

1. stress hormone ;
2. plant secretes ABA in, high temperatures / dry conditions ;
3. ABA binds to receptors ;
4. on plasma membranes of guard cells ;
5. inhibits proton pump / H^+ not pumped out of cell ;
6. high H^+ conc / positive charge, inside cell ;
7. K^+ diffuses out of cell ;
8. water potential of cell increases ; **A** increase in solute potential
9. water moves out of cell by osmosis ;
10. volume of guard cells decreases ;
11. guard cells become flaccid ;
12. response very fast ; [8 max]

(b)

13. (barley) seed is, dormant / metabolically inactive ;
14. seed absorbs water ;
15. embryo produces gibberellin ;
16. gibberellin stimulates aleurone layer ;
17. to produce amylase ;
18. amylase hydrolyses starch ;
19. in endosperm ;
20. to maltose / glucose ;
21. embryo uses sugars for respiration ;
22. energy used for growth ;
23. gibberellins affect, gene / transcription of mRNA, coding for amylase ; [7 max]

[Total: 15]