2016 International Mock Board Exam Coalition

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Practical Section– 120 Questions

**Questions – 35 Pages**

***This examination is meant to be used as a study tool when preparing for the ACLAM or ECLAM Certifying Examinations. The material presented in this mock examination follows the ACLAM role delineation document, but is not necessarily reflective of the ACLAM or ECLAM Certifying Examinations.***

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Question 1: Peripheral blood smear from a guinea pig. What is the nucleated cell in the center of the image and when would you expect to see an increased number of these cells in circulation?

1. Heterophil, bacterial infection
2. Foa-Kurloff cell, pregnancy
3. Moon cell, estrus
4. Pseudoeosinophil, drug reaction
5. Dobson cell, juvenile/active growth

Question 2: Newborns of which of these animals are attached firmly to the nipples of the dams and are dragged around for about 3 weeks.

1. A
2. B
3. C
4. D

Question 3: Which of the following behaviors or physiologic parameters of mice and rats are **not** determined/validated by this instrument?

1. Normal behaviors such as climbing, locomotion, immobility and rearing
2. Normal behaviors such as drinking, grooming and eating
3. Special behaviors such as seizures, startle response and head twitches
4. Measures body temperatures, blood pressures and metabolic rate

Question 4: What set of results do the horizontal lines on this diagram represent assuming the dotted parabolic line is known negatives and the solid parabolic line is known positives?

* 1. False negative results
	2. Equivocal results
	3. False positive results
	4. True negative results
	5. True positive results

Question 5: According to the 2013 AVMA Guidelines on Euthanasia, which is the preferred method for euthanizing the species depicted:

a. penetrating captive bolt

b. immersion in buffered tricaine methansulfonate

c. CO2 inhalation

d. immersion in an isoflurane water bath

e. decapitation

Question 6: A ferret presents with chronic diarrhea and weight loss. Necropsy and histopathology indicates the ferret was suffering from eosinophilic gastroenteritis. What histopathologic feature in the slide is most supportive of this diagnosis?

1. Eosinophilic infiltrate
2. Intralesional helminthes
3. Interstitial edema and fibrosis
4. Splendore Hoeppli bodies

Question 7: The agent which causes this condition must be differentiated from which environmental condition in glabrous mice:

a. Low temperature

b. Low humidity

c. High temperature

d. High humidity

Question 8: The packaging shown here is used for shipping what material?

a. Infectious substance

b. Biological specimen

c. Clinical specimen

d. Diagnostic specimen

Question 9: The items shown are most commonly used for laboratory rabbits for what purpose?

* 1. Enrichment
	2. Weight-training
	3. Optical-testing
	4. Color differentiation testing

Question 10: The equipment in this image is used to perform which one of the following tests:

1. Bacteriology testing
2. Environmental testing
3. PCR testing
4. Serology testing
5. Parasite testing

Question 11: Which of the following is true regarding the use of the apparatus pictured above in rodents?

1. It is primarily used to study depression.
2. It is primarily used to evaluate neuromuscular function by testing swimming ability.
3. Mice typically require less training to perform this test than tests that involve lever-pressing and/or food restriction.
4. Animals must be removed immediately if they become immobile to prevent drowning.
5. It is primarily used to induce stress.

Question 12: This personal protective equipment is required for all of the following hazardous agents except?

1. B virus injected macaques
2. B virus in mice
3. 1918 flu virus in any animal
4. Hantavirus in Sigmodon spp.
5. Filovirus in *Papio* spp.

Question 13: What is the most likely etiology of the pictured guinea pig disease?

1. Inability to produce the hepatic enzyme L-gulonolactone oxidase
2. Metastatic calcification due to inability to metabolize excess dietary calcium
3. Vitamin C toxicity secondary to consuming a diet formulated for mice
4. Rhabdomyomatosis secondary to environmental stressors

Question 14: The following condition was found in numerous mice in an institution. Choose the **LESS** likely etiological agent that may cause this condition:

a. *Citrobacter rodentium*

b. Coronavirus

c. Rotavirus

d. Reovirus

e. Polyoma virus

Question 15: Which statement best describes the procedure being performed below:

1. Jugular blood sampling
2. Carotid arterial blood sampling from right carotid artery
3. Vena caval blood sampling from right side to prevent damage to recurrent laryngeal nerve
4. Subclavian arterial blood sampling from right side to prevent damage to recurrent laryngeal nerve
5. Azygous vein blood sampling from the right side

Question 16: The equipment pictured here is:

a. A rodent euthanasia chamber

b. A rodent metabolic chamber

c. An open field chamber

d. A rodent anesthesia induction chamber

Question 17: How would you evaluate the following picture of a rat using the rat grimace scale?

