

LATG MIDTERM EXAMINATION

1. Lab Animal Supervisor 1, Floor Supervisor and Group Leader are titles usually associated with which level of management?
 - a. Lower-level
 - b. Middle-level
 - c. Top-level
 - d. Not considered a management level

2. A product tested to reduce vegetative bacteria by 99.9% to 99.99% would be called a:
 - a. Sterilent
 - b. Sanitizer
 - c. Disinfectant
 - d. Antiseptic

3. What is the most common method for storing unused transgenic lines?
 - a. Cell culture
 - b. Embryo transfer
 - c. Maintenance breeding
 - d. Cryopreservation

4. The Knotts test is used to detect:
 - a. Pregnancy
 - b. Heartworm infections
 - c. Fungal infections
 - d. Postpartum estrus

5. Due to this structure in the eye, one is unable to perform retro-orbital bleeds in *Oryctolagus cuniculus*:
 - a. Harderian glands
 - b. Cornea
 - c. Meibomian glands
 - d. Nictating membrane

6. In the context of clinical pathology, what does the abbreviation CBC stand for?
 - a. Complete basal center
 - b. Chemical biochemistry
 - c. Complement blood cells
 - d. Complete blood count

7. Which of the following species is a New World monkey?
 - a. *Saimiri sciureus*
 - b. *Papio papio*
 - c. *Macaca mulatta*
 - d. *Macaca fascicularis*

8. As a general standard, what is the proper number of air changes per hour required for an animal room?
- a. 3-8
 - b. 10-15
 - c. 16-20
 - d. 20-25

9. Safety cabinets are available in three classes. Which class would you want for the best personnel protection against highly contagious pathogens?
- Class I
 - Class II, type A
 - Class III
 - Class II, type B
10. Which of the following is not a direct cost?
- Maintenance fees
 - Food and bedding
 - Non-capital equipment
 - Salaries
11. Why should you breed female guinea pigs before 7 months of age?
- Higher incidence of ovarian tumors
 - Pelvis ossifies creating a smaller birth canal
 - They forget how to breed
 - Ovaries are underdeveloped and eggs are fragile
12. Which of the following is not considered an organelle?
- Nuclear membrane
 - Endoplasmic reticulum
 - Golgi apparatus
 - Lysosomes

13. Epithelial cells are:
- a. a specialized form of connective tissue that contains chondrocytes imbedded in a gel like matrix
 - b. sheets of tightly bound cells with very little intracellular substance between cells
 - c. developed from undifferentiated mesodermal cells in the embryo
 - d. prokaryotic cells
14. Which of the following is not a form of connective tissue?
- a. Bone tissue
 - b. Adipose tissue
 - c. Reticular tissue
 - d. Striated muscle
15. Labor unions can cause serious problems for the effective operation of a lab animal facility. If the union feels an employee has been treated unfairly based on their written contract, a formal, written complaint, known as a _____, can be filed with management.
- a. Plaintiff
 - b. Discrepancy
 - c. Violation
 - d. Grievance

16. Which of the following is not an endoparasite?

- a. Heartworm
- b. Pinworm
- c. Hookworm
- d. Ringworm

17. Gram negative bacteria will stain which of the following colors?

- a. Pink
- b. Blue
- c. Green
- d. Yellow

18. Which animal is at the highest risk of acquiring a vertebral fracture from improper handling?

- a. Rabbit
- b. Guinea pig
- c. Chinchilla
- d. Gerbil

19. Light intensity is a concern especially with what type of animal?

- a. Obese
- b. Diabetic
- c. Albino
- d. Pigmented

20. Which of the following genera is not covered under the Animal Welfare Act?

- a. *Mesocricetus*
- b. *Oryctolagus*
- c. *Columba*
- d. *Meriones*

21. Identify the zoonotic viral disease of nonhuman primates that is fatal to humans?

- a. Cercopithecine Herpesvirus 1 (Herpes B)
- b. Shigellosis
- c. Measles
- d. Tuberculosis

22. A very small microbe that lives and reproduces inside living cells is called a:

- a. Bacteria
- b. Fungi
- c. Parasite
- d. Virus

23. In a parasitic infection, which blood cells would most likely become more abundant in the blood circulation?

- a. Lymphocytes
- b. Eosinophils
- c. Monocytes
- d. Neutrophils

24. Which of the following statements is true about quality assurance units according to GLP regulations?
- a. The QA unit is composed of individuals who are responsible for monitoring each study
 - b. The QA unit is independent of the personnel who conduct studies
 - c. The QA unit is an ongoing verification system for the various aspect of laboratory operation
 - d. All of the above are true
25. Rederived animals with one or more known associated nonpathogenic organisms are referred to as:
- a. Germfree
 - b. VAF
 - c. Gnotobiotic
 - d. SPF
26. Which of the following is not an organ in the endocrine system?
- a. Spleen
 - b. Pancreas
 - c. Pituitary
 - d. Adrenal

