

Test Bank for Prescotts Microbiology 12th Willey

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CORRECT ANSWERS ARE LOCATED IN THE 2ND HALF OF THIS DOC.

TRUE/FALSE - Write 'T' if the statement is true and 'F' if the statement is false.

- 1) Light rays are refracted (bent) when they cross the interface between materials with different refractive indices.
 - ☐ true
 - ☐ false
- 2) A substage condenser is used to focus light onto the specimen, which increases the resolution of a light microscope.
 - ☐ true
 - ☐ false
- 3) Confocal microscopes, in combination with specialized computer software, can be used to create three-dimensional images of cell structures.
 - ☐ true
 - ☐ false
- 4) A light microscope with an objective lens numerical aperture of 0.65 is capable of allowing two objects 400 nm apart to be distinguished when using light with a wavelength of 420 nm.
 - ☐ true
 - ☐ false
- 5) Resolution improves when the wavelength of the illuminating light decreases.
 - ☐ true
 - ☐ false
- 6) Immersion oil is used to prevent a specimen from drying out.
 - ☐ true
 - ☐ false
- 7) It is possible to build a light microscope capable of 10,000× magnification, but the image would not be sharp because resolution is independent of magnification.
 - ☐ true
 - ☐ false
- 8) Immersion oil increases the amount of light entering the objective lens.
 - ☐ true
 - ☐ false

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- 9) Gram staining divides bacterial species into two groups based on differences in cell wall structure.
- ☐ true
 - ☐ false
- 10) Negative staining facilitates the visualization of bacterial capsules that are intensely stained by the procedure.
- ☐ true
 - ☐ false
- 11) Negative staining with India ink can be used to reveal the presence of capsules that surround bacterial cells.
- ☐ true
 - ☐ false
- 12) Mordants increase the binding between a stain and specimen.
- ☐ true
 - ☐ false
- 13) In order to stain flagella so that they may be readily observed by light microscopy, it is usually necessary to increase their thickness.
- ☐ true
 - ☐ false
- 14) The Gram-staining procedure is widely used because it allows rapid identification of a microorganism with little additional testing.
- ☐ true
 - ☐ false
- 15) Because transmission electron microscopy uses electrons rather than light, it is not necessary to stain biological specimens before observing them.
- ☐ true
 - ☐ false
- 16) Scanning electron microscopes bombard specimens with a stream of electrons; however, the specimen image is produced by electrons that are derived from atoms of the specimen itself rather than by the electrons used to bombard the specimen.
- ☐ true
 - ☐ false

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17) It was possible to view viruses only after the invention of the electron microscope because they are too small to be seen with a light microscope.

- ☐ true
- ☐ false

18) Scanning tunneling electron microscopes create a three-dimensional image of specimens at atomic-level resolution.

- ☐ true
- ☐ false

MULTIPLE CHOICE - Choose the one alternative that best completes the statement or answers the question.

19) Confocal microscopes exhibit improved contrast and resolution by_____.

- A) illumination of a large area of the specimen
- B) blocking out stray light with an aperture located above the objective lens
- C) use of light at longer wavelengths
- D) use of ultraviolet light to illuminate the specimen

20) A 30× objective and a 20× ocular produce a total magnification of_____.

- A) 230×
- B) 320×
- C) 50×
- D) 600×

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21) A 45× objective and a 10× ocular produce a total magnification of_____.

- A) 900×
- B) 55×
- C) 450×
- D) 145×

22) A microscope that exposes specimens to ultraviolet, violet, or blue light and forms an image with the light emitted at a different wavelength is called a_____ microscope.

- A) phase-contrast
- B) dark-field
- C) scanning electron
- D) fluorescence

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- 23) Immersion oil can be used to increase the resolution achieved with some microscope lenses because it increases the _____ between the specimen and the objective lens.
- A) optical density
 - B) refractive index
 - C) optical density and refractive index
 - D) neither optical density nor refractive index
- 24) If the objective lenses of a microscope can be changed without losing focus on the specimen, they are said to be _____.
- A) equifocal
 - B) totifocal
 - C) parfocal
 - D) optifocal
- 25) An instrument that magnifies slight differences in the refractive index of cell structures is called a(n) _____ microscope.
- A) phase-contrast
 - B) electron
 - C) fluorescence
 - D) densitometric
- 26) The instrument that produces a bright image of the specimen against a dark background is called a(n) _____ microscope.
- A) phase-contrast
 - B) electron
 - C) bright-field
 - D) dark-field
- 27) As the magnification of a series of objective lenses increases, the working distance _____.
- A) increases
 - B) decreases
 - C) stays the same
 - D) cannot be predicted
- 28) Prior to staining, smears of microorganisms must be heat-fixed in order to _____.
- A) allow eventual visualization of internal structures
 - B) ensure removal of dust particles from the slide surface
 - C) attach them firmly to the slide
 - D) create small pores in cells that facilitates binding of stain to cell structures

