Mark schemes

Q1.

(a) 1. Use a grid

OR

Divide field/area into squares;

Accept use of tape measures/map/area with coordinates.

Accept Belt transect.

2. Method of obtaining random coordinates/numbers e.g. calculator/computer/random numbers table/generator;

If transect method used accept quadrats at regular intervals.

3. Count number/frequency in a quadrat;

Ignore amount/abundance.

4. Large sample and calculate mean number (per quadrat);

Accept large sample and method of calculating mean.

Accept many/multiple for large sample but ignore several.

If a specific number is given it must be 10 or more.

5. Multiply mean number of plants per m^2 by area of field

OR

Divide area of field by area of quadrat x mean number of plants per quadrat

OR

Multiply mean number of plants per quadrat/section by number of quadrats/sections in field;

Accept sections/squares for quadrats.

Accept 'average' for 'mean'.

Do not allow 'scale up' without further qualification.

(b) 1. Interspecific (competition);

2. Less/no light (for potato plant) **so** less/no photosynthesis;

3. Less nitrates/nitrogen to produce amino acids/protein/DNA/RNA/ATP

OR

Less phosphate/phosphorus to produce DNA/RNA/phospholipids/RuBP/GP/triose phosphate/NADP/ATP;

Accept any named organic nitrogen or phosphorus containing molecule.

3

(c) Correct answer of 6.69 / 6.7 = **2 marks**;;

Incorrect answer but shows 669 / 67 (ignore position of any decimal point or preceding / subsequent zeros or numbers following 669) = **1 mark**

OR

Shows 0.012 **= 1 mark**

OR

Shows 8.47 / 8.5 **= 1 mark**

OR

Shows 8.69 **= 1 mark**

OR

Shows 3.35×10^{-4} (in any correct mathematical form) **= 1 mark;**

Ignore any numbers after 6.69

Ignore any numbers after 0.012

Ignore any numbers after 8.47 / 8.5

*Accept answers which would round to 3.35×10^{-4} for **1 mark**.*

2

[10]

Q2.

(a) 1. A group (of organisms) of the same species in a (particular) space at a (particular) time;

Accept descriptions of 'space' eg area, part of the world, habitat, ecosystem

2. That can (potentially) interbreed;

Accept that can produce fertile offspring

2

(b) The number of all species present in the woodland

1

(c) **Max 3 for mark points 3 to 10**

Reason for

1. The number of (bird) species increased (over 30 years);

2. Long-term study;

Reasons against

3. (Bird) species did not increase every year;

Accept some years the (bird) species decreased

Accept (bird) species fluctuated

4. Don't know if the protection was for birds

OR

Don't know if the aim of the protection was to increase biodiversity

OR

Don't know when the protection started;

5. No data from/comparison with a woodland without protection;

Accept no control (woodland)

6. Only breeding birds recorded

OR

Non-breeding birds may be present, but not recorded

OR

Not all bird species were recorded;

7. Only one woodland

OR

Protection might not be the same in other/all woodlands;
Ignore unqualified references to sample size

8. Only one day each year

OR

Birds breed at different times

OR

Birds migrate

OR

Birds might not be present/seen on the day (of recording);

9. Number of each species not known;
Accept did not calculate index of diversity

10. The data is old/out of date;

4 max

(d) Not a linear relationship;
Accept descriptions of a linear relationship
Accept not a proportional relationship
Accept no correlation
Accept data fluctuates

1

(e) 1. (The bird community) becomes less similar (to the first year)

OR

(The bird community) becomes more dissimilar (to the first year);
Accept the index (of similarity) decreases
Accept there is a negative correlation

2. (Suggesting) biodiversity has changed/ increased;

3. Due to changes/increases in the species/birds (present)

OR

Due to changes in the woodland/abiotic/biotic factors;
*Accept **named** examples that would cause change eg change in environment/ habitat/ competition/ predation/food sources*

2 max

(f) 1. Climax community;

2. (Even in a climax community,) number of birds/species will change;

Accept suitable suggestions that describe the species/bird composition changing, eg migration of birds

2

(g) 1. No significant decrease/difference as shown by SD;

2. No idea if due to human activity

OR

No data/measurement/evidence of human activity

OR

Changes could be due to natural variation;

*Accept **named** examples of factors that could cause change, eg disease, natural disasters*

3. LPI/index above 1970/1.0/baseline

OR

LPI/index increased (overall)

4. (Vertical) scale has been altered to make (changes in) LPI/index look worse;

Accept 'biodiversity' for LPI

3 max

[15]

Q3.

(a) (1) carrying

(2) niche

(3) abiotic

(4) community;;

*All 4 correct = **two** marks.*

*2 or 3 correct = **one** mark.*

*1 correct = **zero**.*

(3) Accept physical, chemical, physicochemical or non-living.

2

(b) 1. Conserve/protect species/plants/animals/organisms
OR

For (bio)diversity;

2. Conserve/protect habitats/niches
OR

Provides/many habitats/niches;

Accept conserving land (and ways of life) for indigenous communities.

3. Reduces climate change;

Accept 'reduces global warming', 'reduces greenhouse effect', 'removes/takes up carbon dioxide' or 'produces/provides oxygen'.

4. Source of medicines/drugs/wood;

5. Reduces erosion/eutrophication;

6. (For) tourism;

2 max

(c) 1. Heat (loss) from respiration;

2. (Food) not digested
OR

Not all eaten;

Accept faeces for not digested.

3. Excretion;

Accept urine/urea for excretion.

3

[7]

Q4.

(a) 1. *E. rufus* in north (west)
OR
E. rufus in the west
OR
E. rufus above river;

2. *E. rufifrons* in south
OR
E. rufifrons in west **and** east
OR
E. rufifrons below river;

1 and 2. Accept equivalent valid statements e.g., for 1, no E. rufus in south.

*1 and 2. If neither mark is awarded, accept, for one mark, 'they are separated by the river' **OR** 'there is no overlap in their distribution/ranges'.*

1 and 2. Accept converse.

1 and 2. Do not penalise 'prefer'.

3. (Actual) distribution similar to expected (distribution)
OR
(Actual) distribution similar to environmental needs
OR
(Actual) distribution (slightly) less than expected distribution;

Accept for one or both species.

3

(b) 1. Geographical isolation;
OR
Allopatric speciation;

Ignore descriptions of geographical isolation.

Reject sympatric.

Ignore reference to two species at start.

2. Reproductive separation/isolation
OR
No gene flow
OR
Gene pools separate;

Reproductive isolation must be at beginning of process.

Accept no interbreeding but must be a separate idea from mp 6 which relates to definition of a species.

Reject no inbreeding.

3. Different selection pressures;
OR
Different environmental/abiotic conditions/factors;

4. (Variation due to) mutation(s) (in different populations);

5. (Different/advantageous) allele/s passed on/selected
OR
Change in frequency of allele/s;

6. (Eventually different species) cannot (inter)breed to produce fertile offspring;

5 max

(c) (Marking) does not affect survival/predation/recapture;

Accept. Mark does not rub/wash off/is non-toxic.

Ignore 'does not harm' on its own unless it relates to survival/predation/recapture.

1

(d) 3;

Ignore any wording provided e.g. lemurs.

1

[10]