1. Glass ware used to measure 24- hour urine volumes is

a. Volumetric Flask
b. Beaker
c. Erlenmeyer Cylinder
d. Graduated Cylinder

2. The following are true about universal precaution EXCEPT :

a. Consider all specimens as highly infectious
b. Not eating in the laboratory
c. Mouth pipetting in emergency situations
d. Wearing gloves in the lab

3. The durable material used to make heat resistant glassware is

a. Polyethylene
b. Soda Lime
c. Borosilicate
d. Polystyrene

4. The test procedure that uses a Westergren tube is:

a. Erythrocyte sedimentation rate
b. hematocrit
c. Reticulocyte count
d. Microhematocrit

5. Scientists studying a common mutation in the LDL receptor gene have inserted the defective gene into fertilized murine ova. The altered ova are implanted in a foster mother and the progeny are used to study the effects of the mutant allele. The mice produced in this procedure would be referred to as :

a. Knockout mice
b. Transgenic mice
c. Allogenic mice
d. Cloned mice

6. Which one of the following would be seen in a patient with severe thiamine deficiency:

a. Decreased serum levels of pyruvate and lactate
b. Increased clotting time of blood
c. Increased urinary excretion of xanthurenic acid following a tryptophan load
d. Decreased transketolase activity in RBCs

7. An automated hematology cell count uses the principle of:

a. Diffusion
b. Color absorption changes
c. Changes in cell electrical currents
d. light wave scattering

8. Which needle gauge corresponds with the smallest needle size:

a. 18
b. 20
c. 21
d. 23

9. If a chemical gets into your mouth you should:

a. Spit it out
b. Rinse your mouth
c. Visit a doctor
d. All of them

10. If a lavender top, plain red top, grey top, and light blue top tubes are collected, what is the order of draw:

a. They can be collected in any order
b. plain red top, lavender, blue, grey
c. Blue, plain red top, grey, lavender
d. plain red top, light blue, lavender, grey

11. A woman 7 months pregnant with her first child develops anemia. Laboratory evaluation indicates an increased mean cell volume (MVC), hyper-segmented neutrophils, and altered morphology *of* several other cell types. The most likely underlying cause of this woman's anemia is:

a. Folate deficiency
b. Iron deficiency
c. Glucose 6-phosphate dehydrogenase deficiency
d. Vitamin B12 deficiency

12. The test that counts the number of immature RBC's is the:

a. Osmotic fragility test
b. Differential
c. Reticulocyte count
d. Stab cell count

13. Which of following veins should be the last choice to obtain a venous blood sample for routine laboratory testing :

a. Cephalic vein
b. Medial cubital vein
c. Femoral vein
d. Veins on the back of the hand

14. The instrument which can measure the amount of the light absorbed by the sample at any selected wavelength is :

a. Ph meter
b. Centrifuge
c. Spectrophotometer
d. Gel electrophoresis apparatus

15. A standard micro plates in ELISA test has:

a. 98 wells
b. 94 wells
c. 96 wells
d. 100 wells

16. Alkali skin burn is immediately treated by neutralization with:

a. Sodium bicarbonate powder
b. Boric acid
c. Acetic acid 1%
d. Cold water

17. Which of the following devices are used to maintain a sterile environment while working with microorganisms?

a. Laminar Airflow
b. Microwave oven
c. Water Bath
d. Incubator

18. Which device is used to separate the components of blood?

a. Auto analyzer
b. Centrifuge
c. Hematocrit
d. Magnetic stirrer

19. Which of the following refers to the term C.O.P. of refrigeration?

a. Cooling for Performance
b. Coefficient of Performance
c. Capacity of Performance
d. Co-efficient of Plant

20. What optical technique measures metal ions in a solution based on ground state atoms absorbing light at defined wavelengths for the element being measured?

a. Atomic absorption spectrophotometry
b. Nephelometry
c. Chemiluminescence
d. Trubidimetry

21. Which of the following of the refrigerant is used as a refrigerant in Lithium Bromide Absorption Refrigeration system?

