

BIO 126L
EXAM 1, Sample 3

PRINT YOUR NAME

TA'S NAME

Please sign below if you wish to have your grades posted by the last five digits of your SSN

Signature

INSTRUCTIONS:

BIO 126L EXAM I has 8 pages, and 38 questions.
There are a total of 200 points, accounting for 20% of your final grade.
Place your name at the top of each page and check that your exam is complete.

ANSWER ALL QUESTIONS.

Be brief and precise in your answers. **DO NOT RAMBLE!**

Multiple choice questions: Circle the **SINGLE BEST** answer.

In all cases there is one answer that most completely answers the question being asked.

You must show your calculations where asked.

Copying and all other forms of cheating will be met with the appropriate disciplinary action.

In case you dispute the answer that is deemed correct, you **MUST** first submit to your TA your question and the reason that you think your answer is the best (not just right, but the best of the answer choices) along with references that support your viewpoint. This must be done within 1 week after the exams are returned.

YOU MUST HAND OVER YOUR COMPLETED EXAM TO YOUR TA WHEN LEAVING THE ROOM AND MAKE SURE THAT YOUR NAME HAS BEEN WRITTEN DOWN

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1. (20 points) Mention True / False for the following:

- a. _____ You should always carry test tubes in a rack.
- b. _____ *Arthrobacter flavescens* JG-9 (the strain you used in the lab) can use siderophores produced by all microbes.
- c. _____ Desferal disc contains a siderophore that *Arthrobacter flavescens* JG-9 can use to obtain iron from the medium.
- d. _____ Objective lenses on your microscope should be cleaned in the following order: 100X, 10X and 40X.
- e. _____ When instructed to make a bacterial smear on a slide, you should heat-fix the bacteria on to the slide.
- f. _____ Oblique reflected light is used to observe colonies growing on blood agar plate.
- g. _____ You saw the nucleus in the red blood cells under the microscope.
(R.B.C. were a part of the mixed cell suspension)
- h. _____ Titer and optical density are directly proportional during the normal growth cycle of an organism.
- i. _____ When streaking for isolating a colony by the three-phase streaking pattern you should NOT flame your inoculating loop before streaking each section.
- j. _____ In the "motility" test, red color is indicative of bacterial growth.

2. (5 points) 0.01mm is equal to _____ μm

- a. 0.1 b. 1 c. 10 d. 100

3. (5 points) When a microscope is said to be "parfocal", it means that:

- a. Its depth of focus can not be adjusted
- b. When changing objectives you need only minor focusing adjustment
- c. All lenses have the same total magnification
- d. All objectives have the same focal length

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4. (5 points) Which of the following will have NO effect on resolution?

- a. Wave length of light source
- b. Numerical aperture of the objective lens
- c. Magnification of the ocular lens

5. (6 points) What will be the resolving power when using a light wave of 500nm with an objective lens having a numerical aperture of 1. Mention the correct units for the resolution. You must give the formula, and show your calculations to get full credit.

Formula:

Resolution:

6. (4 points) Which of the following is routinely used in the lab to solidify the medium to make plates?

- a. agar
- b. gelatin
- c. peptone
- d. neutral red

7. (4 points) With which objective lens (mention the magnification) would you use immersion oil and why?

8. (3 points) Using immersion oil with a 40X objective lens would make the image sharper / blurrier. Circle the correct answer.

9. (3 points) A coccus refers to a _____ shaped bacterium.

- a. rod
- b. spherical
- c. helical
- d. cylindrical

10. (4 points) Stereomicroscopes are used in the lab to look at the cell / colony morphology. Circle the correct answer.

11. (4 points) What is the maximum TOTAL magnification you can get using a stereoscope?

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12. (4 points) Give the names of the different Gram staining solutions in the order in which they are used.

I. _____

II. _____

III. _____

IV. _____

13. (4 points) When Gram staining a culture of a known Gram negative rod, you forgot the iodine step. This stained culture appeared _____ under the microscope.

a. clear

b. brown

c. pink

d. purple

14. (6 points) If alcohol step was omitted from Gram staining, Gram positive organisms will appear _____, and Gram negative would be _____.
Mention the color.

15. (4 points) An association between two organisms in which one benefits at the expense of the other organism is known as _____.

16. (5 points) What does "ZOI" stand for in reference to Antibiotic sensitivity test? Very briefly describe what it would look like on a plate?