1. Moderate orbital tightening and moderate nose/cheek flattening.
2. No orbital tightening and no nose/cheek flattening.
3. Obvious orbital tightening and moderate nose/cheek flattening
4. Moderate orbital tightening and no nose/cheek flattening

Question 18: Infections with these pathogens can negatively affect research results by causing which of the following?

1. Elevations in monocyte skin infiltration
2. Decreases in monocyte skin infiltration

c. Elevations in IgA levels and inflammatory cytokines

d. Elevations in IgE levels and inflammatory cytokines

e. Elevations in IgE levels and decreases in inflammatory cytokines

Question 19: Which of the following imaging modalities will an investigator most likely use after giving an intraperitoneal injection of this compound to mice?

* 1. Bioluminescence
	2. High-frequency Ultrasound
	3. MicroCT
	4. MRI

Question 20: With regard to the husbandry and care of the animal shown below, what is the largest concern?

* 1. The animal will need to be sedated frequently for procedures, so dietary supplementation will be needed.
	2. The animal may develop skin lesions that will need to be treated clinically.
	3. The animal will need to be exempted for social housing, which means that extra enrichment will need to be provided.
	4. The study will need to be halted if the jacket becomes damaged or soiled.
	5. Caging change will be need to be coordinated with the study schedule, because the animal will need to be moved into the tether cage the same day the study is started.

Question 21: The interior height for any primary enclosure used to confine this species shall be at least \_\_\_\_\_\_ inches?

* 1. 5
	2. 5.5
	3. 6
	4. 6.5
	5. 7

Question 22: The CDC and NIH recommend what biosafety level facility for animal studies using nonhuman primates experimentally or naturally infected with the disease above.

a. Animal Biosafety Level 1

b. Animal Biosafety Level 2

c. Animal Biosafety Level 3

d. Animal Biosafety Level 4

e. Animal Biosafety Level 5

Question 23: Which of the following is true about this assay?

* 1. Measures mechanical hypersensitivity (grams force)
	2. Repeat testing affects the latency for paw withdrawal
	3. A cut-off point to prevent tissue damage is not needed
	4. Allows for independent testing of both sides of the body
	5. Increases the number of animals required for a given experiment

Question 24: Identify the following instrument and its most likely use:

1. Stylet; To aide in intubation of the neonatal trachea
2. Acupuncture needle; to enhance analgesia by stimulating the release of endogenous opioids
3. Trochar; to implant small pellets subcutaneously
4. Peripheral nerve stimulator; to measure the degree of neuromuscular blockade

Question 25: Which of the following virus types is most likely attributable to the lesion shown?

a. Alphaherpesvirus

b. Betaherpesvirus

c. Gammaherpesvirus

d. Retrovirus

e. Polyomavirus

Question 26: This clinical sign in a NZB x NZW F1 hybrid mouse (NZBWF1/J) is a potential sequela of its genetic manipulation to model what human disease?

1. Multiple sclerosis
2. Rheumatoid arthritis
3. Hodgkin’s lymphoma
4. Muscular dystrophy
5. Systemic lupus erythematosus

Question 27: What agent is appropriate for a surgical skin preparation in this species?

a. Sterile saline

b. 80% benzalkonium choride

c. Betadine surgical scrub

d. 70% Isopropyl alcohol

Question 28: Which of the following helps prevent complications in the spinal procedure in rats shown below?

1. Widening the exposure of the lumbar spine
2. Withholding post-operative fluid therapy
3. Cooling the body temperature to 18 degrees C during surgery
4. Avoiding extracorporeal reflection of the small intestine during the exposure

Question 29: Which of the following pathologic findings is commonly seen in mice that have recovered from the disease shown in the above picture?

