AMI DAY 2 Name: _____ Date:_____

Directions: Each passage is followed by several questions. After reading a passage, choose the best answer to each question and fill in the corresponding oval on your answer document. You may refer to the passages as often as necessary.
You are NOT permitted to use a calculator on this test.

In agriculture, soils can be classified based on *mineral content* (the amount of various metals present in the soil), and *organic content* (the percent of soil volume occupied by material made by living organisms). Ideal concentrations of various minerals are given in parts per million (*ppm*) in Table 1. If the levels of different minerals of a soil are all similar, relative to the optimal levels, the soil is said to be *well defined*. If the levels of different minerals in a soil vary widely relative to the optimal levels, the soil is said to be *poorly defined*.

Table 1

Mineral	Ideal concentration (ppm)
Nitrogen	22
Phosphorus	14
Potassium	129
Chloride	12
Sulfur	88
Iron	6.9
Manganese	2.7

Study 1

Soil was taken from 5 different farms to a laboratory. The soils were *desiccated* (all water was removed), and a 1 L sample of each soil was prepared. In order to make sure that no minerals were trapped within the organic matter of a soil, the organic matter of each soil was burned by heating the soil to 500°C for 20 minutes. The ash of the organic matter was removed and the remaining soil analyzed for the concentration of various minerals. The results are shown, as percent of ideal concentration, in Table 2.

Table 2

Mineral	Concentration of minerals (% of ideal concentration)				
	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5
Nitrogen	89	112	160	78	210
Phosphorus	76	19	212	94	34
Chloride	124	106	64	87	65
Sulfur	290	97	189	102	112
Iron	57	26	73	91	165
Manganese	86	45	89	97	109

Study 2

To determine the percentage of the mass of each soil composed of organic matter, the above procedure was repeated, with the soil weighed before being heated to 500°C and after having the ash removed. The number of live cells (bacteria, fungi, etc.) in a cubic millimeter of each soil was determined by microscopic analysis. The results are presented in Table 3.

Table 3

Farm	% organic matter	# living cells per mm^3
1	7.1	2,964
2	8.9	3,920
3	4.8	1,642
4	6.6	2,672
5	18.9	9,467

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1. Soils with more living cells per mm^3 generally consume more oxygen than soils with fewer living cells. Based on this information, the soil of which farm would be expected to consume the most oxygen?

- F. Farm 1
- G. Farm 2
- H. Farm 3
- J. Farm 5

2. If, in Study 2, before and after heating a soil sample to 500°C for 20 minutes and removing the ash, the mass of the sample was approximately the same, which of the following is the most reasonable conclusion?

- A. There was little or no water in the soil.
- B. There was a large quantity of water in the soil.
- C. There was little or no organic matter in the soil.
- D. There was little or no mineral content in the soil.

3. In Study 2, before heating the sample to 500°C, it was necessary for the scientists to desiccate the soil in order to ensure that:

- F. the water was not mistaken for a mineral.
- G. the water was not consumed by the living cells.
- H. it was possible to count live cells by making sure the soil didn't stick together.
- J. the mass of the water was not mistaken for organic matter.

4. Based on Study 2, if the scientists took a soil sample from another farm, and the number of living cells per mm^3 was determined to be 2,100, the % organic matter in that soil would most likely be:

- A. less than 4.8.
- B. between 4.8 and 6.6.
- C. between 6.6 and 7.1.
- D. greater than 7.1.

5. Beans grow fastest in soils with high nitrogen and iron levels. If all other levels were equal, then based on the results of Study 1, which of the farms would be expected to produce the fastest growing beans?

- F. Farm 5
- G. Farm 4
- H. Farm 3
- J. Farm 2