Solutions

Each answer shows the steps, then the **result**.

2.1

- the role and position of a species within its ecosystem

2.2

(a)

- quadrats / transects

(b)

- mark-release-recapture

3.1 B

- Random sampling avoids bias, giving a representative result

3.2 B

- A higher D means greater diversity and usually greater stability

3.3

(a)

- $N = \dfrac{60 \times 80}{24} = 200$ snails

(b)

- any one: no births/deaths/migration; marks do not affect survival; marked animals mix randomly

3.4

- $\sum(n/N)^2 = (5/10)^2 + (3/10)^2 + (2/10)^2 = 0.25 + 0.09 + 0.04 = 0.38$; $D = 1 - 0.38 = 0.62$

3.5

(a)

- An ecosystem is all the organisms in an area together with the non-living components of their environment, and the interactions between them. A niche is the role an organism plays — where it lives, what it feeds on, what feeds on it, and the conditions it tolerates

(b)

- Percentage frequency $= \dfrac{7}{10} \times 100 = 70\%$; total area sampled $= 10 \times 0.25 = 2.5$ m^2; density $= \dfrac{84}{2.5} = 33.6$ individuals per m^2

(c)

- Lay two tapes at right angles as axes and use random numbers to generate each pair of coordinates; random placement removes the observer's unconscious bias towards interesting or easy patches; only then is the sample representative, so the results can be applied to the whole area

(d)

- Habitat (or ecosystem) diversity, species diversity, and genetic diversity within a species. A species count treats a species represented by one individual the same as one represented by thousands, so an index such as Simpson's, which uses the abundance of each species as well, gives a truer picture of the community