1. Bone marrow necrosis
2. Lymphocytic choriomeningitis
3. Chronic hyperplastic typhlocolitis
4. Splenic fibrosis

Question 30: The organization pictured below was the precursor to what current organization?

* 1. AALAS
	2. ACLAM
	3. AAVP
	4. OLAW
	5. USDA

Question 31: Why would the following device be placed in an animal in the manner shown below?

1. To facilitate frequent collection of cecal contents.
2. To allow visualization of the gastric mucosa
3. To minimize the forced handling of macaques otherwise needed for oral dosing
4. To prevent gastric bloat

Question 32: What procedure is being performed in this photo?

1. Tattooing
2. Microchip identification placement
3. Placement of a tail vein catheter
4. Endotracheal intubation

Question 33: A group of rhesus involved in an organ transplantation study has severe aplastic anemia. The following sample was obtained from one of the affected individuals. Please select the most likely etiological agent.

a. Adenovirus

b. Filovirus

c. Arenavirus

d. Flavavirus

e. Parvovirus

Question 34: What does the equipment depicted measure?

a. Depression

b. Memory

c. Avoidance

d. Mechanical allodynia

e. Rotational behavior

Question 35: What is the benefit of this housing set up for *Danio rario*?

1. Decreased cortisol production for singly housed animals
2. Increased breeding
3. Increased growth rate
4. Increased shoaling behavior
5. Decreased aggression

Question 36: What hazard does this symbol indicate is present?

1. Ionizing radiation
2. Explosive
3. Laser
4. High voltage
5. Oxidizing

Question 37: What initiative is represented by this logo supported by animal research? Note the name has been removed from the logo.

1. Americans for Medical Progress
2. Doctors Without Borders
3. Institute for Laboratory Animal Research
4. One Health
5. Association for Assessment and Accreditation of Laboratory Animal Care

Question 38: What is the name of the device shown in the photo?

a. Elevated plus maze

b. Grip strength bar

c. Balance beam

d. Rotarod

Question 39: The spores of which pathogen are seen in these histological sections of ovarian, intestinal, and kidney from zebrafish?

1. *Pseudocapillaria tomentosa*
2. *Piscinoodinium pillulare*
3. *Ichthyophthirius multiliis*
4. *Edwardsiella ictaluri*
5. *Pseudoloma neurophilia*

Question 40: For data with this frequency distribution, what percentage of the area under the curve is located within one standard deviation of the mean?

a. 33%

b. 50%

c. 68%

d. 95%

e. It varies with the magnitude of the standard deviation

Question 41: What is the condition shown here, which may be seen during ocular development in Wistar Hannover (WH) rats?

a. Diffuse retinal detachment

b. Spontaneous intraocular hemorrhage and retina pigment deposition

c. Optic nerve degeneration

d. Corneal opacity and lenticular cataractous change

e. Asteroid hyalosis

Question 42: The diagram below depicts a method to evaluate what in respect to mice?

a. vibration

b. G-forces

c. despair (forced swimming test)

d. memory (Morris maze)

e. coordination (rotorod)

Question 43: What required information is NOT STATED on this signage on the door of a mouse housing room in which an ABSL2 agent is in use?

a. The name of the animal species in use

b. After hours (home or cell) contact information for the investigator

c. Historical information of infectious agents used previously in this colony

d. Soiled cage and waste disposal procedures

e. Procedures necessary when exiting the room

Question 44: According to the 8th Edition of the Guide for the Care and Use of Laboratory Animals, what is the recommended minimum space for this animal?

1. 23 in2
2. 40 in2
3. 51 in2
4. 60 in2
5. >70 in2

Question 45: Which of the following statements best describes this drug?

a. Have currently accepted medical use and a high potential for abuse which may lead to severe psychological or physical dependence.

b. Have no currently accepted medical use in the United States, a lack of accepted safety for use under medical supervision, and a high potential for abuse

c. Have currently accepted medical use, have a potential for abuse and abuse may lead to moderate or low physical dependence or high psychological dependence.

d. Have currently accepted medical use, have a low potential for abuse and consist primarily of preparations containing limited quantities of certain narcotics

Question 46: Which of the following images of Syphacia spp. shows a nonviable egg?