27. A mature male from the family Caviidae, is called a boar. What is the genus and species of this animal?
- Cavia porcedae*
 - Cavia porcellus*
 - Porcinus cavius*
 - Porcine caveus*
28. The ILAR document that is considered to be the standard by which all occupational health programs involving research animals are measured is the _____.
- Guide for the Care and Use of Laboratory Animals
 - Occupational Health and Safety in Care and Use of Research Animals
 - Guide for Environmental Health and Safety in the Laboratory
 - Research Animal Guide for Occupational Health and Safety
29. A prolonged capillary refill time would indicate:
- decreased WBC volume
 - decreased blood pressure
 - increased blood pressure
 - decreased depth of anesthesia

30. A beagle dog weighs 10 kilograms. You are told to give the dog 60 mg/kg q.i.d. of gentamicin. How many total milligrams of gentamicin would you give the animal in a day?
- a. 600 mg
 - b. 1800 mg
 - c. 2400 mg
 - d. 3600 mg
31. If you were asked to administer an isotonic solution to an animal patient, you might administer_____.
- a. 5.0% sodium chloride solution
 - b. 20% sodium chloride solution
 - c. 0.9% sodium chloride solution
 - d. 0.1% sodium chloride solution
32. A disease state or anomaly that is present when an animal is born is said to be:
- a. Persistent
 - b. Hereditary
 - c. Expressive
 - d. Congenital

33. Usually DNA and RNA are similar in that their basic structural unit is a(n) _____ but differ in that _____ is _____ and _____ is single stranded.

- a. nitrogenous base; RNA; double stranded; DNA
- b. nucleotide; DNA; double stranded; RNA
- c. ribose sugar; RNA; single stranded and DNA
- d. amino acid; DNA; double stranded; RNA

34. A synonym for gnotobiotite is:

- a. Germ-free
- b. Axenic
- c. Defined flora
- d. Specific pathogen free

35. Protective keratinized epithelium would most likely be found _____.

- a. In the urethra
- b. Lining the liver and bile ducts
- c. In the lining of the lungs
- d. As a component of the skin

36. Skeletal muscle and cardiac muscle have the same contractile mechanisms but _____ contracts _____ and _____ contracts involuntarily.
- skeletal muscle; voluntarily; cardiac muscle
 - cardiac muscle; involuntarily; skeletal muscle
 - skeletal muscle; involuntarily; cardiac muscle
 - cardiac muscle; voluntarily; skeletal muscle
37. _____ is the study of fungi.
- Fungology
 - Mycology
 - Microbiology
 - Morphology
38. Bacterial spores are very resistant to destruction by heat, chemicals, drying, and other aseptic techniques. The two genera of most significance are gram positive rods of _____ & _____ sp.
- Histoplasma; Candida*
 - Clostridium; Bacillus*
 - Streptococcus; Staphylococcus*
 - Microsporum; Trichophyton*

39. Which of the following statements is incorrect when referring to viruses?
- Viruses can reproduce independently
 - Viruses are small and simple biological entities
 - Viruses only have one type of nucleic acid: either DNA or RNA
 - Viruses have a nucleic acid surrounded by a protein coat
40. Parasitism by ectoparasites or endoparasites is called _____.
- Parasitology
 - Entomology
 - Symbiosis
 - Infestation
41. The most common pathogenic amoeba species is _____.
- Trypanosoma cruzi*
 - Balantidium coli*
 - Encephalitozoon cuniculi*
 - Entamoeba histolytica*
42. Coccidia reproduce asexually by multiple fission known as:
- Sporulation
 - Schizogony
 - Metazoan
 - Protozoology
43. Which of the following is a significant zoonotic agent spread by cats.
- Plasmodium inui*
 - Eimeria stiedae*
 - Toxocara cati*
 - Toxoplasma gondii*
44. Cestodes are also known as:
- flukes
 - tapeworms
 - roundworms
 - thorny-headed worms
45. _____ is a common pinworm of mice and rats.
- Syphacia rattus*
 - Syphacia mesocriceti*
 - Syphacia obvelata*
 - Dentostomella translucida*
46. Which of the following coccidial parasites is found in the bile duct and liver of the rabbit?
- Encephalitozoon cuniculi*
 - Eimeria stiedae*

