Worksheet Answer Key 🔑

Problem 1

The function is P(t)=1+9·2−t1000.

a) The carrying capacity is the numerator, which is **1000**.

b) To find the initial population, we evaluate the function at t=0:
P(0)=1+9·2−01000=1+9·11000=101000=**100 algae**.

c) To find the population after 3 days, we evaluate the function at t=3:
P(3)=1+9·2−31000=1+9·811000=1+891000=8171000=1000·178≈470.59. Since we're dealing with a population, we can round to **471 algae**.

Problem 2

The function is H(t)=1+499·0.5−t5000.

a) The maximum number of people that can hear the rumor is the carrying capacity, which is the numerator: **5,000**.

b) To find the initial number of people who heard the rumor, we evaluate the function at t=0:
H(0)=1+499·0.5−05000=1+499·15000=5005000=**10 people**.

c) To find the time when 2,500 people have heard the rumor, we set H(t)=2500 and solve for t:
2500=1+499·0.5−t5000
1+499·0.5−t=25005000=2
499·0.5−t=1
0.5−t=4991
To solve for t, we take the logarithm of both sides:
−t·log(0.5)=log(4991)
−t·(−0.301)=−2.698
t=−0.301−2.698≈**8.96 weeks**.

Problem 3

The function is S(x)=1+24·3−x25000.

a) The maximum number of units the company expects to sell is the carrying capacity, which is the numerator: **25,000 units**.

b) To find the sales in the first month, we evaluate the function at $x=1$: $S(1)=1+24\cdot 3-125000=1+24\cdot 3125000=1+825000=925000\approx 2777.78$. Since we're dealing with units, we can round to **2,778 units**.