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- 29) Acid-fast organisms such as *Mycobacterium tuberculosis* contain_____ constructed from mycolic acids in their cell walls.
- A) proteins
 - B) carbohydrates
 - C) lipids
 - D) peptidoglycan
- 30) In the Gram-staining procedure, the primary stain is_____.
- A) iodine
 - B) safranin
 - C) crystal violet
 - D) alcohol
- 31) In the Gram-staining procedure, the decolorizer is_____.
- A) iodine
 - B) safranin
 - C) crystal violet
 - D) ethanol or acetone
- 32) In the Gram-staining procedure, the counterstain is_____.
- A) iodine
 - B) safranin
 - C) crystal violet
 - D) alcohol
- 33) In the Gram-staining procedure, the mordant is_____.
- A) iodine
 - B) safranin
 - C) crystal violet
 - D) alcohol
- 34) After the primary stain has been added but before the decolorizer has been used, Gram-positive organisms are stained_____ and Gram-negative organisms are stained_____.
- A) purple; purple
 - B) purple; colorless
 - C) purple; pink
 - D) pink; pink

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- 35) After the decolorizer has been added, Gram-positive organisms are stained _____ and Gram-negative organisms are stained _____.
- A) purple; purple
 - B) purple; colorless
 - C) purple; pink
 - D) pink; pink
- 36) After the mordant has been added, Gram-positive organisms are stained _____ and Gram-negative organisms are stained _____.
- A) purple; purple
 - B) purple; colorless
 - C) purple; pink
 - D) pink; pink
- 37) If the decolorizer is left on too long in the Gram-staining procedure, Gram-positive organisms will be stained _____ and Gram-negative organisms will be stained _____.
- A) purple; blue
 - B) purple; colorless
 - C) purple; pink
 - D) pink; pink
- 38) If the decolorizer is not left on long enough in the Gram-staining procedure, Gram-positive organisms will be stained _____ and Gram-negative organisms will be stained _____.
- A) purple; purple
 - B) purple; colorless
 - C) purple; pink
 - D) pink; pink
- 39) Which of the following is considered to be a differential staining procedure?
- A) Gram stain
 - B) Acid-fast stain
 - C) Both Gram stain and Acid-fast stain
 - D) Leifson's flagella stain

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- 40) Basic dyes such as methylene blue bind to cellular molecules that are_____.
- A) hydrophobic
 - B) negatively charged
 - C) positively charged
 - D) aromatic
- 41) The Gram-staining procedure is an example of _____.
- A) simple staining
 - B) negative staining
 - C) differential staining
 - D) fluorescent staining
- 42) Regions of a specimen with higher electron density scatter_____ electrons and, therefore, appear_____ in the image projected onto the screen of a transmission electron microscope.
- A) more; lighter
 - B) more; darker
 - C) fewer; darker
 - D) fewer; lighter
- 43) Scanning electron microscopy is most often used to reveal_____.
- A) surface structures
 - B) internal structures
 - C) both surface and internal structures simultaneously
 - D) either surface or internal structures, but not simultaneously
- 44) Small internal cell structures are best visualized with a_____.
- A) light microscope
 - B) dark-field microscope
 - C) transmission electron microscope
 - D) flagellar microscope
- 45) In transmission electron microscopy, spreading a specimen out in a thin film with uranyl acetate, which does not penetrate the specimen, is called_____.
- A) freeze-etching
 - B) simple staining
 - C) shadow staining
 - D) negative staining

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- 46) Atomic force microscopes use a scanning probe that maintains a fixed distance from the surface of the specimen. It is useful for specimens that_____.
- A) do not conduct electricity well
 - B) have extremely uneven surfaces
 - C) do not conduct electricity well, and have extremely uneven surfaces
 - D) conduct electricity well, and have smooth surfaces
- 47) If immersion oil was replaced with water, what would happen?
- A) The refractive index would increase, improving resolution.
 - B) The refractive index of water would be greater than air but less than oil, improving resolution less than oil.
 - C) The refractive index of water would be less than that of air, decreasing resolution.
 - D) There would be no difference.
- 48) As the resolution of a microscope system improves, the size of the smallest object that can be seen clearly _____.
- A) is larger
 - B) is smaller
 - C) is not affected
- 49) If you forgot to heat fix a smear before doing a Gram stain, which of the following might occur?
- A) The stains would not adhere to the bacteria.
 - B) The smear may not adhere to the slide.
 - C) The decolorization step of the Gram stain would not work properly.
 - D) Gram-positive and Gram-negative bacteria would both stain purple.
- 50) A specimen has been prepared for viewing with a transmission electron microscope, using uranyl acetate as a negative stain. The area stained by the uranyl acetate will be _____ electron-dense compared to the specimen itself.
- A) more
 - B) less
 - C) equally
- 51) If you forgot the decolorization step while performing a Gram stain, which outcome would you expect?
- A) Gram-positive bacteria would stain pink
 - B) Gram-negative bacteria would stain purple
 - C) Gram-negative bacteria would be unstained
 - D) Gram-positive bacteria would be unstained