a. Lithium Bromide
b. Hydrogen
c. Water
d. Ammonia

22. Blood culture is indicated in the following bacterial diseases except:

a. Meningitis
b. Gastroenteritis
c. Pyelonephritis
d. Pneumonia

23. Which of the following is a postanalytical error?

a. Drawing above an IV site
b. Improper centrifugation of a specimen
c. Expired reagent used for the assay
d. A calculation error on a patient report

24. Centrifugation is based on?

a. Patrick's Law
b. McLaren's law
c. Stoke's Law
d. Stain's Law

25. The particle sedimentation velocity increases with?

a. Increasing viscosity
b. Decreasing difference in density between the two phases
c. Increasing diameter
d. All of the above

26. Eosinophils are one of the granulocytes used in immune defense against parasites. In terms of the white blood cell differential, what percentage do eosinophils make up in a normal patient?

a. 0.04
b. 0.12
c. 0.2
d. 0.35

27. Which of the following used for sedimentation of red blood cells?

a. High speed centrifuge
b. Low speed centrifuge
c. Ultra centrifuge
d. Vacuum centrifuge

28. What is use of density gradient centrifugation?

a. To purify viruses, ribosomes, membrane
b. To remove dirt
c. To remove fine particles
d. To remove large particles

29. In terms of the long-term follow up management of patients with particular types of cancer, it is possible to use tumor markers. Which of the following cancers would you be able to monitor through the use of alpha-fetoprotein?

a. Hepatocellular carcinoma
b. Renal cell carcinoma
c. Small cell lung cancer
d. Gastric cancer

30. Auto-agglutination of red cells at room temp can result in which of the following?

a. Low RBC count
b. High MCV
c. Low hematocrit
d. All of the above

31. Which one of the following tests is not routinely performed on the Complete Blood Count (CBC)?

a. White cell differential
b. Red cell count (RCC)
c. White cell count (WCC)
d. Hematocrit (Hct)

32. How many grams of NaCl are needed to make 300ml of a 2% solution:

a. 2 grams
b. 6 gram
c. 20 grams
d. unable to determine with this information

33. Reticulocytes contain :

a. Howell-Jolly bodies
b. DNA remnants
c. RNA remnants
d. Basophilic granules

34. Three different methods of detecting Sexually transmitted Diseases (STDs)from a patient are:

a. QBC, PCR, microscopy
b. PCR, electron microscopy, immunoassay
c. Culture, FBC, ESR
d. Microscopy, culture, Gram's stain

35. Acid fuchsin is a counterstain that colors:

a. Magenta
b. Blue
c. Orange
d. Red/purple

36. Which of the following statement is false about double beam absorption instruments?

a. It is similar to single beam instruments except two beams are present
b. Tungsten bulb is used as a source
c. Reference beam must have a higher intensity than sample beam
d. Both the beams after they pass through respective samples are compared

37. When an erythrocyte containing iron granules is stained with Prussian blue, cell is called:

a. Spherocyte
b. Leptocyte
c. Schistocyte
d. Siderocyte

38. What effect would using a buffer at pH 6.0 have on a Wright's-stained smear?

a. Red cells would be stained too pink
b. White cell cytoplasm would be stained too blue
c. Red cells would be stained too blue
d. Red cells would lyse on the slide

39. What type of analyzer allows a STAT to be loaded after several rack of routine samples but then aspirates the STAT specimen before completing the routine samples?

a. Batch
b. Random access
c. Sequential
d. Continuous flow

40. What angle should be held the needle during phlebotomy at?

a. 15-30 degree
b. 40-50 degree
c. 60-70degree
d. 90 degree

41. Which of the following is an example of an analytical error?

a. Storing samples at an improper temperature
b. Using an outdated calibration curve
c. Inappropriate specimen type received
d. Intravenous saline contamination from an IV

42. What lab test is used to screen for neural tube defects during pregnancy?

a. Alpha fetoprotein
b. Estradiol
c. Human chorionic gonadotropin
d. Chromosome analysis

