

Reproduction

Mark Scheme 3

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Reproduction
Sub-Topic	
Paper Type	Alternative to Practical
Booklet	Mark Scheme 3

Time Allowed: 54 minutes

Score: /45

Percentage: /100

1 (a) (i)/(ii)

All measurements in mm;						
seedling	4°C		3 °C			
	agreed		with fine roots		without fine roots	
			agreed		agreed	range
1	1	11–13	92	91–93	78	77–79
2	1	9–11	67	66–68	56	55–57
3	1	10–12	69	68–70	52	51–53
4	1	13–15	78	77–79	65	64–66
5	1	9–11	79	78–80	76	75–77
mean		10–12.4	77	76–78	65.4	64–66.4

One mark for each column, measurements within tolerance or consistent error e.g. $\times 10$;;
One error no mark for that column.

One mark for correct units;

Units mark given if measurement given as mm

Reject if used cms / if numbers out by factor of ten / if put mm by measurements.

Incomplete seedling measurements max 1 for units only

[3]

(ii) add totals and calculation of means correct;;

If both means wrong then check for working and allow 1 mark;

If one mean only correct 1 mark .

If measurements totally wrong then check their working if correct allow both marks and allow ecf (still a tolerance of plus or minus 1mm)

[2]

(b) (i) *general point* greater / more / faster / better len
division in 30°C or converse; ignore germination

explanation enzyme / reactions / activity / metabolism faster or converse;

AVP; detail of enzyme activity

allow one from each row

	4 °C		30 °C	
shoot / stem stalk / plumule	not visible / present	OR	present / elongated / longer / present	;
leaf	not visible / present	OR	developed / present	;
testa / seed coat <i>ignore coat alone</i>	still present	OR	(some) detached	;
root / radicle	not developed	OR	developed / side roots <i>ignore root hairs</i>	;

Use of data ; credit once only

Ignore refs to root hairs / colour references

[max 6]

- (ii) variation / reliability / reduce (percentage) error / reproducible / to eliminate differences / mutation / AW ;

[ignore accurate or precise / mean or to average / fair test]

[1]

[Total:12]

- 2 (a) Drawing : **S** size same or bigger;
O clear continuous lines; *reject if shaded*
D detail (10 segments);
ignore shaded in mouth / anus
- ONE Label: **L** segments / sections /
mouth / head / anus (accept at either end) /
outer covering /
(tail) spikes /
spiracles / breathing holes;
ignore antennae / feelers / tentacles – credit one correct label

[max 4]

- (b) (i) Arthropod / insect; accept dipteran
must be correctly spelt
ignore invertebrates / fly

[1]

- (ii) six legs / three pairs of legs/limbs;
three parts / sections to body / head + thorax + abdomen;
compound eyes;
one pair of antennae; *ignore 'feelers'*
wings;
jointed / segmented limbs; *ignore joined*

ignore mouth parts / hairs / 3 segments in body
mark first three list order

[max 3]

- (c) (i) **O** orientation; (*x axis – temperature*)
A axes labelled + units; *accept time in days and temp ° C*
S equal / even scale; plots use *more than half the graph, even with 2 lines. If non linear scale used – do not allow plot.*
P plot; [of pupa to adult only] *+/- half a square, one wrong no mark*
L clear, unbroken line; *accept point to point or a curve through all points + / -21 °C.*

R extrapolation or added bits of graph / line of best fit
O and **A** *only for columns whether bar chart or histograms*
ignore second line if both drawn.

[max 5]

- (ii) development quicker at higher temperatures or converse;
from graph pupa to adult

metabolism / respiration / enzyme activity faster / AW quicker or accept the converse;
comparison of larva / 2.3 to pupa / 2.4.the temp has greater effect
vs pupa / 2.4 to adult / 2.2; *from table*

[3]

[Total:16]

3 (a) completion of Table 3.1

Table 3.1

dish	number of seedlings	
	green	
A	1	7 ;
B	1	5 ;
total	34	12 ; ecf

(if error in counting is made – this error must be carried forward to contribute to total row of figures) [3]

- (b) 1. ratio 3 green :1 white or allow 2.8 x green or 74% green and 26% white even if not linked to 3:1 ratio) (ecf will have to be considered here as well as in Table)
 2. green is dominant;
 3. white is recessive;
 4. parents heterozygous;
 (As alternatives to points 2 and 3, some candidates may have described the genotypes as homozygous **GG** and some may be heterozygous **Gg** green – accept as alternative wording for equivalent to points 2 and 3 above) [MAX. 2]
- (c) 1. green (seedlings) will grow/white will die;
 2. green have chlorophyll; (ignore ref to chloroplasts)
 3. green can photosynthesise/make glucose/starch AW or white cannot;
 (ignore make food but make glucose and carbon dioxide negates) [3]

[Total: 8]

4 (a) (i) two from:

	seedling in light/clear box	seedling in dark/black box
leaves/cotyledons	large broad ignore thick leaves with petiole/stalk [not colour]	small/narrow ignore thin leaves without petiole/stalk
stem/stalk	wider/shorter/thicker	
roots	more	
growth	normal	eti
whole seedling	shorter/thicker apical tip/bud	taller/thinner no apical tip/bud

[Max: 2]

(ii) any four from:

- 1 idea of repeats/more seeds/more boxes;
- 2 grown under same temperature;
- 3 same species/same number/same age or size;
- 4 same watering/humidity/AW;
- 5 grown in same substrate/cotton wool;
- 6 measurements – calculate average/mean;

[Max: 4]

(b) any three from:

- 1 grows/curved/bending towards light slit/light source; [not moves]
- 2 unequal growth/AP;
- 3 shows phototropic response;
- 4 +ive/positive phototropic response to light;
- 5 reference to auxin/AP

[Max: 3]

[Total: 9]