- c. *Eimeria magna*
- d. *Taenia pisiformis*

47. _____ is the heartworm of dogs, cats and ferrets. The adults live in the heart and _____. _____ is a nematode that causes no known disease problems but whose microfilaria must be differentiated from those of the heartworm.
- Toxocara canis*; aorta; *Spirocerca lupi*
 - Dirofilaria immitis*; pulmonary artery; *Dipetalonema reconditum*
 - Trichuris vulpis*; hepatic artery; *Taenia pisiformis*
 - Ancylostomum caninum*; vena cava; *Dioctophyma renale*
48. Which of the following arthropods is known to cause mange in dogs, cats, rabbits, humans, and many other animals?
- Polyplax serrata*
 - Polyplax spinulosa*
 - Psoroptes cuniculi*
 - Sarcoptes scabiei*
49. Which of the following is false about lice?
- Lice are not species specific
 - There are two types: sucking and chewing
 - All lice are wingless
 - Their entire life cycle is spent on the host

50. The scientific term for lice infestation is _____.
- a. Acariasis
 - b. Myiasis
 - c. Pediculosis
 - d. Mycosis
51. Which document requires that health certificates must accompany all shipments of nonhuman primates, dogs, and cats?
- a. The Guide
 - b. Occupational Health and Safety in the Care and Use of Research Animals
 - c. Animal Welfare Act
 - d. Public Health Service Policy
52. Radiation safety is a significant component to the overall animal facility program. Which of the following particles is easily prevented from entering the human body by skin or a sheet of paper?
- a. Alpha
 - b. Beta
 - c. Gamma
 - d. X-ray

53. Biological safety cabinets and flow cabinets are two types of safety devices used in a research facility. Identify which cabinets only protect the work surface (i.e., animals or cell culture) and not the user?
- Class II, type A
 - Class III
 - Chemical fume hood
 - Horizontal laminar flow cabinet
54. What does the acronym OSHA stand for?
- Occupational Safety and Health Administration
 - Occupational Sanitation and Health Association
 - Occupational Security and Humanity Administration
 - Occupational Safety and Human Association
55. Which of the following is not a common immunization available and recommended for laboratory animal users?
- Tetanus
 - Tuberculosis
 - Hepatitis B
 - Rabies

56. According to GLP regulations, testing facilities must have what type of group to monitor the studies independently of the personnel responsible for conducting the studies?
- IACUC
 - QA
 - EH&S
 - OSHA
57. Two Japanese Snow monkeys have the same genotype for red face color. However, only one monkey has a red face. What term is used to describe the proper functioning of the genes in the monkey with the red face?
- Mutant
 - Clone
 - Wild-type
 - Anomaly
58. Rodent Health Surveillance is an important part of maintaining the biosecurity of a barrier rodent facility. Interpretation of serologic samples taken from sentinel rodents used in dirty bedding transfer surveillance program is equally important. How long does it usually take for a sentinel animal to develop antibodies to a viral agent?
- 3-5 days
 - 10-14 days
 - 21-24 days
 - 30-35 days
59. What does the M represent in the equation used to determine the sample size for a rodent health surveillance program?
- Mortality
 - Morbidity
 - Mouse
 - Murine
60. According to the Guide, continuous exposure to acoustical levels above _____ dB can have both auditory and nonauditory effects in rodents.
- 55
 - 65
 - 75
 - 85
61. According to the Guide, light levels of _____ above the floor is adequate for most routine care procedures and prevents phototoxic retinopathy in albino animals.
- 75 foot-candles at two meters

- b. 55 foot-candles at three meters
- c. 30 foot-candles at one meter
- d. 40 foot-candles at four meters

62. If animals are to be euthanized at the end of the study, the method of euthanasia must be in accordance with the guidelines (Panel on Euthanasia) set up by the _____.

- a. USDA
- b. NIH
- c. AVMA
- d. PHS

63. Which organelle acts as the decoding machinery of the cell in the process of translation?

- a. Ribosome
- b. Golgi Apparatus
- c. Mitochondria
- d. Cytoplasm

64. What is the genus and species of the ferret?

- a. *Mustela putorius furo*
- b. *Mondelphis domestica*
- c. *Cynomys ludovicianus*
- d. *Cercocebus torquatus atys*

65. During the process of translation, mRNA is read in-groups of three. These groups of three are referred to as _____.

- a. Codons
- b. Clones
- c. Constructs
- d. Complexes

66. What does the acronym PCR stand for?

- a. Polyclonal Chemical Reaction
- b. Polymerase Chain Reaction
- c. Polymer Constructed Region
- d. Polyclonal Cloning Registration

67. A number of different test mechanisms are used to detect the presence of DNA, RNA, and protein in a biological sample. _____ is used to test for the presence of RNA, _____ is used to detect DNA, and _____ is used to detect for the presence of protein.

