C4.1 Populations and communities

What the Cell · DP Biology · worksheet · SL statements C4.1.1–18

Name _____ **Date** _____ **Total** _____ / 50

About 45 minutes, or one section at a time. The number of marks shows how many separate points to make. You may use a calculator.

Section A: Recall

12 marks

1 **Define** population. C4.1.1 **[2]**

2 **Define** carrying capacity. C4.1.5 **[1]**

3 **State** two density-dependent factors. C4.1.6 **[2]**

4 **List** the three phases of a sigmoid population growth curve, in order. C4.1.7 **[3]**

5 **State** one named example of parasitism and one of pathogenicity. C4.1.11 **[2]**

6 **Outline** one named example of allelopathy. C4.1.18 **[2]**

Section B: Understanding

18 marks

7 **Explain** why quadrats must be placed randomly. C4.1.2 **[2]**

8 **Outline** how random quadrats are used to estimate the population of a sessile organism. C4.1.3 **[3]**

9 **State** two assumptions made when using the Lincoln index. C4.1.4 **[2]**

10 **Distinguish** between intraspecific competition and cooperation, using an example of each. C4.1.10 **[3]**

11 **Explain** how a hard coral and its zooxanthellae each benefit from their relationship. C4.1.12 **[2]**

12 **Explain** how an invasive species can cause an endemic species to decline. C4.1.13 **[2]**

13 **Describe** one field method of testing for interspecific competition. C4.1.14 **[2]**

14 **Distinguish** between top-down control and bottom-up control. C4.1.17 **[2]**

Section C: Working with data

14 marks

All data in this section are invented for practice. The patterns are realistic.

15 C4.1.3

Limpets were counted in eight random 0.25 m^2 quadrats on a rocky shore with an area of 50 m^2.

Quadrat	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Limpets	4	7	2	5	6	3	8	5

a **Calculate** the population of limpets on the shore. Show your working. **[2]**

b **Outline** what the standard deviation of these counts would show. **[1]**

16 C4.1.4

60 ground beetles were caught in pitfall traps, marked with a dot of paint and released. Two days later, 45 beetles were caught, and 9 of them were marked.

a **Calculate** the population size. **[1]**

b **Explain** the effect on the estimate if some paint marks wore off before the second catch. **[2]**

17 C4.1.15

The presence or absence of two meadow plants, X and Y, was recorded in 60 random quadrats.

Observed	Y present	Y absent	Total
X present	6	24	30
X absent	18	12	30
Total	24	36	60

a **State** the null hypothesis. **[1]**

b **Calculate** the four expected values. **[2]**

c **Calculate** the value of chi-squared. Show your working. **[2]**

d **Deduce** what the result shows. The critical value for 1 degree of freedom at p = 0.05 is 3.84. **[2]**

e **Suggest** one reason for the result. **[1]**

Section D: Longer answer

6 marks

18 **Explain** how density-dependent factors control the size of a population, using a named predator–prey example. C4.1.6, C4.1.7, C4.1.16 **[6]**