Populations - answers

1 (a) (i) The exponential phase is represented by the letters c - f
    (ii) The stationary phase is represented by i - k
    (iii) The lag phase is a - b
  (b) During the exponential phase the population is doubling at each generation.

2 (a) In green plants the limiting factors are likely to be light, water, minerals, temperature, grazing, pests and diseases.
  (b) In birds the limiting factors could be food, nest sites, predation, temperature, diseases.

3 Infant mortality refers to the number of babies in a population who die at the age of 1 year or less. It is usually expressed as the number of deaths per 1000 live births.

4 A fertility rate of 3 means that women of child-bearing age will have, on average, three children.

5 A steady increase in population could result from:
  (a) an increased birth rate;- provided that (i) most of the extra babies survive to reproductive age, (ii) there is no corresponding increase in the death rate.
  (b) a decreased death rate;- provided that the decrease applies to people before they reach reproductive age. A decrease in the death rate of the over-50s will not produce a continuing increase in population.
  (c) more people living to reproductive age;- provided that the fertility rate (i.e. number of babies per woman) does not decrease.
  (d) a decrease in infant mortality; provided that the babies grow up and reach reproductive age.
  (e) an increase in life expectancy; provided that it applies to people of reproductive age and not just to the elderly.
(NOTE: Most of the proviso's could apply to each case but they have not been repeated.)

6 (a) Kenya would be expected to show the greatest increase in population (53 - 14 = 39 per thousand or 3.9%).
  (b) Gabon would show the least increase (1.1%).

7 If 65 year-old women have a life expectancy of 13 years, their average age at death will be 65 + 13 = 78 years.

8 The changes in society which could contribute to a falling death rate are:
  (i) improvements in clean water, sewage disposal and sanitation,
  (ii) better health care, including immunisation programmes,
  (iii) improved standards of nutrition and housing,
  (iv) better education, leading to the changes listed above,
  (v) greater wealth, leading to the changes listed above.

9 Birth rate might be reduced by
  (i) later marriages (hence smaller families),
  (ii) family planning techniques, including contraception.

10 An increase in fertility would lead to a greater number of children and young people in the population.
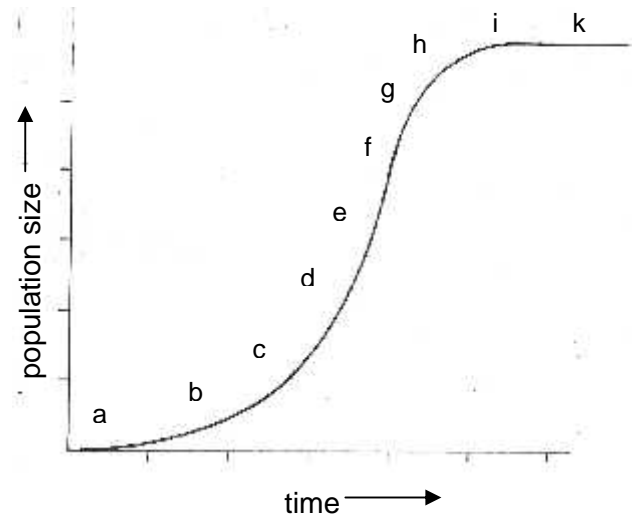
Populations - answers (continued)

11 (a) The age structure of population A shows a great preponderance of babies and young
people. More than half the population is under 30 and there are relatively few elderly
people. In population B the birth rate is declining (there were more babies born 50 years
ago than there are today) and the bulk of the population is middle aged. There is a greater
proportion of elderly people than in population A.
(b) The death rate in population A is much greater in the early years of life than it is in B.
(c) Chart B is characteristic of an industrialised country.

29 Populations

1 The graph represents a sigmoid growth curve
for a population of micro-organisms.
  (a) Select the sequence of letters on the curve
    which best represents (i) the exponential
    phase of growth, (ii) the stationary phase and
    (iii) the lag phase.
  (b) What is taking place during the exponential
    phase?

2 What are likely to be the limiting factors in
a population of (a) green plants, (b) birds?

3 What is meant by the expression 'infant mortality'?

4 What is meant by a 'fertility rate of 3'?

5 Each of the following events could result in population growth, but only if certain other
conditions are fulfilled. In each case, suggest what these conditions are.
  (a) Birth rate increases.
  (b) Death rate decreases.
  (c) More people live to reproductive age.
  (d) Infant mortality decreases.
  (e) Life expectancy increases.

6 The table shows birth rates, death rates and infant mortality for four African countries some
years ago. Which country would you expect to show (a) the greatest, (b) the smallest population
increase by now, assuming no wars or famines?

Country	Rates per 1000 population		
	Birth rate	Death rate	Infant mortality
Tanzania	46	16	125
Gabon	33	22	178
Ethiopia	50	25	162
Kenya	53	14	80

7 If 65 year-old women in Britain have a life expectancy of 13 years, what will be their
average age at death?

8 State the changes in society which could contribute to a falling death rate.

9 State three conditions in a society which could contribute to a reduction in the birth rate.

10 How would an increase in the fertility rate affect the age structure of a population?

29 Populations - continued

11 The bar charts show the numbers of people of different ages in two countries.
   (a) Describe the age structure of the population in each case.
   (b) Comment on the death rates in the two countries.
   (c) Which of the two charts is characteristic of an industrialised country?

A   B