- a. Southern blot, Northern blot, Western blot
- b. Northern blot, Southern blot, Western blot
- c. Western blot, Southern blot, Northern blot
- d. Southern blot, Western blot, Northern blot

68. What technique is the most widely used method for production of transgenic mice?

- a. Blastocyst injection
- b. Embryonic transfer
- c. Targeted mutation
- d. Pronuclear microinjection

69. What is another name commonly used to refer to “targeted mutation” mice?

- a. Knockout
- b. Surrogate
- c. Pseudotransgenic
- d. Embryonic

70. What is the genus and species of the cynomolgus monkey?

- a. *Pan troglodytes*
- b. *Saguinus oedipus*
- c. *Macaca fascicularis*
- d. *Macaca arctoides*

71. What is the average length for the estrous cycle in baboons, chimpanzees, and rhesus monkeys?

- a. 14-17 days
- b. 7-13 days
- c. 20-25 days
- d. 27-35 days

72. What is the term used for injecting donor female mice with 2 hormone injections that causes them to release additional eggs?

- a. Superovulation
- b. Synchronization
- c. Microinjection
- d. Pseudopregnancy

73. Which of the following best defines the term “totipotent”?

- a. An unsuccessful knockout mouse
- b. Cells carry a new gene that was not anticipated
- c. A cell that overexpresses a protein from a new gene
- d. A cell is capable of becoming any type of body tissue

74. During infections, certain white blood cells can “eat” foreign bacteria or dead host cells. This process is commonly known as?

- a. Macrocytosis
- b. Pinocytosis
- c. Phagocytosis
- d. Exocytosis

75. A nitrogenous base found in RNA but is not present in DNA is _____.

- a. uracil

- b. adenine
- c. guanine
- d. cytosine

76. What is the proper term used to describe the cell division of sex cells?

- a. Mitosis
- b. Mitotic
- c. Meiosis
- d. Migration

77. Which of the following is not a type of connective tissue?

- a. adipose
- b. cartilage
- c. bone
- d. nerves

78. Which of the following anatomical locations would you not expect to find smooth muscle cells?
- Bile duct and gallbladder
 - Urethra and urinary bladder
 - Biceps and triceps
 - Uterus
79. The study of chemical compounds found in living organisms is called _____.
- Organic chemistry
 - Biochemistry
 - Inorganic chemistry
 - Anatomical pathology
80. Transportation of information from DNA to the cell by mRNA is known as _____.
- Translation
 - Translocation
 - Transcription
 - Replication
81. Which of the following is not a method used to detect genetic contamination in a closed rat-breeding colony?
- Dental homology
 - Reciprocal skin grafting
 - Mandibular morphometrics
 - Biochemical markers
82. Avoiding citations by the USDA is a security consideration, because these citations are available to the public via _____ Act.
- Animal Welfare
 - Disclosure of Public Information
 - Public Health Service
 - Freedom of Information
83. What cells are used in cell culture to give rise to embryonic stem cells?
- Trophectoderm
 - Inner cell mass
 - Outer cell mass
 - Blastocoel
84. What is the length of the estrous cycle in mice and rats?
- 2-3 days
 - 4-6 days
 - 15-17 days
 - 19-21 days

85. Which of the following terms is defined as “difficult birth”?
- a. Parturition
 - b. Dystocia
 - c. Dysphagia
 - d. Metritis

86. The chinchilla, guinea pig, and porcupine are all related and belong to which suborder?
- a. Hystricomorpha
 - b. Myomorpha
 - c. Lagomorpha
 - d. Caviomorpha
87. In the cost analysis of a laboratory animal facility which of the following traditionally accounts for the greatest percentage of costs?
- a. Feed and bedding
 - b. Cash Wash Operation
 - c. Personnel
 - d. Animal purchases
88. If an academic institution has a labor cost allocation of \$350,000, of which \$150,000 is covered by the University for the salary of the Director and \$150,000 is supplied by the Office for the Vice President for Research, how much money must be recovered through per diem rates to break even?
- a. \$75,000
 - b. \$ 350,000
 - c. \$150,000
 - d. \$50,000

89. Cost analysis, the method used to calculate the amount of money required to operate an animal resource program is commonly based on which document?
- Analysis and Rate Setting Manual for Animal Resource Facilities
 - Per diem rate setting guidelines
 - Cost Analysis and Per Diem Rates for Laboratory Animal Facilities
 - Analysis, Costs, Per diems and the Animal Facility
90. All animal research facilities are at risk, because there are always individuals who object to animal research. However, certain types of research increase the level of risk. Which of the following would not be considered a type of research that increases risk?
- Use of random sources dogs in cardiovascular disease
 - Use of rodents in radiotelemetry
 - Use of nonhuman primates in toxicology
 - Use of sheep in pain studies

