C4.1 Populations and communities: data-based questions

What the Cell · DP Biology · data-based questions

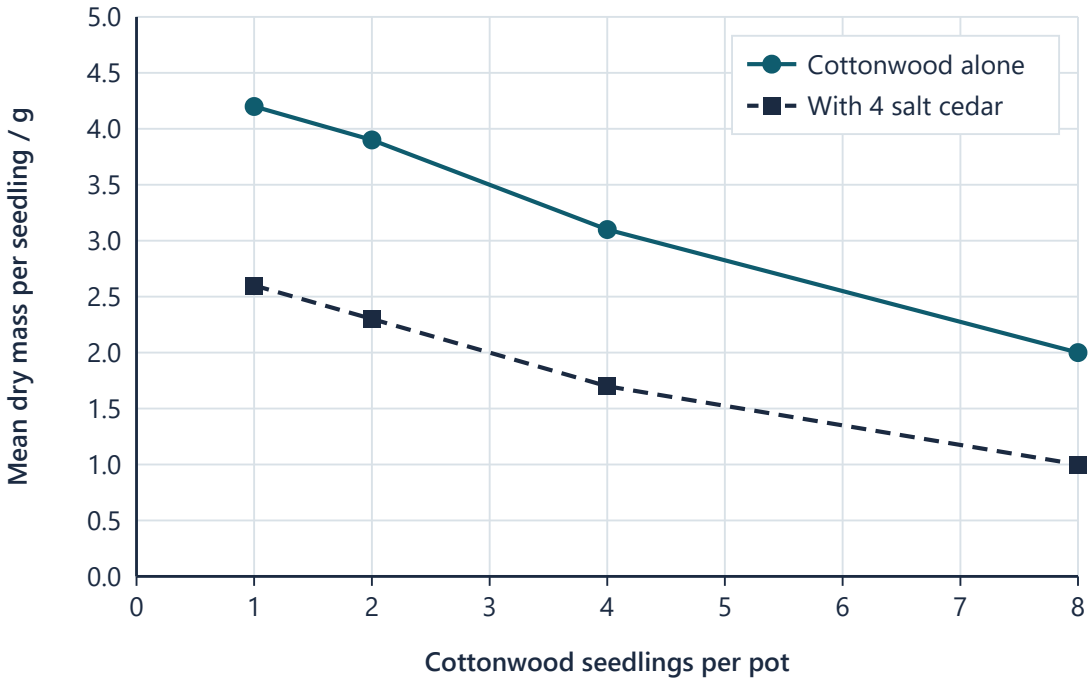
Name _____ **Date** _____ **Total** _____ / 19

Read the data carefully before you answer. The number of marks shows how many separate points to make. Show your working in calculations.

1 Competition between tree seedlings

6 marks

Since dams stopped rivers flooding in the south-west of the USA, the invasive salt cedar (*Tamarix*) has replaced native cottonwood (*Populus*) along many rivers. Cottonwood seedlings were grown in pots at four densities, either alone or with four salt cedar seedlings. The mean dry mass of each cottonwood seedling was measured after one season.



a **Describe** the effect of increasing cottonwood density on the mass of cottonwood seedlings grown alone. **[1]**

b **Calculate** the percentage decrease in mass caused by salt cedar when one cottonwood seedling is grown per pot. **[1]**

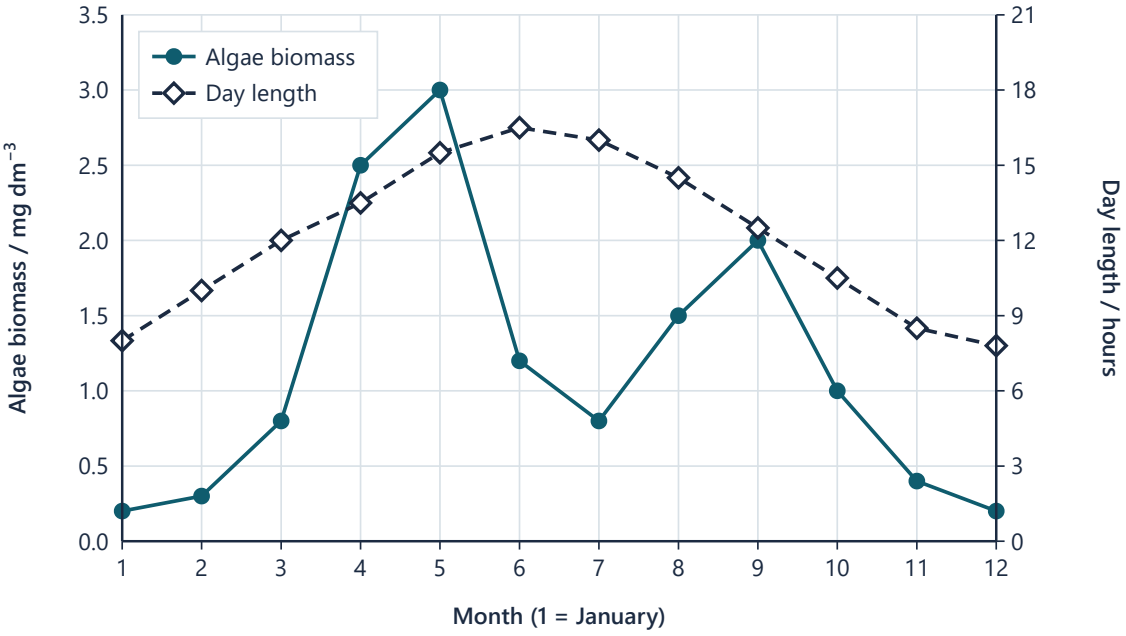
c **Distinguish** between intraspecific and interspecific competition, using these data. **[2]**

