M1.(a) 1. Females are (generally) longer / larger / bigger / up to 115(mm) / males are (generally) shorter / smaller / up to 100(mm);

Ignore: tall Accept: females have a larger / 90 modal / peak / most common value <u>and</u> males have a smaller / 80 modal / peak / most common value Accept mean length of females greater / mean length of males shorter Reject: use of mean in relation to 80 mm or 90 mm Reject: Most of the females are 90 mm long / most of the males are 80 mm long

2. Females show a greater range / variation / males show a narrower range / variation.

Accept: correct use of figures from the graph: the range of males is 50 to 100 <u>and</u> of females is 50 to 115 / the spread is 50 for males <u>and</u> 65 for females

- 2
- (b) (i) **2.6** to **2.7** = 2 marks; Incorrect answer but evidence of a numerator of **24180 OR 156 × 155** <u>or</u> denominator of **9014** = 1 mark;
- 2

- (ii) (Fewer plant species) no mark
 - (So) few(er) habitats / niches; Ignore habitat size
 Q Neutral: fewer homes
 - (So) lower diversity of <u>insects</u> / fewer <u>insect</u> species / fewer <u>insect</u> types;
 Q Neutral: fewer <u>insects</u> Accept less variety of <u>insects</u>
 - (So) fewer food sources / less variety of food.
 Q Neutral: less food
 Ignore references to pesticides, farmers' actions, competition between lizards and evolution

3

M2.(a) 4:

(b) 2.68(6). If answer incorrect: $\Sigma n(n-1) = 242 = 1 \text{ mark}$

N(N-1) = 650 = 1 mark

2

2

1

1

[5]

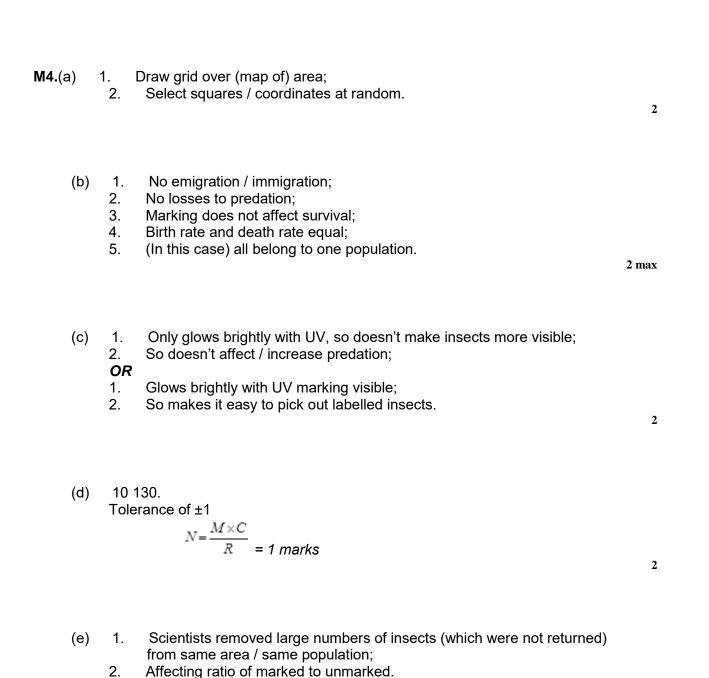
1

(c) 1. Take more samples and find mean;
2. Method for randomised samples described.
Allow larger area = 1 mark

- **M3.**(a) Species richness measures only number of (different) species / does not measure number of individuals.
 - (b) Trees vary in height.
 - (c) 1. Index for canopy is 3.73;
 - 2. Index for understorey is 3.30;
 - 3. Index in canopy is 1.13 times bigger; If either or both indices incorrect, allow correct calculation from student's values.
- 3
- (d) 1. For *Zaretis itys*, difference in distribution is probably due to chance / probability of being due to chance is more than 5%;
 - 2. For all species other than *Zaretis itys*, difference in distribution is (highly) unlikely to be due to chance;
 - 3. Because P < 0.001 which is highly significant / is much lower than 5%.

[8]

3



² [10]

M5.(a) 1. Number of (individuals of) each species; Accept: 'population' for 'number' 2. Total number of individuals / number of species; Accept: 'species richness' MP2 allows for other types of diversity index

2

1

(b) (i) (Shows) results are due to the herbicide / are not due to another factor / (to) compare the effect of using and not using the herbicide / shows the effect of adding the herbicide;

Neutral: allows a comparison Neutral: ensures results are due to the independent variable Reject: 'insecticide' Accept: 'pesticide'

- (ii) 1. (More) weeds killed **so** more crops / plants survive / higher yield / less competition;
 - High concentrations (of herbicide) harm / damage / kill / are toxic to crops / plants;
 Accept: 'pesticide'
 Neutral: 'insecticide'
 Accept: use of figures (eg 400+)

2

- (iii) 1. Reduced plant diversity / fewer plant species / fewer varieties of plant;
 Accept: 'weed' for 'plant'
 Neutral: fewer plants
 Accept: only one crop species remains
 - Fewer habitats / niches;
 Q Neutral: fewer homes / shelters
 - 3. Fewer food sources / varieties of food; *Neutral: less food*

[8]

3

Accept: all marks if answer written in context of producing increased diversity of plants 1 Do not award this mark in context of new species being formed and then not interbreeding 1 Accept reproductive isolation as an alternative to no interbreeding

2. Mutation;

2 Accept: genetic variation

- Different selection pressures / different foods / niches / habitats;
 3 Accept: different environment / biotic / abiotic conditions or named condition
 3 Neutral: different climates
- 4. Adapted organisms survive and breed / differential reproductive success;
- 5. Change / increase in allele frequency / frequencies;

5

1

 (b) Similar / same environmental / abiotic / biotic factors / similar / same selection pressures / no isolation / gene flow can occur (within a species);
 Accept: same environment