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- 52) If you forgot to apply the safranin counterstain while performing a Gram stain, which outcome would you expect?
- A) Gram-positive bacteria would stain pink.
 - B) Gram-negative bacteria would stain purple.
 - C) Gram-negative and Gram-positive bacteria would be unstained.
 - D) Gram-negative bacteria would be unstained.
- 53) Which type of microscopy would be preferred for creating a three-dimensional view of the distribution and arrangement of flagella on a bacterial cell surface?
- A) Bright-field microscopy
 - B) Scanning electron microscopy
 - C) Fluorescence microscopy
 - D) Transmission electron microscopy
- 54) Which type of microscopy would be preferred for showing fine internal detail of the eukaryotic organelles?
- A) Bright-field microscopy
 - B) Scanning electron microscopy
 - C) Fluorescence microscopy
 - D) Transmission electron microscopy
- 55) You are researching the structure of a transmembrane protein. Which type of microscopy would provide you the best view of this protein?
- A) Bright field microscopy
 - B) Scanning electron microscopy
 - C) Transmission electron microscopy
 - D) Atomic force microscopy
- 56) If the strength of a lens is the reciprocal of its focal length ($1/f$), which of the following lenses will have the greatest strength?
- A) A lens with a focal length of 1cm
 - B) A lens with a focal length of 100 mm
 - C) A lens with a focal length of 0.1 mm
 - D) A lens with a focal length of 1 mm
- 57) Glass has a greater refractive index than air. This means that_____.
- A) the velocity of the light is slowed when it passes through the glass from the air
 - B) the velocity of the light accelerates when it passes through the glass from the air
 - C) the velocity of the light is slowed when it passes through the air from the glass
 - D) the light is bent away from the normal when passing through glass from air

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FILL IN THE BLANK. Write the word or phrase that best completes each statement or answers the question.

- 58) The_____ is the point at which a lens focuses parallel beams of light.
- 59) The_____ is the distance between the center of a lens and the point at which it focuses parallel beams of light.
- 60) The_____ is the distance between the specimen and the objective lens when the specimen is in focus.
- 61) The useful magnification of a light microscope is limited by the_____ of the light source being utilized.
- 62) The special dyes used in fluorescence microscopy that absorb light at one wavelength and emit light at a different wavelength are called_____.
- 63) In order to view a specimen with a total magnification of 400×, a_____ objective must be used if the ocular is 10×.
- 64) The procedure in which a single stain is used to visualize microorganisms is called_____ staining. TBEXAM.COM
- 65) _____ is the process by which internal and external structures of cells and organisms are preserved and maintained in position.
- 66) Thin films of bacteria that have been air-dried onto a glass microscope slide are called_____.
- 67) A procedure that divides organisms into two or more groups depending on their individual reactions to the same staining procedure is referred to as_____ staining.
- 68) An electron microscope uses_____ lenses to focus beams of electrons onto a specimen.
- 69) _____ breaks frozen specimens along lines of greatest weakness, often down the middle of lipid bilayer membranes so that they may be observed by transmission electron microscopy.
- 70) The_____ microscope is capable of atomic resolution of specimens, even when they are immersed in water.

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- 71) The designer of the first transmission electron microscope, _____, was awarded the 1986 Nobel Prize in physics.

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Answer Key

Test name: Chapter 02

- 1) TRUE
- 2) TRUE
- 3) TRUE
- 4) TRUE
- 5) TRUE
- 6) FALSE
- 7) TRUE
- 8) TRUE
- 9) TRUE
- 10) FALSE
- 11) TRUE
- 12) TRUE
- 13) TRUE
- 14) FALSE
- 15) FALSE
- 16) TRUE
- 17) TRUE
- 18) TRUE
- 19) B
- 20) D
- 21) C
- 22) D
- 23) B
- 24) C
- 25) A
- 26) D
- 27) B
- 28) C
- 29) C
- 30) C
- 31) D
- 32) B
- 33) A
- 34) A
- 35) B
- 36) A
- 37) D

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- 38) A
- 39) C
- 40) B
- 41) C
- 42) B
- 43) A
- 44) C
- 45) D
- 46) A
- 47) B
- 48) B
- 49) B
- 50) A
- 51) B
- 52) D
- 53) B
- 54) D
- 55) D
- 56) C
- 57) A
- 58) focal point
- 59) focal length
- 60) working distance
- 61) wavelength
- 62) fluorochromes
- 63) 40x
- 64) simple
- 65) Fixation
- 66) smears
- 67) differential
- 68) magnetic
- 69) Freeze-etching
- 70) scanning tunneling
- 71) Ernst Ruska

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