

# SAMPLE MATH PROBLEMS FOR MICROBIOLOGY

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13 August 1995, rvsd 12 Feb' 97, 1 July 98, 28 June 01, 11 Mar 02, 27 June 05, 2 July 10  
[http://biology.clc.uc.edu/fankhauser/Labs/Microbiology/Micro\\_Math\\_Problems.htm](http://biology.clc.uc.edu/fankhauser/Labs/Microbiology/Micro_Math_Problems.htm)

## Remember:

$(\text{CFU}/\text{standard unit volume}) = (\text{no. of colonies}) \times (\text{dil'n factor}) \times (\text{standard unit volume}/\text{aliquot plated})$

1. 0.1 mL of urine was plated out on nutrient agar. After incubation at 37°C, 279 colonies appeared. Give the CFU/mL. How many CFU are there per 100 mL?
2. A water sample was diluted by placing a 0.1 mL aliquot into 0.9 mL of diluent, and 1 mL of this dilution was pour-plated. After incubation, 217 colonies appeared. What is the CFU/mL in the original water specimen?
3. A bacterial culture was diluted by adding a 0.1 mL aliquot to 0.9 mL water. Then, 0.1 mL of this dilution was plated out, yielding 73 colonies. Calculate the CFU/100 mL in the original culture.
4. A dilution of a bacterial suspension was prepared by adding 100 $\mu$ L of the suspension to 9.9 mL of sterile physiological saline (PSS). 100 $\mu$ L of this dilution was plated out, yielding 27 colonies. Give the CFU/mL in the original culture.
5. A serial dilution was prepared by adding 0.1 mL of a bacterial culture to 9.9 mL. Then, 0.1 of that dilution was added to 9.9 mL of fresh diluent. Finally, 0.1 mL of the last dilution was spread. Later, 561 colonies were counted. What was the original CFU/mL?
6. 200  $\mu$ L of milk was mixed with 9.8 mL diluent, and 10 lambdas of the dilution were pour-plated. If there were 141 colonies on the plate, what was the original CFU/mL in the milk?
7. 250 mL of drinking water was passed through a millipore filter, and the membrane was layered on a pad supplied with on m-Endo MF medium. 21 red colonies formed. What was the coliform/100 mL? Does this drinking water meet the standards for drinking water? Using this protocol, what would the largest number of coliform permitted and still have the water "safe for consumption?"
8. 10  $\mu$ L of a phage lysate suspension were added to 9.99 mL diluent, 10  $\mu$ L of that added to 9.99 mL fresh diluent. Then 10  $\mu$ L of this last dilution plated with indicator bacteria. 207 plaques appeared following incubation. What was the titer (phage/mL) of the original lysate?
9. 0.73 gm of hamburger was suspended in 7.3 mL of diluent, 0.1 mL of the suspension diluted into 9.9 mL diluent, 0.1 of that dilution was added to 0.9 mL fresh diluent, and 0.2 mL of this last dilution was pour plated. 422 colonies formed. What was the CFU/g in the meat? Does this hamburger meet the standards for wholesome meat?
10. A 1 cm square surface was swabbed with a moistened sterile cotton swab, and the swab was suspended in 2 mL of sterile water and vortexed to suspend swabbed bacteria. 10 lambdas of this suspension was added to 9.99 mL diluent, and 20 $\lambda$  lambdas were pour plated, and 106 colonies appeared. What was the CFU/sq.cm on the surface?
11. A package of yeast (7.39 g) was suspended into 100 mL dH<sub>2</sub>O. This was serially diluted by transferring 0.1 aliquots successively to 9.9 dilution blanks three times in secession. 0.1 and 0.2 mL aliquots were spread on 4% glucose nutrient agar. Colonies appeared as follows: 0.1 plate: 179, 0.2 plate: 321. How many yeast were there originally in the package? How many yeast are there in a gram? How many picograms does a single yeast cell weigh?