1. A
2. B
3. C
4. D

Question 47: The "rhino" mutation is allelic with "hairless" and is a more sever manifestation of the "hairless mutation" as seen in this image. Which of the following is **NOT** a feature of the skin of these mutants?

a. Nail aplasia

b. Comedone formation

c. Ruptured follicles with associated dermal inflammation

d. Generalized acanthosis and orthokeratosis

e. Skin Ulceration

Question 48: How will the presence of the tissue indicated by the red arrow affect reproductive performance in female mice?

1. Decrease copulatory plugs and pregnancy rates
2. Decrease copulatory plugs but no effects on pregnancy rates
3. Increase rates of dystocia and fetal death
4. No effect on reproductive performance
5. Increase rates of pseudo hermaphrodites

Question 49: This disinfectant is considered to be a:

1. Denaturant
2. Reactant
3. Oxidant
4. Reductant

Question 50: A new researcher in your institution wishes to use this animal for translational research pertaining to paramyxoviral respiratory diseases. Which is correct regarding the care and handling of this species?

1. Continual water availability may lead to a diabetes insipidus like syndrome
2. Intraspecific aggression is rare even if males are introduced to social groups as adults
3. Feeding a standard rodent diet is likely to lead to hypovitaminosis C
4. Tail restraint is not recommended due to the risk of injury to the animal or the handler
5. Typical gestation length is 21-22 days

Question 51: The organisms pictured below were found on the dorsal fin of a goldfish in quarantine. Which of the following would be an appropriate course of action?

1. Isolate the fish and the infection will be self-limiting
2. Treat all water in the facility with chlorine
3. Physically examine each fish and remove organisms
4. Perform skin scrape and euthanize infected fish

Question 52: Which method of sanitation is the most important means of preventing the spread of this organism throughout a fish facility?

1. Using an acid wash in a tunnel washer
2. Using an alkaline wash in a tunnel washer
3. Soaking tanks in 3.175 g/L sodium thiosulfate
4. Soaking tanks in 0.7% bleach
5. Maintaining UV sterilization in filtration system

Question 53: The condition shown in this H & E section of a mouse stomach can be seen in all of the following sites, **EXCEPT**, which one?

a. Intestinal epithelium

b. Gallbladder epithelium

c. Trachea epithelium

d. Bile and pancreatic duct epithelium

e. Nasal respiratory epithelium

Question 54: Name the genus and species and a common use in research:

a. *Columba livia domestica*; memory

b. *Coturnix japonica*; birth defects

c. *Columba livia domestica*; birth defects

d. *Coturnix japonica*; memory

Question 55: One of the pigs in your facility began breathing hard and developed red and blotchy skin. It died relatively quickly after. The provided photo is from the necropsy of this pig. Which of the following statements best describes this syndrome?

1. Only identified in miniature pig breeds
2. Triggered by dantrolene administration
3. Associated with a mutation in the calcium-release channel protein (ryanodine receptor)
4. Caused by excess dietary selenium

Question 56: Which federal agency has primary jurisdiction over the importation of this species?

a. Treasury

b. Defense

c. Education

d. Health and Human Services

e. Interior

Question 57: During routine husbandry procedures an animal caretaker noted these abnormal findings in a swine room. What is the most likely etiology?

a. Gastric ulceration

b. *Ascaris suum*

c. *Trichuris suis*

d. *Strongyloides ransomi*

e. *Oesophetostomum* spp.

Question 58: Which of the following methods of euthanasia is considered “acceptable with conditions” in the species pictured?

* 1. Injectable ethanol
	2. Injectable ketamine/xylazine combination
	3. Inhaled nitrogen
	4. Injectable opioids

Question 59: The experimental technique depicted below is useful for which of the following?

1. measurement of precise food and water intake
2. fiberoptic tracing of neurons
3. intermittent whole blood sampling from cerebral (dural) venous sinuses
4. continuous collection of extracellular fluid samples
5. locomotor inhibition evaluation

Question 60: Which of the following is true regarding the rat pictured below?

