

# What is Carrying Capacity?

## Worksheet

Carrying capacity is the maximum stable population size a habitat can support long-term; as a population nears  $K$ , growth slows due to limited resources, following the logistic growth model  $dN/dt = rN(1N/K)$ .

## Questions

1. In  $dN/dt = rN(1N/K)$ , what does  $K$  represent?

- A) Growth rate
- B) Carrying capacity
- C) Population size
- D) Time

2. What happens to growth rate as  $N$  approaches  $K$ ?

- A) It increases
- B) It approaches zero
- C) It becomes negative always
- D) It stays constant

3. A population with  $N=1000$ ,  $K=1000$  has  $dN/dt = ?$

- A) Maximum
- B) Zero
- C) Negative
- D) Undefined

4. Which is NOT a factor limiting carrying capacity?

- A) Food supply
- B) Predation
- C) Space
- D) Individual's eye color

5. A population of 500 deer has  $r=0.3$  and  $K=1000$ . Find the current growth rate.

6. A bacterial colony has  $N=900$ ,  $K=1000$ ,  $r=0.5$ . How fast is it growing?

7. If  $N=K$  exactly, what is  $dN/dt$ ?

8. Define: What is carrying capacity ( $K$ )?

9. Define: What happens when  $N$  approaches  $K$ ?

10. Define: What model describes carrying capacity?

## Answer Key

1. B) Carrying capacity - K is the carrying capacity - the maximum sustainable population.
2. B) It approaches zero - As NK,  $(1N/K)0$ , so growth slows toward zero.
3. B) Zero - At  $N=K$  the population is at equilibrium,  $dN/dt=0$ .
4. D) Individual's eye color - Eye color doesn't affect resource availability or survival at the population level.
5.  $dN/dt = rN(1N/K) = 0.3500(1500/1000) = 1500.5 = 75$  deer/year
6.  $dN/dt = 0.5900(1900/1000) = 4500.1 = 45$  cells/hour
7.  $dN/dt = rN(1N/N) = rN0 = 0$  Growth stops - the population is at equilibrium
8. The maximum population size an environment can sustainably support given its resources.
9. Population growth rate slows toward zero as resources become limiting.
10. The logistic growth model:  $dN/dt = rN(1N/K)$ .

### **Bounlu**

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