91. NABR, an organization which has been instrumental in conducting media campaigns that detail the advances made in research by using laboratory animals, has been used by several pharmaceutical companies to provide a voice to animal rights issues. What does the acronym NABR stand for?
- National Animal Biomedical Research Fund
 - National Association for Biomedical Research
 - National Administration for Biomedical Research
 - National Advancement for Biomedical Research
92. New World and Old World monkeys belong to the suborder known as _____.
- Prosimii
 - Tarsioidea
 - Cercopithecoidea
 - Anthropoidea
93. What is the genus and species of the Japanese Snow Monkey (Macaque)?
- Macaca mulatta*
 - Macaca fuscata*
 - Macaca nemestrina*
 - Macaca radiata*

94. The AWA requires that dogs, cats, and nonhuman primates shipped from one site to another must have a health certificate. How far in advance from the shipment date may a veterinarian issue a health certificate?
- a. 10 days
 - b. 15 days
 - c. 20 days
 - d. 30 days
95. What type of animals should not be used for microbial testing (rodent health surveillance program)?
- a. Aged or immunocompetent
 - b. Adults or Transgenic
 - c. Young or immunocompromised
 - d. Adults or Aged
96. To test the microbial status of cages and countertops, special agar plates are used and incubated for 24 hours. After 24 hours the number of bacterial colonies on each plate are counted and reported as _____.
- a. MPN
 - b. RODAC
 - c. BCUs
 - d. CFUs

97. Axenic animals differ greatly from animals that have a normal microflora. Which of the following is incorrect in reference to axenic animals?
- Axenic animals have a less developed immune system
 - Axenic animals have a smaller cecum
 - Axenic animals have a longer lifespan
 - Axenic animals have thinner walled intestine
98. What is the very first step in developing an occupational health and safety program?
- Risk Assessment
 - Allergy testing
 - Viral Serologic Testing
 - Vaccination against Zoonotic Agents
99. The ____ of a radioactive isotope is the time required for the initial number of radioactive atoms to decrease by half.
- radioactive decay
 - threshold Limit Value
 - half life
 - radioactive curve

100. *Clostridium tetani*, the bacterial agent responsible for the tetanus is a gram-positive rod shaped spore. What color is *C. tetani* following gram staining?
- Blue
 - Red
 - Pink
 - Green
101. Viruses transmitted by flies and mosquitoes are sometimes referred to as:
- Paramyxoviruses
 - Rhabdoviruses
 - Acariasis
 - Arboviruses
102. What protozoal agent is known to infect the kidneys of rabbits and is transmitted via urine?
- Psoroptes cuniculi*
 - Encephalitozoan cuniculi*
 - Eimeria stiedae*
 - Cheyletiella parasitovorax*
103. Trematodes are commonly referred to as _____.
- Flukes
 - Tapeworms
 - Roundworms
 - Thorny-headed worms
104. What is the intermediate host for the tapeworm, *Dipylidium caninum*?
- dung beetles
 - flea
 - black ant
 - rabbit
105. What common parasite of dogs is known to cause visceral larval migrans in humans?
- Dirofilaria immitis*
 - Ancylostoma caninum*
 - Trichuris vulpis*
 - Toxocara canis*
106. Oxyurids commonly infect horses and rodents and are more commonly referred to as:
- Flatworms
 - Pinworms
 - Hookworms

d. Roundworms

107. What term is used to describe female parasites that produce eggs which can develop without insemination?

- a. Autoinfection
- b. Autogenic
- c. Disinsemination
- d. Parthenogenic

108. The scientific term for mite infestation is _____.
- Mycosis
 - Pediculosis
 - Myiasis
 - Acariasis
109. Managers at all levels are expected to have three different types of skills. Identify the skill, which best correlates with the phrase “see the big picture”.
- Technical
 - People
 - Conceptual
 - Dictatorial
110. Which of the following is not an important phase of management?
- planning
 - organizing
 - controlling
 - depending
111. One of the most important roles of a supervisor is to:
- Motivate the staff
 - Direct the staff
 - Pay the staff
 - Dictate to the staff