1. Filament test for whisker response is being performed
2. Von Frey filament tests mechanical stimuli
3. A hotplate test would be less reliable as it tests for thermal stimuli
4. Tail clip test would be more reliable as it tests for thermal stimuli
5. The investigator is assessing the rat grimace scale

Question 61: The organism shown below in liver tissue of a mouse is unlikely to be found in the heart of which of the following species?

a. Mouse

b. Rat

c. Hamster

d. Gerbil

e. Guinea pig

Question 62: This image depicts:

1. HEPA filter for a biocontainment facility
2. Quencher exhaust for an MRI
3. Emergency generator for an animal facility
4. Incinerator for a biocontainment facility

Question 63: The most likely cause for the behavior displayed by the zebrafish is:

1. Temperature higher than their thermal tolerance (28◦C)
2. Low dissolved oxygen levels within the water
3. Salinity higher than their tolerance level of 2 g/L
4. Insufficient feeding amount of 5-10% of body weight daily

Question 64: Which anesthetic combination causes the fewest deleterious cardiovascular effects for the species shown?

1. Ketamine and xylazine
2. Ketamine and medetomidine
3. Telazol and xylazine
4. Telazol and dexmedetomidine
5. Ketamine and romifidine

Question 65: Which of the following must be considered when collecting a urine sample from rats using the technique depicted?

1. Intraluminal ureteral bleeding may occur resulting in occlusion of the catheter with blood clots.
2. Male rats ejaculate after urethral catheterization resulting in plugging of the catheter with coagulum.
3. The female rat has distinct vaginal and urethral openings.
4. Due to curves in the male rat urethra, a curved-tip catheter is recommended.
5. The urethra of the female rat is essentially impossible to catheterize.

Question 66: This device is used in rabbits. What is this device used for?

1. Intramuscular injection
2. Environmental enrichment
3. Physical euthanasia
4. Otoscopic examination

Question 67: The primary purpose of this system is to:

a. Acidify drinking water

b. Filter drinking water via biofiltration

c. Sterilize drinking water

d. Filter drinking water via reverse osmosis

e. Hyperchlorinate drinking water

Question 68: A Yorkshire pig showed clinical signs of anorexia, coughing, depression, swollen joints, and neurological signs prior to death. This photo is from the necropsy. What is the etiologic agent for this condition?

1. *Erysiplelothrix rhusiopathiae*
2. Porcine circovirus-2
3. *Haemophilus parasuis*
4. *Pasteurella multocida*
5. *Streptococcus suis*

Question 69: This example of an indoor marmoset cage provides an increase in what beneficial parameter for the marmosets?

1. sanitation
2. UV light
3. microorganisms
4. environmental enrichment

Question 70: What is the name of the following piece of equipment and what is it used for?

a. Hygrometer; Humidity

b. Thermometer; Temperature

c. VOC Meter; Volatile Organic Compounds

d. Balometer; Air Volume

e. Anemometer; Air Speed

Question 71: The ectoparasite depicted in this image can cause intense pruritus and may lead to excoriation, self- mutilation, and secondary bacterial infections in rabbits. What is the etiologic agent?

1. *Sarcoptes scabies*
2. *Psoroptes cuniculi*
3. *Haemodipsus ventricosus*
4. *Spilopsyllus cuniculi*
5. *Linguatula serrata*

Question 72: What is the minimum cage height this animal should be provided?

1. 20 inches
2. 30 inches
3. 40 inches
4. 50 inches
5. 60 inches

Question 73: What is the purpose of this equipment?

* 1. Vacuuming up hair after preparing for surgery
	2. Active scavenging of halogenated anesthetics
	3. Ultrasound to confirm swine pregnancy
	4. Bedding disposal

Question 74: An older rat in your facility is showing signs of snuffling and chattering. Upon necropsy and histopathology you find the following. What is your most likely diagnosis?

* 1. CAR bacillus
	2. *Mycoplasma pulmonis*
	3. Sendai virus
	4. *Streptococcus pneumoniae*
	5. *Pneumocystis carinii*

Question 75: What is the landmark denoted by the asterisk (\*) that may be used as a coordinate during stereotaxic electrode implantation?

1. Coronal
2. Lambda
3. Bregma
4. Sagittal
5. Horizontal

Question 76: A male animal, like the one pictured, is found to have a cranial abdominal mass during physical exam. What is the most likely diagnosis?