43. Beer Lambert's law gives the relation between which of the following?

a. Reflected radiation and concentration
b. Scattered radiation and concentration
c. Energy absorption and concentration
d. Energy absorption and reflected radiation

44. Acute phase reactants are elevated in which of the following disorders?

a. Cirrhosis
b. Nephrotic syndrome
c. Inflammation
d. Alpha 1-antitrypsin deficiency

45. When the entire CBC is suppressed due to either anemia, infection or hemorrhage it is called :

a. Erythroplasia
b. Thrombocytopenia
c. Pancytopenia
d. leucopenia

46. Which of the following concentrations is expressed in moles/liter?

a. Molality
b. Normality
c. Molarity
d. Percent concentration

47. An enzyme result is 1530 U/L but is flagged out of instrument linearity. Using 0.1 mL of patient sample and 0.2 mL of diluent, the laboratory technician makes a dilution and repeats the analysis. What dilution factor should the diluted result be multiplied by?

a. 1
b. 2
c. 3
d. 4

48. What is the normal WBC differential lymphocyte percentage (range) in the adult population?

a. 20-50%
b. 10-20%
c. 5-10%
d. 50-70%

49. Which of the following is not true about Absorption spectroscopy?

a. It involves transmission
b. Scattering is kept minimum
c. Reflection is kept maximum
d. Intensity of radiation leaving the substance is an indication of concentration

50. Which hematoxylin stain does not have hematoxylin and a mordant mixed in one solution?

a. Harris'
b. Ehrlich's
c. Delafield's
d. Mallory's

51. A donor who recently tested positive for HBsAg should be deferred:

a. Permanently
b. For 5 years
c. For 1 year
d. For 6 months

52. Mean cell volume (MCV) is calculated using the following:

a. (Hgb/RBC)x10
b. (Hct/RBC)x10
c. (Hct/Hgb)x100
d. (Hgb/RBC)x100

53. A patient had a specimen drawn for iron determination at 8 am and another one drawn for the same test at 4 pm. The results were higher in the am than the pm. This is an example of which of the following?

a. Delta check
b. Physiological variation
c. Diurnal variation
d. Critical value alert

54. According to Clinical & Laboratory Standards Institute (CLSI) recommendations what is the minimum number of subjects required, to establish a reference range?

a. 80 b. 100

c. 120 d. 150

55. The most commonly used agent for removal of alcohol, making tissue transparent:

a. Ethanol b. Paraffin

c. Xylene d. Acetone

56. Which of the following is the simplest of pH meters?

a. Null-detector type pH meter b. Direct reading type pH meter

c. Digital pH meter d. Modern pH meter

57. Insufficient centrifugation will result in:

a. A false increase in Hct value b. A false decrease in Hct value

c. No effect on Hct value d. All of the above depending on the patient

58. Most of the plasma thyroxine (T4) is:

a. Free b. Bound to globulin

c. Bound to cholesterol d. Bound to albumin

59. If a patient has a reticulocyte count of 7% and a Hct of 20%, what is the corrected reticulocyte count :

a. 1.4% b. 3.1%

c. 3.5% c. 14%

60. An elevated quantitative beta-hCG will be seen in which of the following conditions?

a. Menopause b. Pregnancy

c. Hirutism d. Spontaneous miscarriage

61. What is reference range for serum electrolyte Na+:

a. 98-106 mEq/L b. 136-145 mEq/L

c. 3.5-5.0mEq/L d. 9.0-10.5mg/d

62. When performing automated cell counts, most automated cell counted instruments

a. Count nucleated red blood cells with platelets

b. Count nucleated red blood cells with leukocytes

c. Do not count nucleated red blood cells

d. Count nucleated red blood cells with erythrocytes

63. In vibrating condenser amplifier type pH meter, to maintain good performance which of the following has to be done?

a. Frequency of the vibrator should be stable

b. Frequency of the vibrator should be constant

c. Amplitude of the vibrator should be constant

d. Both frequency and amplitude of the vibrator should be constant and stable

64. The most frequent "in born error of metabolism" found in newborns is :

a. Maple syrup disease
b. Tyrosinemia
c. Cystinuria
d. Phenylketonuria

65. In a serial dilution, if tube 1 is undiluted and twofold dilutions are used thereafter, what is the titre in tube #10?

