

Mark the best answer to each question on scantron.

Refer to images as directed.

READ CAREFULLY!

1. To observe bacterial cellular morphology would typically require total magnification of:

- (a) 1x
- (b) 10x
- (c) 100x
- (d) 1000x
- (e) 10000x

2. A student performed a Gram-stain, but did not wash sufficiently during the "decolorization" step (not enough ethanol applied); as a result (after completing the stain procedure on this sample), both Gram(+) and Gram(-) cells would likely appear _____.

- (a) safranin-colored
- (b) clear (un-colored)
- (c) blue-colored
- (d) violet-colored
- (e) dark red-colored

3. Suppose you were concerned that a mistake had been made, and no pH indicator was included in your urease test media. Which of the following is a positive control you could use to test this media?

- (a) add methyl red to the media - make sure it is the right color
- (b) incubate an uninoculated sample (a blank)
- (c) add heavy inoculum & incubate for additional time
- (d) add phenol red to the media - make sure the color changes
- (e) add base to the media - make sure the color changes

4. In the carbohydrate fermentation test broths, a positive result is recorded if the sample becomes more _____.

- (a) acidic
- (b) basic
- (c) liquid
- (d) turbid
- (e) none of the answers shown

5. MSA (Mannitol Salt Agar) utilizes which pH indicator?

- (a) brom thymol blue
- (b) methyl green
- (c) phenol red
- (d) sodium chloride
- (e) methyl red

6. A colony picked directly from _____ plates should never be considered a pure culture.

- (a) Mannitol Salt Agar
- (b) Columbia CNA
- (c) Hektoen Enteric Agar
- (d) answers A+C
- (e) answers A+B+C

7. Which of the following results would be considered most conclusive / most reliable?

- (a) Urease negative
- (b) Tryptophanase (Indole) negative
- (c) Beta hemolysis
- (d) Gamma hemolysis
- (e) Oxidase negative

8. Which set of phenol red carbohydrate fermentation test results shown below would be most trusted and reliable?

- | | PR (base): | PR-Glucose: | PR-Lactose: | PR-Sucrose: |
|-----|------------|-------------|-------------|-------------|
| (a) | + | - | + | + |
| (b) | - | - | - | - |
| (c) | - | - | + | + |
| (d) | - | + | - | - |

- (e) None of the results shown are reasonable – all seem unreliable, none should be trusted.

9. A colony picked directly from _____ plates should never be considered a pure culture.

- (a) Mannitol Salt Agar
- (b) Columbia CNA
- (c) Hektoen Enteric Agar
- (d) answers A+C
- (e) answers A+B+C

10. Addition of 300 microliters sample to 2.7 milliliters diluent is a(n) ____-fold dilution. Addition of 30 microliters sample to 2.97 milliliters diluent would be a(n) ____-fold dilution.

- (a) 10, 1000
- (b) 100, 10
- (c) 10, 100
- (d) 1000, 10
- (e) 100, 1000

11. Which microscope image could be consistent with Gram-stained *Salmonella typhimurium* or *Shigella sonnei*? (see figures on separate page)

- (a) K
- (b) L
- (c) M
- (d) O
- (e) Q

12. Which microscope image shows gram-negative cocci? (see figures on separate page)

- (a) J
- (b) L
- (c) N
- (d) P
- (e) Q

13. Which single microscope image best demonstrates that the Gram stain reaction is functioning properly? (see figures on separate page)

- (a) K
- (b) L
- (c) M
- (d) O
- (e) P

14. Which sample shows evidence of an exoenzyme that can degrade/break down proteins? (see figures on separate page)

- (a) Left sample on gelatinase tests
- (b) Right sample on gelatinase tests
- (c) Left sample on urease tests
- (d) Right sample on DNase test
- (e) Right sample on urease tests

15. In the image of the blood agar plate (see image on separate page), which sample appears to have alpha-hemolytic activity?

- (a) A
- (b) B
- (c) C
- (d) All of the above
- (e) none of the answers shown are correct

16. In the image of the blood agar plate (see image on separate page), which sample shows hemolytic activity consistent with that of *Staphylococcus epidermidis*?

- (a) A
- (b) B
- (c) C
- (d) All of the above
- (e) none of the answers shown are correct

17. If no growth was observed in a given phenol red carbohydrate test media after 48 hours, this fermentation test result:

- (a) Is considered positive
- (b) Is considered negative
- (c) Could be considered positive or negative, depending on the desired outcome
- (d) Is considered unusable / unreliable
- (e) Is considered a false positive

18. Which of the following species is a major cause of throat infections? (Hint: Exhibits Beta-hemolysis, is DNase positive, grows best with supplemental CO₂).

- A) *Streptococcus pyogenes*
- B) *Micrococcus luteus*
- C) *Streptococcus pneumoniae*
- D) *Staphylococcus aureus*
- E) *Streptococcus salivarius*

19. H⁺ ions, H₂S gas, 2,3-butanediol, and CO₂ gas are each

- (a) pH indicators
- (b) fermentable carbohydrate sources
- (c) possible products of carbohydrate fermentation
- (d) components of differential media
- (e) none of the answers shown are correct

20. Which of the following sugars was NOT included in our TSIA slants?

- (a) glucose
- (b) lactose
- (c) sucrose
- (d) fructose
- (e) All of the above sugars were included

21. Which of the following can cause false positives on a diagnostic test?

- (a) Low test sensitivity
- (b) Inadequate amount of sample applied
- (c) Low test specificity
- (d) reading test results after shorter-than-specified incubation
- (e) answers "A" or "B"

22. Which of the following can cause false negatives on a diagnostic test?

- (a) Low test sensitivity
- (b) excessive amount of sample applied
- (c) Low test specificity
- (d) reading test results after longer-than-specified incubation
- (e) answers "A" or "B"

23. In the carbohydrate fermentation test results (see image on separate page), which sample is positive for acid generation and gas production?

- (a) sample on the left side
- (b) sample on the right side
- (c) sample in the middle
- (d) middle and right samples
- (e) none of the above

24. In the PR-carbohydrate fermentation test results (see image on separate page), which sample is positive for acid generation and negative for gas production?

- (a) sample on the left side
- (b) sample on the right side
- (c) sample in the middle
- (d) middle and right samples
- (e) none of the above