d Salt cedar tolerates salty, dry soil better than cottonwood. **Suggest** how restoring natural floods could help cottonwood. [2]

2 Resting eggs in water fleas

7 marks

Water fleas (*Daphnia*) usually reproduce asexually, but can switch to sexual reproduction, making resting eggs that survive for years in lake mud. The graph shows day length and the biomass of algae (their food) in a lake over one year.



a **Identify** the month in which food is most plentiful. [1]

Daphnia were kept in four combinations of day length and food, and the percentage of females producing resting eggs was recorded.

	High food	**Low food**
Long days (16 h)	2%	18%
Short days (10 h)	21%	64%

b **Discuss** which conditions favour the production of resting eggs. [2]

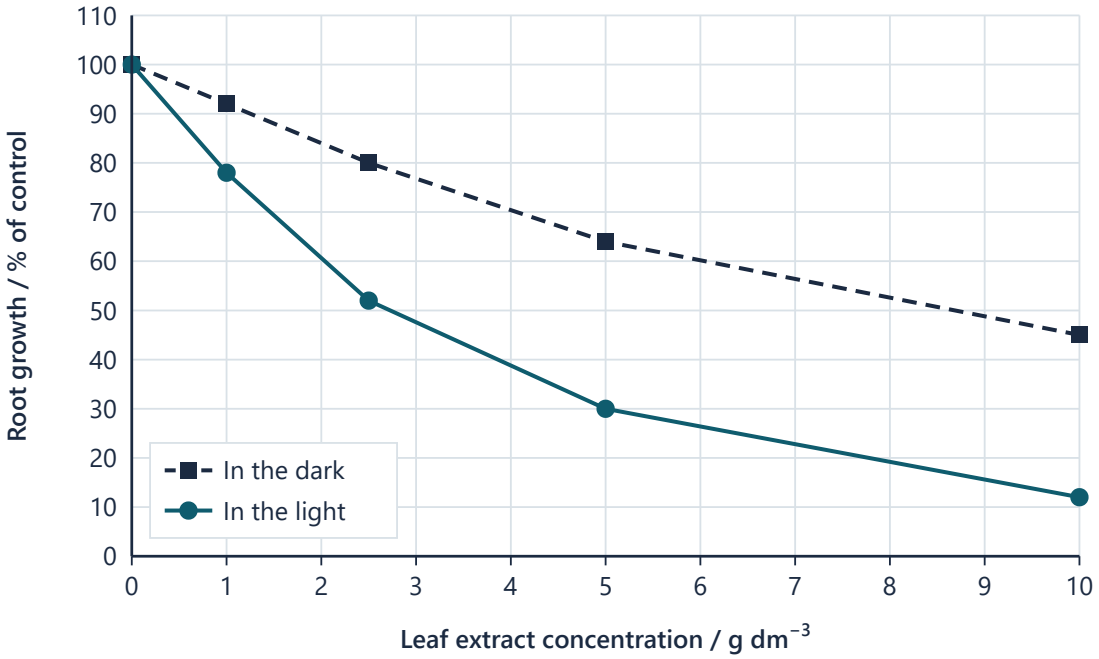
c **Deduce**, with a reason, whether many resting eggs are likely to be made in May. [1]

d **Suggest** the advantages to *Daphnia* of reproducing asexually at some times and sexually at others. **[3]**

3 A tree that poisons its neighbours

6 marks

Tree of heaven (*Ailanthus altissima*) is an invasive tree whose leaves release chemicals into the soil. An extract of its leaves was added at different concentrations to seeds of alfalfa, a crop plant, kept in the light or in the dark. After 5 days, root growth was measured as a percentage of the growth in water alone.



a **State** the root growth in the light at 5 g dm^{-3} of extract. **[1]**

b **Compare** the effect of the extract in the light and in the dark. **[2]**

c **Suggest** two reasons for testing the extract both in the light and in the dark. **[2]**

d **Explain** how releasing these chemicals could help tree of heaven become invasive. **[1]**