a. 128 b. 256 c. 512 d. 1024

66. Which one among the following is correct?

a. Molarity changes with temperature
b. Molality does not change with temperature
c. Normality does not change with temperature
d. Molarity does not change with temperature

67. Concentrated aqueous sulphuric acid is 98% H_2SO_4 by mass and has a density of 1.80 g m/L. Volume of acid required to make one litre of 0.1 M H_2SO_4 is

a. 5.55 mL b. 11.10 mL c. 16.65 mL d. 22.20 mL

68. An osmotic fragility test shows initial hemolysis of the red cells at 0.70 % NaCl. This is most consistent with:

a. Hereditary spherocytosis
b. Hereditary ovalocytosis
c. G6PD deficiency
d. Paroxysmal Cold Hemoglobinuria

69. Isotonic solutions have same

a. Vapour pressure
b. Freezing temperature
c. Osmotic pressure
d. Boiling temperature

70. At a particular temperature, the solution which cannot dissolve more solute is called

a. Saturated solution
b. Unsaturated solution
c. Aqueous solution
d. Supersaturated solution

71. You have a 2M stock NaCl stock solution, you need to make a 200ml of 150mM solution , how much of your stock solution do you need?

a. 0.75 mL
b. 75 ml
c. 150 ml
d. d. It can't be done, you need to use powder

72. How much agarose would you need to make 50ml at 0.75%?

a. 0.75 g b. 150 mg c. 375 mg d. 3.75 g

73. What is the mechanism by which EDTA prevents clotting in blood samples ?

a. Binds antithrombin
b. Chelates calcium
c. Antagonizes vitamin K
d. Inhibits platelet aggregation

74. Which one of the following is a standard solution?

a. It contains one gram equivalent mass of the substance in one litre solution
b. Its strength is accurately known
c. Its strength is to be determined
d. A solution which has been prepared from pure substance

75. Fibrinogen determinations are performed on

a. Either serum or plasma
b. Serum only
c. Plasma only
d. Any body fluid

76. Which of the following is useful to stimulate antibody production?

a. An adjuvant
b. A hapten
c. Antiserum
d. Purified antigen

77. What staining method is used most frequently to stain and count reticulocytes?

a. Immunofluorescence
b. Supravital staining
c. Romanowsky staining
d. Cytochemical staining

78. A physician's office tests pre-diabetic patients for a fasting blood glucose level using a glucometer when these patients arrive for an office visit. What type of testing is this referred to as?

a. Random access analysis
b. Centralized testing
c. Batch analysis
d. Point of care testing

79. All of the following are affected by meal/ dietary intake, EXCEPT?

a. Glucose
b. Albumin
c. Creatinine
d. Urea

80. Methyl orange is

a. Pink in acidic medium, yellow in basic medium
b. Yellow in acidic medium, pink in basic medium
c. Colourless in acidic medium, pink in basic medium
d. Pink in acidic medium, colourless in basic medium

81. A blood donor should be tested for the following transfusion transmissible infections except

a. HIV
b. Hepatitis B&C
c. Syphilis
d. Typhoid

82. Which factor may cause a blood smear to be too thin:

a. The angle of the spreader is too high
b. The smear is spread too slowly
c. The angle of the spreader is too low
d. A dirty spreader is used

83. A couple is expecting their first child and have consulted a genetic counselor because the woman had a brother who died *of* sickle cell anemia. There is also a history *of* disease in the man's family. Fetal cells are obtained by amniocentesis. Which test would best determine whether the *fetus* would be born with the disease?

a. Western blot
b. Hemoglobin electrophoresis
c. PCR with allele-specificprobes *on* a dot-blot
d. Serum creatinine

84. Cytatin C is a marker for :

a. Glomerular filtration
b. Proximal tubular function
c. Distal tubular function
d. Renin-Angiotensin system

85. DNA footprinting is a suitable technique for identifying which of the following :

a. Particular mRNA in mixture
b. Particular t-RNA in mixture
c. Introns within DNA
d. Protein binding site within DNA

86. Cultured aerobic *actinomycetes* are best identified by :

a. An automated system used in the laboratory
b. Classical biochemicals
c. Antigen detection tests such as an ELISA
d. Molecular methods such as 16S rRNA gene sequencing.