* 1. Gastric adenocarcinoma
	2. Hemangiosarcoma
	3. Bloat
	4. Lymphoma
	5. Lipoma

Question 77: What is the device used for?

1. Skin scrape for the detection of parasites
2. Inoculation of bacteria subcutaneously
3. Lancing a blood vessel for blood collection
4. Cutting off a skin tag for biopsy

Question 78: Which of the following statements is TRUE regarding the use of this unit in animal facilities?

* 1. It provides product protection but no personnel protection
	2. It provides personnel protection but no product protection
	3. It provides both product and personnel protection
	4. It provides neither product nor personnel protection

Question 79: When using the device pictured below, which of the following considerations is correct?

1. Habituation is never required as there is minimal impact on the animal’s normal behavior
2. Animals may be individually housed with IACUC approval
3. When used for more than 12 consecutive hours, the device must be removed and the animal allowed at least one continuous hour of unrestrained activity daily
4. Animals will always have increased urinary cortisol when the device is being used
5. Behavioral assessments are not a reliable method of assessing that an animal has adapted to the device

Question 80: What imaging modality does the following image represent?

* 1. Representative 3D guided A-Mode echocardiograph
	2. Representative 2D guided A-Mode echocardiograph
	3. Representative 2D guided doppler echocardiograph
	4. Representative 3D guided M-Mode echocardiograph
	5. Representative 2D guided M-Mode echocardiograph

Question 81: Which of the following statements is true with regards to the mice pictured?

1. The mouse on the left has a facial expression consistent with fear or distress
2. The mouse on the right is exhibiting behaviors indicating a need for analgesics
3. None of the mice above are showing signs that indicate a need for analgesics
4. The mouse in the center has muzzle alopecia consistent with an external parasite infection

Question 82: According to the Animal Welfare Act, which of the following is **TRUE** regarding the primary enclosure for a female of the species pictured, weighing 9.5 kg, and her 5-month-old infant weighing 1.5 kg?

1. An exemption from the caging standards does not need approval by the IACUC if it has already been reviewed and approved by the attending veterinarian.
2. After the infant is weaned and the female becomes pregnant again, she will need a group 4 cage if she gains more than 0.5 kg.
3. Since this is a brachiating species, they require a group 6 cage.
4. The female and infant described require a group 3 cage while they are housed together.
5. A low perch in the cage, even if it does not allow the animals to comfortably sit underneath, is added to the floor space of the cage.

Question 83: What is an indication for use of this equipment in the rodent housing facility?

1. Measuring ATP
2. Measuring ultrasound
3. Measuring ammonia
4. Measuring hydration

Question 84: Your zebra finch colony was recently exposed to 24 hours of continuous light over several days and has increased morbidity and mortality. Histopathology of the ventriculus of one of the animals is shown above. In addition to correcting the light cycle, what is the treatment of choice for these animals?

1. Amoxicillin
2. Amphotericin B
3. Metronidazole
4. Depopulate colony
5. Test and cull

Question 85: What is the minimum floor area requirement for this singly housed male weighing 15.5 kg, according to Animal Welfare Regulations?

1. 4.3 ft2
2. 6.0 ft2
3. 8.0 ft2
4. 25.1 ft2

Question 86: This device is used to measure which of the levels listed below, which is an important consideration in the cage microenvironment?

1. humidity
2. ammonia
3. temperature
4. carbon dioxide

Question 87: This is a histologic section from the adrenal gland of a mouse. What is the etiologic agent?

a. MAV

b. MHV

c. MCMV

d. MTV

e. MVM

Question 88: Moving this animal to a new environment is associated with a **decrease** in which of the following parameters?

* 1. C-reactive protein (CRP)
	2. Pig major acute-phase protein (PMAP)
	3. Haptoglobin
	4. Porcine α-1 acid glycoprotein (PAGP)
	5. Albumin

Question 89: Occlusion of these ports found on ventilated racks can cause which of the following?

1. dehydrated animals
2. increased nest building behavior
3. rhinitis, otitis, tracheitis, and pneumonia
4. none of the above, the ports are supposed to be occluded for normal operation of the rack

Question 90: The pictured animal displays which of the following captive breeding behaviors?