17. (6 points) MacConkey agar is selective against Gram positive / negative organisms. Bile salts and _____ make the medium selective. Circle the correct answer.

18. (6 points) If you wanted to isolate an obligate anaerobe from a mix, would you incubate the agar plate containing that mix in the 37°C walk in incubator, just the way you incubate your *E. coli* plate? Explain your answer in less than 20 words.

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19. (6 points) Name the two reducing agents present in the thioglycolate plus glucose medium.

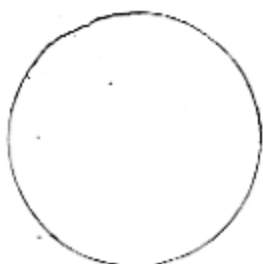
20. (6 points) When preparing plates containing MacConkey agar you forgot to add lactose to the medium. These plates would be: Circle the correct answer.

a. Selective: Yes / No

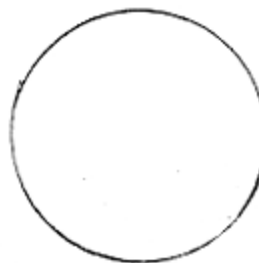
b. Differential: Yes / No

21. (6 points) We used *Arthrobacter flavescens* JG-9, a natural auxotroph for siderophore in the lab. In the space below, sketch out the growth pattern you'll observe for this organism when plated on a Brain Heart infusion agar, and on a blood agar plate. Indicate the regions where you'll see growth.

BHI plate



Blood agar



22. (4 points) Using a P200 micropipettor, a setting of 115 will dispense

_____ μ l / _____ ml.

23. (4 points) Using a P1000 micropipettor, a setting of 051 will dispense

_____ μ l / _____ ml.

24. (4 points) In order to be considered statistically significant for titer calculation, a dilution plate must contain between _____ to _____ colonies.

25. (4 points) Which of the following measures ONLY viable bacterial cells?

a. Dilution plating

b. Optical density

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26. (8 points) Given the following dilution series calculate the STEP and CUMULATIVE dilution factor, and fill in the blank spaces below:

	STEP DILUTION	CUMULATIVE DILUTION
A: 1ml stock + 9ml diluent	_____	_____
B: 0.1ml of A + 9.9ml diluent	_____	_____
C: 0.5ml of B + 4.5ml diluent	_____	_____
D: 0.2ml of C + 1.8ml diluent	_____	_____

27. (4 points) You performed a dilution series of an *E. coli* culture. You plated 100 μ l from the 10^{-4} dilution tube and got 95 colonies on one plate and 105 on the duplicate. Calculate the titer of your original (undiluted) stock culture of *E. coli*. Show your calculations. Write the correct units.

Titer of the original stock: _____

28. (6 points) Uninoculated glucose fermentation broth is _____ in color.

After incubation for 24 hours (at 37°C) with a glucose fermenter it would appear _____.

29. (4 points) What is the major component of the gas in the Durham tube?

30. (5 points) What is the appearance of a positive reaction with Kovac's reagent?
Answer in less than 15 words.

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31. (5 points) What does the Kovac's reagent bind with (form a covalent bond) to give a positive reaction?

_____ (name the chemical)

32. (6 points) What do the following symbols describe when writing about the Biochemical tests? Answer in less than 10 words.

A: _____

NR: _____

33. (5 points) After 30 hours of incubation with a "gelatinase" producing bacteria, the top few mm of the gelatin medium will be liquid / solid after being placed at 8°C for about half an hour. Circle the correct answer.

34. (5 points) Write down the chemical name of the Catalase reagent.

35. (6 points) A _____ antibiotic lysis bacterial cells, where as a _____ antibiotic only stops growth.

a. bacteriostatic

b. bacteriocidal

c. bacteriolytic

36. (4 points) Which characteristic of *Vibrio natriegens* makes it a suitable organism to use for growth curve experiments in a teaching lab (lasting for about 3-4 hours)? Answer in less than 15 words.

37. (10 points) Sketch a graph in the space provided below to show the three phases of the growth curve you were able to observe for *Vibrio natriegens* (under normal conditions) in the lab. (Label both the X and the Y axes and the different phases appropriately).



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38. Bonus: (4 points)

Write down the complete scientific name of "E. COLI", spelled correctly, upper case and lower case letters used where needed, and underlined.