87. An ELISA designed to test for the presence of serum antibody for a new strain of pathogenic bacteria is under development. Initially, a monoclonal antibody specific for a single epitope of the organism was used both to sensitize the wells of the ELISA plate and as the enzyme -labelled detecting antibody in a conventional sandwich ELISA. The ELISA failed to detect the antigen despite the use of a wide range of antibody concentrations. What is the most probable cause of this problem?

a. The antigen is too large
b. The antibody has a low affinity for the antigen.
c. The monoclonal antibody used to sensitize the wells is blocking access of the epitope, thus when the same antibody is enzyme-labeled, it cannot bind to the antigen.
d. The enzyme-labeled antibody used should have been a different isotype than the sensitizing antibody.

88. Organisms can be attenuated for inoculation by :

a. Growing it at a temperature higher than optimum
b. By passage through animals of different species which are less susceptible to it
c. By continuous cultivation in presence of antagonistic substance
d. Any one of the above

89. The diploid genome of a species comprises 6.4 x 109 bp and fits into a nucleus that is 6µm in diameter. If base pairs occur at intervals of 0.34nm along DNA helix, what is the total length of DNA in a resting cell?

a. 3.0 m b. 3.5 m c. 2.2 m d. 4.0 m

90. Which of the following tests could be positive in 'window period' of HIV infection.

a. HIV ELISA
b. Western Blot Assay
c. HIV protein p24 assay
d. None of the above

91. An ugly looking wound on the right forearm of a butcher grew non-hemolytic colonies on blood agar with swirling projections. Gram stain revealed stout gram -positive bacilli. To demonstrate spores in the said bacilli. Which of the following g is most appropriate?

a. Modified acid fast stain
b. ZN stain using 30% sulphuric acid
c. Gram stain using methylene blue as the counter stain.
D. Malachite green stain

92. The best method to determine whether albumin is transcribed in the liver of amouse model of hepatocarcinoma is which one of the following ?

a. Genomic library screening
b. Genomic southern blot
c. Tissue northern blot
d. Tissue western blot

93. Pure plasmid DNA was isolated from a bacterium. Restriction enzyme digestion of this plasmid with either BamH1or EcoR1 resulted in two DNA fragments. A double digestion of the same plasmid with both these enzymes resulted in three DNA fragments. From this we can conclude that the isolated plasmid DNA is :

a. Double stranded and linear
b. Double stranded and circular
c. Single stranded and linear
d. Single stranded and circular

94. Which structure of proteins remains intact during denaturation process?

a. Both secondary and tertiary structure
b. Primary structure
c. Secondary structure
d. Tertiary structure

95. The end product of purine catabolism in normal humans is ?

a. Urea
b. Uric acid
c. Creatinine
d. Xanthine

96. Which of the following statement is not true about Lesch-Nyhan syndeome

a. Occurs due to lack of enzyme HGPRTase.
b. Occurs due to accumulation of urate
c. Occurs due to lack of enzyme spingomylenase
d. Excessive amount of purine production occurs

97. Which of the following contributes nitrogen atoms to both purine and pyrimidine rings?

a. Aspartate
b. Carbamoyl phosphate
c. Glutamine
d. Both a and c

98. The naturally occurring proteins consist of

a. D-amino acids
b. L-amino acids
c. Both a and b
d. None of these

99. The amino acid containing an indole ring is

a. Tryptophan
b. Arginine
c. Threonine
d. Phenylalanine

100. Phosphorylation cascades involving a series of protein kinases are useful for cellular signal transduction , because:

a. They are species specific
b. They always lead to same cellular response
c. They amplify the original signal manifold
d. They counter the harmful effects of phosphatases