112. Institutional cost recovery is essential for an animal facility to stay in operation in an academic setting. Therefore, the animal facility operational costs must include direct and indirect costs that are charged back to the investigator. An indirect cost is defined as:
- costs incurred by salaries of employees, animal purchases, supplies, and animal diets
 - costs incurred by the institution in general support of the animal facility operation
 - costs incurred by employee sick days, vacation time, and phone calls
 - costs incurred by cage washing, animal bedding, and daily husbandry operations
113. _____ rates are the expenses directly charged to a PI to care for one animal for one day in a research facility.
- Average daily census
 - Centralized management
 - Cost centers
 - Per diem
114. What percentage of people who work with laboratory animals develop laboratory animal allergies?
- 10%
 - 20%
 - 30%
 - 40%
115. Which of the following documents is not a federal regulation?
- Animal Welfare Act
 - The Guide for the Care and Use of Laboratory Animals
 - Public Health Service Policy on Humane Care and Use of Laboratory Animals
 - Food and Drug Administration's Good Laboratory Practices
116. The Animal Welfare Act is enforced by a division of the USDA known as:
- NIH
 - APHIS
 - PHS
 - OPRR

117. Congress can amend the Animal Welfare Act (AWA). There were several major amendments made to the AWA in 1985. Which of the following was not a major amendment made in 1985 to the AWA?
- a. Development of canine exercise and nonhuman primate environmental enrichment programs
 - b. Veterinary care program must regulate the value of scientific data obtained from sick animals
 - c. Institutions must train scientists, associates, and other staff members on the proper care and use of lab animals
 - d. Scientists may only perform one major survival surgery procedure unless scientifically justified and approved by the IACUC
118. According to GLP regulations all protocol changes and the reasons for the changes must be documented and signed by the _____.
- a. Staff Veterinarian
 - b. Study Director
 - c. Toxicologist
 - d. IACUC

119. Recent studies in the field of laboratory animal allergies have revealed that the proteins from _____ and _____ are important allergens in the development of allergies.
- Saliva; urine
 - Respiration; defecation
 - Dander; fur odor
 - Bile; blood
120. What zoonotic disease should researchers and technicians who work with nonhuman primates be tested for on a regular basis?
- Tuberculosis
 - Ebola virus
 - Measles
 - Marburg Virus
121. Two common types of immunogenetic markers used in genetic monitoring are _____ and _____ antigens.
- Platelet; Hepatocellular
 - LPS; WBC
 - Erythrocyte; Leukocyte
 - RBC; MHC

122. What is the formula used to determine sample size in serologic monitoring of a rodent colony for infectious diseases?
- $\log_e (1.0+C)/\log_e (1.0+M)$
 - $\log_e (2.0-C)/\log_e (2.0-M)$
 - $\log (1.0+D)/\log (1.0+C)$
 - $\log_e (1.0-C)/\log_e (1.0-M)$
123. What is the most common occupational health problem in people working with laboratory animals?
- Carpal tunnel syndrome
 - Chronic back pain
 - Hepatitis B and Rabies infection
 - Allergies
124. What is the efficiency of HEPA filters?
- removes 95.50% of particles that are 0.3 μm in diameter or larger
 - removes 90.99% of particles that are 0.3 μm in diameter or smaller
 - removes 99.97% of particles that are 0.3 μm in diameter or larger
 - removes 98.79% of particles that are 0.3 μm in diameter or smaller

125. There are 3 classes of biological safety cabinets. Identify which type of cabinet should be used for BSL-4 agents, such as Ebola virus.
- Class II, Type A
 - Class III
 - Class II, Type B
 - Class I
126. Which documents from a chemical vendor gives specific information on the physical properties and toxicological information of a chemical substance?
- TLVs
 - MSDS
 - EPA
 - NRC
127. Which of the following is the method of choice for decontaminating infectious waste prior to removing it from a biocontainment area?
- EtO
 - Steam autoclaving
 - Cold sterilization
 - Clidox fogging

128. _____ is a form of diffusion that occurs in the presence of a semipermeable membrane and involves the movement of molecules from a high concentration to a low concentration.
- Tonicity
 - Osmosis
 - Passive transport
 - Active transport
129. What is the main difference between facilitated diffusion and active transport?
- Facilitated diffusion requires a carrier substance and active transport never uses a carrier substance
 - Active transport requires energy usage by the cell
 - Facilitated diffusion requires energy usage by the cell
 - Active transport is known as carrier-mediated diffusion
130. Which of the following is an important active transport system that exists in all cells?
- Sodium-potassium pump
 - Chloride-hydrogen pump
 - H₂O pump
 - Sodium-Hydrogen pump

131. What organelles generate the majority of the energy needed by cells to carry out their functions?
- Centrioles
 - Mitochondria
 - Golgi apparatus
 - Endoplasmic reticulum
132. What type of tissue is cartilage?
- Epithelium
 - Muscle
 - Nerve
 - Connective
133. What type of cell is a histiocyte?
- Lymphocyte
 - Macrophage
 - Neutrophil
 - Eosinophil

