

Key to Quiz Questions—Week 5

1. (10 pts) Compare the total amount of organic matter carbon that would accumulate in two hypothetical forests, both with the same amount of litterfall ($900 \text{ gCm}^{-2}\text{yr}^{-1}$) over a five year period. For the sake of simplicity, assume the following:
 - There is no accumulated carbon at the beginning of the time period
 - All the litterfall occurs on the first day of the year (Jan 1)
 - You are calculating the amount of carbon on the morning of Jan 2 of the 5th year. You can ignore any decomposition that occurs on Jan 1 of the last year.
 - a. Calculate the total amount of organic matter carbon that would accumulate in a tropical forest where $k=3.5$ over a five year period.
 - b. Calculate the total amount of organic matter carbon that would accumulate in a temperate forest where $k=0.35$ over a five year period.

Litter falls each year and decays varying lengths of time until after the 5th year. The litter that drops the day before doesn't decay at all, while the previous year's has decayed 1 year, the litter from two year ago has decay 2 years etc. Since litter decay is an exponential process, the amount remaining has to be calculated for each year's litterfall using the number of years it has decayed using the equation for exponential decay $L_t = L_0 \times e^{-kt}$. Since the question was a little ambiguous, there are several answers we will consider correct.

Carbon Input 900 gC per m2 per yr

a. Tropical

$k= 3.5$

	year	Amt left after 5 yr
years ago that annual litterfall dropped	5	2.26E-05
	4	7.48E-04
	3	2.48E-02
	2	0.82
	1	27.18
	0	900.00
total litter		928.02

other correct answers

28.02

Carbon Input 900 gC per m2 per yr

b. Temperate

$k= 0.35$

	year	Amt left after 5 yr
years ago that annual litterfall dropped	5	1.56E+02
	4	2.22E+02
	3	3.15E+02
	2	446.93
	1	634.22
	0	900.00
total litter		2,674.42

other correct answers

1,774.42

1,618.03

2. (15 pts) Every public forested property has a multiplicity of users whose needs and impacts must be considered as part of a management plan. Imagine that you are in charge of managing Evergreen's forests. Be very specific in your answers so that we can ascertain your level of critical thinking.
 - a. Identify four different user groups that currently use Evergreen's forests, the benefits they receive and the impacts that they cause. At least one of the user groups needs to be one that extracts some type of forest resource (and they are using the forests on campus).
 - b. Since the population in Thurston county is growing rapidly, assume that the size of each of the user groups identified in "a" will increase proportionally. For each of these groups at some point in the future, the impacts that they cause may decrease their benefits or the benefits of another user group. Identify what these impacts may be for each user group and how they might decrease benefits for other users of the forest.
 - c. As a manager, you must devise a management plan for sustainable use of the Evergreen forests. Outline how you might manage the forests in a sustainable way to continue to provide the experiences that each user group seeks. You may have to limit some or all uses to minimize impacts. Implementation of your management plan can not cost the College; your management plan must generate the income to implement any management actions. Outline the major elements of your plan and include strategies that you propose to generate the income needed for your management plan. Consider the user groups you have identified in your answer.

There are a number of possible answers. Identifying user groups and demonstrating critical thought and reasonable support for your answer was necessary for full credit.