1.	d. Graduated Cylinder
2.	c. Mouth pipetting in emergency situations
3.	c. Borosilicate
4.	a. Erythrocyte sedimentation rate
5.	b. Transgenic mice
6.	d. Decreased transketolase activity in RBCs
7.	c. Changes in cell electrical currents
8.	d. 23
9.	d. All of them
10.	d. plain red top, light blue, lavender, grey
11.	a. Folate deficiency
12.	c. Reticulocyte count
13.	c. Femoral vein
14.	c. Spectrophotometer
15.	c. 96 wells
16.	c. Acetic acid 1%
17.	a. Laminar Airflow
18.	b. Centrifuge
19.	b. Coefficient of Performance
20.	a. Atomic absorption spectrophotometry
21.	c. Water
22.	b. Gastroenteritis
23.	d. A calculation error on a patient report
24.	c. Stoke's Law
25.	c. Increasing diameter
26.	a. 0.04
27.	b. Low speed centrifuge
28.	a. To purify viruses, ribosomes, membrane
29.	a. Hepatocellular carcinoma
30.	d. All of the above
31.	a. White cell differential
32.	b. 6 gram
33.	c. RNA remnants
34.	d. Microscopy, culture, Gram's stain
35.	a. Magenta
36.	c. Reference beam must have a higher intensity than sample beam
37.	d. Siderocyte
38.	a. Red cells would be stained too pink
39.	b. Random access
40.	a. 15-30 degree
41.	b. Using an outdated calibration curve
42.	a. Alpha fetoprotein
43.	c. Energy absorption and concentration
44.	c. Inflammation
45.	c. Pancytopenia
46.	c. Molarity

47.	c. 3
48.	a. 20-50%
49.	c. Reflection is kept maximum
50.	d. Mallory's
51.	a. Permanently
52.	b. (Hct/RBC)x10
53.	c. Diurnal variation
54.	c. 120
55.	c. Xylene
56.	a. Null-detector type pH meter
57.	a. A false increase in Hct value
58.	b. Bound to globulin
59.	b. 3.1%
60.	b. Pregnancy
61.	b. 136-145 mEq/L
62.	b. Count nucleated red blood cells with leukocytes
63.	d. Both frequency and amplitude of the vibrator should be constant and stable
64.	d. Phenylketonuria
65.	c. 512
66.	a. Molarity changes with temperature
67.	a. 5.55 mL
68.	a. Hereditary spherocytosis
69.	c. Osmotic pressure
70.	a. Saturated solution
71.	b. 75 ml
72.	c. 375 mg
73.	b. Chelates calcium
74.	b. Its strength is accurately known
75.	c. Plasma only
76.	a. An adjuvant
77.	b. Supravital staining
78.	d. Point of care testing
79.	c. Creatinine
80.	a. Pink in acidic medium, yellow in basic medium
81.	d. Typhoid
82.	c. The angle of the spreader is too low
83.	c. PCR with allele-specificprobes *on* a dot-blot
84.	a. Glomerular filtration
85.	d. Protein binding site within DNA
86.	d. Molecular methods such as 16S rRNA gene sequencing
87.	c. The monoclonal antibody used to sensitize the wells is blocking access of the epitope, thus when the same antibody is enzyme-labeled, it cannot bind to the antigen.
88.	d. Any one of the above
89.	c. 2.2 m
90.	c. HIV protein p24 assay
91.	D. Malachite green stain

92.	c. Tissue northern blot
93.	a. Double stranded and linear
94.	b. Primary structure
95.	b. Uric acid
96.	c. Occurs due to lack of enzyme spingomylenase
97.	d. Both a and c
98.	b. L-amino acids
99.	a. Tryptophan
100.	c. They amplify the original signal manifold