

FACULTY NOTES

The LTAs and Spinoffs are designed so that each professor can implement them in a way that is consistent with his/her teaching style and course objectives. This may range from using the materials as out-of-class projects with minimal in-class guidance to doing most of the work in class. The LTAs and Spinoffs are amenable to small group cooperative work and typically benefit from the use of some learning technology. Since the objective of the LTAs and Spinoffs is to support the specific academic goals you have set for your students, the Faculty Notes are not intended to be prescriptive. The purpose of the Faculty Notes is to provide information that assists you to take full advantage of the LTAs and Spinoffs. This includes suggestions for instruction as well as answers for the exercises.



FACULTY NOTES

SPINOFF 6D

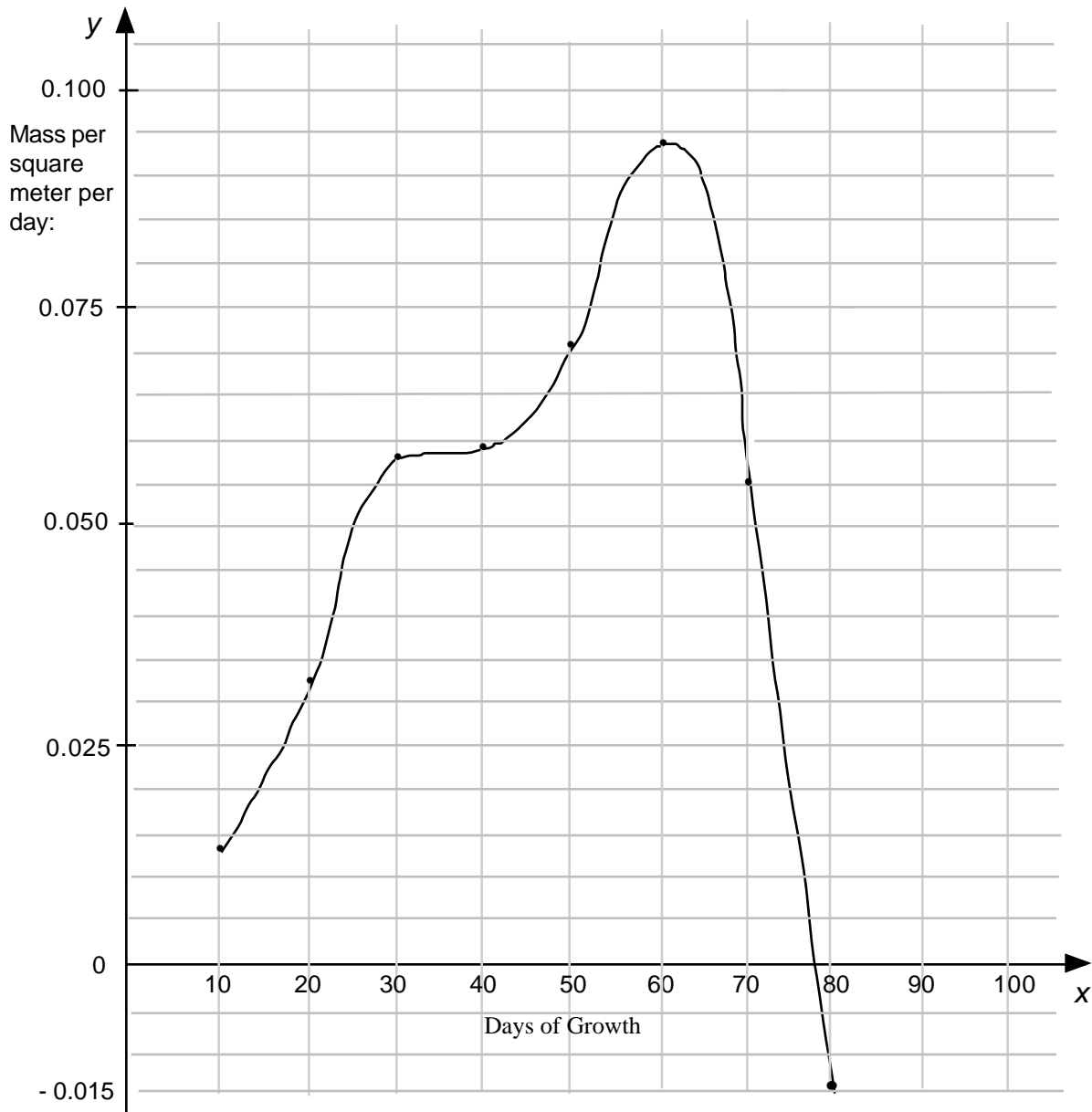
Analysis of Biomass Production in a Lunar Base Station

Solutions

- 1) Based on the graph, there is approximately 0.1 kg/m^2 of wheat present at the end of 10 days, and there is approximately 0.18 kg/m^2 of wheat present at the end of 15 days.
- 2) It takes approximately 64 days to grow 2 kg/m^2 of potatoes.
- 3) Wheat reaches its maximum mass on about the 76th day of growth.
- 4) Potatoes reach their maximum mass on about the 85th day of growth.
- 5) Wheat grows at the fastest rate around day 62.
- 6) Potatoes grow at the fastest rate around day 74.
- 7) Potatoes yield more food. Although potatoes yield 3 kg and wheat yields 4 kg at the end of each cycle, potatoes have higher yields ($\frac{2}{3}$ is edible) than wheat (40% is edible). That is, the final yield of potatoes is $\frac{2}{3}$ of 3 kg = 2 kg and the final yield of wheat is 40% of 4 kg = 1.6 kg.
- 8) The following table records rough estimates of the slopes of the wheat curve at different days. These estimates were obtained by holding a ruler tangent to the wheat curve at each of the indicated points and then using the gridwork to determining the slope of the ruler.

Day	10	20	30	40	50	60	70	80
Slope ($\text{kg/m}^2/\text{day}$)	0.013	0.032	0.058	0.059	0.071	0.093	0.055	- 0.015

9) Using the data points from exercise 8, the graph to describe the relationship between slope and time of the wheat curve is shown below (x-axis: days, y-axis: kg/m²/day).



10) The maximum mass of the wheat occurs when the slope = 0.