

Exercise walk-through

19.4

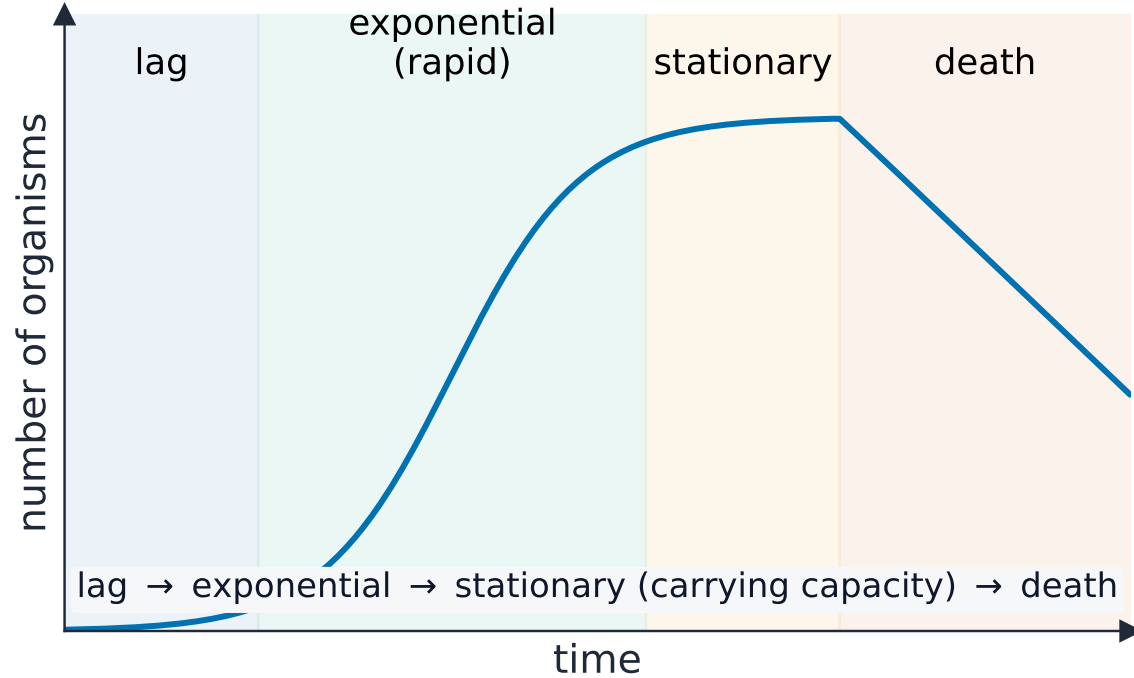
Populations

IGCSE Biology

Populations

A **population** is one species in one area; a **community** is all of them; with the environment it is an **ecosystem**. Growth runs **lag** → exponential → stationary → death, and what sets each phase is the food supply, **competition**, **predation** and disease.

Populations, in detail



A **population** is one species in one area; a **community** is all of them; with the environment it is an **ecosystem**.

The four phases of a population curve

Lag phase

Slow growth: few individuals, and they are still adjusting to the conditions.

Exponential phase

The **exponential phase** : very fast growth, with plenty of food and space and few predators.

Stationary phase

Births balance deaths – the population sits at the carrying capacity of the habitat.

Death phase

Food runs out or waste builds up, and numbers fall.

Every phase is a statement about *limiting factors*, so name the factor that changed at each turn of the curve.

Populations, continued



A coral reef is a rich ecosystem supporting many interdependent species.

The nitrogen cycle, and the four phases of growth

the nitrogen cycle

recycles nitrogen for making **proteins**

and **amino acids**

the microorganisms

nitrogen-fixing **bacteria** make ammonia; nitrifying bacteria make nitrites then nitrates; denitrifying bacteria return N_2 to the air

decomposers

release **ammonium ions**

from dead matter and waste

lag phase

slow growth at first, while numbers are still small

log phase

rapid exponential growth, with resources plentiful

stationary phase

growth stops; births $\approx$ deaths – a **limiting factor** hold

has taken

A **death phase** follows when waste accumulates or food runs out. Naming **which** limiting factor ended the log phase is the mark.

Exercises 2.1·2.2

2.1 Define a population.

[1]

2.2 Name the phase of fastest growth.

[1]

Exercises 2.1·2.2

2.1 Define a population.

[1]

2.1

- a population is a group of organisms of **one species**, living in the same area at the same time

2.2 Name the phase of fastest growth.

[1]

2.2

- the fastest growth is the **exponential (log) phase**

Exercise 3.1

3.1 In the stationary phase of population growth:

[1]

☐

A the population is growing fastest

B births roughly equal deaths

C the population is dying out

D there are no organisms

Exercise 3.1

3.1 In the stationary phase of population growth:

[1]

☐

A the population is growing fastest

B births roughly equal deaths

C the population is dying out

D there are no organisms

3.1 B

- in the stationary phase **births roughly equal deaths**
- A is the log phase; C is the death phase; D is empty

Exercise 3.2 (a)

3.2 A population grows in a place with limited resources.

(a) State two factors that limit population growth.

[2]

Exercise 3.2 (a)

3.2 A population grows in a place with limited resources.

(a) State two factors that limit population growth.

[2]

(a)

- any **two** of: food supply / competition / predation / disease

Exercise 3.2 (b)

3.2 A population grows in a place with limited resources.

(b) Explain why the population enters a death phase.

[2]

Exercise 3.2 (b)

3.2 A population grows in a place with limited resources.

(b) Explain why the population enters a death phase.

[2]

(b)

- food runs out (or wastes build up / disease spreads)
- so **deaths exceed births** and numbers fall