134. Facilities, which use laboratory animals in research, should provide immunizations against work-related infectious diseases. Which of the following is not a common immunization recommended for laboratory animal users?
- a. Hepatitis B
 - b. Tetanus
 - c. Rabies
 - d. Leptospirosis
135. Mice, rats, and hamsters have two sets of specialized glands associated with the eyes. In rats, secretions from this gland cause the conditions known as chromodacryorrhea and chromorhinorrhea.
- a. Lacrimal glands
 - b. Porphyrin glands
 - c. Meibomian glands
 - d. Harderian glands
136. Which of the following is an important protein in mammals comprising about 33% of the total protein in the body. It is an important component of bone, tendons, and the cornea?
- a. Aponeurosis
 - b. Casein
 - c. Amino acids
 - d. Collagen

137. What is the genus and species of the Syrian Hamster?
- a. *Cricetulus griseus*
 - b. *Mesocricetus auratus*
 - c. *Phodopus sungorus*
 - d. *Cricetulus migratorius*
138. A change in the DNA of a gene that causes it to malfunction is called a _____.
- a. phenotype
 - b. genotype
 - c. mutation
 - d. precursor
139. A blood smear from a female guinea pig reveals mononuclear white blood cells with several pink intracytoplasmic inclusions. What is the common name for these unique leukocytes?
- a. Purkinje cells
 - b. Kupper cells
 - c. Precocious cells
 - d. Foa-Kurloff cells

140. What is the genus and species of the laboratory rabbit?
- Oryctolagus cuniculus*
 - Sigmodon hispidus*
 - Marmota monax*
 - Monodelphis domestica*
141. What is the most common problem resulting from improper handling or restraint of rabbits?
- Trichobezoar
 - Mucoid enteropathy
 - Fractured vertebrae
 - Snuffles
142. Old World and New World Monkeys both require Vitamin C supplementation to prevent ascorbic acid deficiency. However, New World Monkeys also require vitamin _____ to prevent fibrous osteodystrophy.
- D₂
 - C₂
 - D₃
 - C₃
143. If an animal is born blind and helpless it is considered to be _____.
- Precocial
 - Altricial
 - Premature
 - Dystotic

144. Parturition in rabbits is called _____.
- farrowing
 - queening
 - kindling
 - whelping
145. The scientific term used to describe blood-stained sputum is _____.
- hematology
 - hematoma
 - hematuria
 - hemoptysis
146. The _____ requires that nonhuman primates be given the opportunity to exhibit species typical behavior (environmental enrichment).
- Animal Welfare Act
 - IACUC
 - PHS policy
 - Good Laboratory Practices
147. Which of the following is not an Old World Monkey?
- Cynomolgus
 - Marmoset
 - Rhesus
 - Baboon

148. Which of the following anatomic features is normally seen in New World Monkeys?
- Cheek pouches
 - Callous pads
 - Eyes open downward
 - Nostrils open to the front or sides
149. During the estrous period, numerous nonhuman primates develop red, wrinkled skin called “sex skin”, on the face, groin, and buttocks. Which of the following does not get sex skin?
- Squirrel monkeys
 - Chimpanzees
 - Baboons
 - Rhesus
150. Which nonhuman primate commonly gives birth to twins?
- Owl monkeys
 - Sheep
 - Squirrel monkeys
 - Marmosets
151. When TB testing nonhuman primates, the route of administration of tuberculin into the eyelid is _____.
- Subcutaneous
 - Intradermal
 - Intramuscular
 - Intranasal
152. There are several types of RNA, but the type that carries the information from DNA inside the nucleus to the rest of the cell is called _____.
- rRNA
 - tRNA
 - mRNA
 - cRNA
153. Which of the following is not a characteristic of New World Monkeys?
- Nonopposable thumbs
 - Ischial callosities
 - Nostrils open to the side
 - Prehensile tails
154. Which of the following warm-blooded vertebrates is not regulated by the Animal Welfare Act?
- Guinea pigs
 - Rabbits

- c. Hamsters
 - d. Nude mice
155. Who prepares the Guide for the Care and Use of Laboratory Animals?
- a. AAALAC, Int.
 - b. USDA
 - c. ACLAM
 - d. ILAR
156. The shelf life of a bag of standard laboratory cat chow is _____ days after the _____ date.
- a. 60; shipping
 - b. 90; milling
 - c. 120; shipping
 - d. 180; milling
157. Rodent barrier rooms should operate on a _____ pressure air supply to prevent disease organisms from entering the room.
- a. Positive
 - b. Negative
 - c. Injected
 - d. Forced
158. A drug that relieves pain is called an _____.
- a. Anesthetic
 - b. Antibiotic
 - c. Antiprotozoal
 - d. Analgesic
159. In a rodent-breeding colony, which type of breeding scheme should be used to obtain minimal homozygosity in the shortest period of time?
- a. Outbreeding
 - b. Inbreeding
 - c. Cross breeding
 - d. Monogamous breeding

160. The destruction of all organisms on an object is referred to as:
- Disinfection
 - Sanitization
 - Sterilization
 - Pasteurization
161. Identify the correct pathway in which blood flows through the heart from the venous side (deoxygenated blood) to arterial side (oxygenated blood).
- Vena cava, Right ventricle, Right atrium, Pulmonary vein, Lungs, Pulmonary artery, Left ventricle, Left atrium, and Aorta
 - Aorta, Left ventricle, Right atrium, Pulmonary vein, Lungs, Pulmonary artery, Right ventricle, Left atrium, and Vena cava
 - Vena cava, Right atrium, Right ventricle, Pulmonary artery, Lungs, Pulmonary vein, Left atrium, Left ventricle, and Aorta
 - Aorta, Left atrium, Right atrium, Pulmonary artery, Lungs, Pulmonary vein, Right ventricle, Left ventricle, and Vena cava
162. Which types of animals are housed in open (non-filtered) cages and have an unknown microbial status?
- SPF
 - Germfree
 - Gnotobiotic
 - Conventional
163. Which of the following is not a physical method of euthanasia?
- Microwave irradiation
 - Rapid freezing
 - Cranial percussion
 - Carbon dioxide
164. The term "hepato" refers to the _____.
- Intestines
 - Stomach
 - Liver
 - Blood
165. What is the name of the voluntary accreditation organization that inspects and accredits animal care programs?
- AAALAC, Int.
 - USDA
 - FDA
 - OPRR
166. What types of enzymes are used to cut DNA samples into smaller pieces?

- a. Restriction
 - b. Cloning
 - c. Denaturation
 - d. Amplification
167. Chronic toxicology testing is conducted in mice and rats. This type of toxicology testing is used to assess toxicity and _____ of drug candidates.
- a. Pathogenicity
 - b. Oncogenicity
 - c. Hematology
 - d. Pharmacology
168. How often is the IACUC required to review an institutions animal care program and inspect the animal facilities?
- a. Every 3 months
 - b. Every 6 months
 - c. Every 12 months
 - d. Every 24 months
169. Which of the following routes of administration is the fastest in terms of rate of absorption?
- a. Intramuscular
 - b. Intradermal
 - c. Subcutaneous
 - d. Intraperitoneal
170. Retro-orbital injection and cardiac puncture should be performed with the animal under _____.
- a. General anesthesia
 - b. Sedation
 - c. Physical restraint
 - d. Tranquilization

171. _____ is the name given to the manipulation of genetic make-up of an organism.
- Targeted mutation
 - Transgenic technology
 - Genetic engineering
 - Gene cloning
172. Metazoan parasites fall into several categories. The heartworm of dogs and cats is classified as a nematode and these parasites are more commonly referred to as _____.
- flatworms
 - roundworms
 - tapeworms
 - thorny-headed worms
173. Which of the following homozygous conditions prevents the gene expression of any coat color, resulting in an albino mouse?
- cc
 - CC
 - AA
 - Aa
174. Which of the following symbols is used to indicate an outbred stock?
- :
 - /
 - ;
 - ()
175. Which of the following bacterial organisms is commonly used as a biological indicator for testing adequate sterilization in an autoclave?
- Bacillus piliformis*
 - Bacillus stearothermophilus*
 - Staphylococcus aureus*
 - Staphylococcus epidermatitis*
176. The normal gestation length for the domestic pig is _____ days.
- 65
 - 114
 - 145
 - 160
177. *Ctenocephalides felis*, *Psoroptes cuniculi*, *Polyplax serrata*, and *Cheyletiella parasitovorax* are all parasites that can affect the health of laboratory animals. How would you classify these parasites based on where they have an effect on laboratory animals?

- a. Ectoparasites
- b. Endoparasites
- c. Lice
- d. Roundworms

178. Which of the following is a highly contagious infectious disease of mice, which can cause mortality in neonatal mice and adverse immunologic effects on research projects?
- a. Mouse Hepatitis Virus
 - b. Mouse Parvovirus
 - c. Sendai virus
 - d. Hantavirus
179. What is the per diem charge per day for Xenopus frogs if the cost center for Xenopus frogs is \$1000 over 250-day period and the average daily census for frogs is 4?
- a. 1 dollar/frog
 - b. 2 dollars/frog
 - c. 4 dollars/frog
 - d. 6 dollars/frog
180. How many milligrams of cephalexin should be given to a 15-kg beagle if the dosage is 30 mg/kg and each capsule of cephalexin is 250 mg?
- a. 1.8 mg
 - b. 250 mg
 - c. 450 mg
 - d. 3 capsules