1. Eusocial, one breeding queen with several non-reproductive workers participating in cooperative brood care
2. Harem breeding, one male for every 4-6 females
3. Monogamous, one male, one female pairings
4. Promiscuous, females and males mate multiple times with multiple mates with no cooperative brood care

Question 91: Use of this method of euthanasia can result in:

* 1. Prolonged time to loss of consciousness
	2. No change in GABA concentrations in the brain
	3. Hemorrhage in the lungs
	4. No change in serum corticosterone

Question 92: According to the AWA, what is **false** with regards to the correct use of this piece of equipment by a research institution?

1. The tag number shall be correctly listed in the records of purchase, acquisition, disposal, or sale of the dog or cat it identifies and to which it is affixed.
2. Unweaned puppies or kittens do not need tags while they are maintained as a litter with their dam in the same primary enclosure, provided the dam has been individually identified.
3. When an animal dies or is euthanized, this tag shall be retained by a research facility until called for by an APHIS official or for a period of 3 years.
4. No tag number shall be used to identify more than one animal or shall be reused within a 5-year period.
5. This tag is not less than 1-1⁄4 inches in diameter.

Question 93: The disease depicted in the slide can be chemically induced in *Mesocricetus auratus* by subcutaneous injection of which substance?

1. Collagen
2. Ethanolamine
3. Casein
4. Dioctyl sodium sulfosuccinate

Question 94: What color is the tail of this animal?

1. nude
2. white
3. black
4. white with a black tip

Question 95: The pictured was found as an incidental finding at necropsy of a New Zealand White rabbit. What is your diagnosis?

1. *Eimeria stiedae*
2. *Cryptosporidium cuniculus*
3. *Encephalitozoon cuniculi*
4. *Treponema paraluiscuniculi*
5. *Lawsonia intracellularis*

Question 96: Which is **NOT** an acceptable method of euthanasia for these animals?

1. Hypothermia, as long as the animal is <7 days of age and does not come into direct contact with ice or pre-cooled surfaces
2. Injectable barbiturates alone
3. CO2 exposure for 5 minutes
4. Leaving the animal in utero after euthanizing the dam

Question 97: The fish depicted on the right has a mutation in what gene?

1. BRAF
2. MYCN
3. APC
4. B-myb
5. TP53

Question 98: What is the purpose of the horizontal wire cable in the image?

1. Emergency door release
2. Emergency shut off cable
3. Trip wire to alert operator that equipment is contacting sprayer arms
4. Cable to turn on interior light

Question 99: Which of the below have been identified as the likely underlying cause of this condition affecting *Meriones unguiculatus*?

1. Chemical irritation from porphyrin continuing lacrimal secretions
2. Demodex infestation
3. B12 deficiency
4. Infection with Cilia-Associated Respiratory Bacillus

Question 100: This gross photograph shows tissues from a Long-Evans rat that died within days after arriving at an animal facility from a commercial breeder. What condition did the rat have and what is depicted in the picture?

* 1. Urolithiasis; kidney with calculi in the renal pelvis
	2. Urolithiasis; urinary bladder with multiple variable sized calculi in the lumen
	3. Spontaneous progressive glomerulonephropathy; kidney with granular surface
	4. Pulmonary pneumocystosis; lung with focal cellular infiltrates
	5. Spontaneous diplococcal (*Streptococcus pneumoniae*) infection; fibrinous pleuritis

Question 101: This behavior is seen most often in animals who were:

1. Reared in isolation
2. Born in the wild
3. Parent reared
4. Reared with con-specifics

Question 102: The causative agent of this disease is **not** known to do which of the following?

1. Cause focal hepatitis
2. Present with only skin “lumps” as the only clinical sign
3. Present with torticollis, nasal or ocular discharge
4. Metastasize to the brain

Question 103: The minimum space requirements for this animal and her infant are:

1. Floor area/animal = 6.0 ft2 and height = 32 inches
2. Floor area/animal = 6.0 ft2 and height = 36 inches
3. Floor area/animal = 8.0 ft2 and height = 36 inches
4. Floor area/animal = 9.6 ft2 and height = 36 inches

Question 104: Biological safety cabinets (BSC) are the primary containment devices that protect the worker, product, and environment from exposure to microbiological agents. Identify the BSC type depicted below.

1. Class II, Type A2
2. Class II, Type B1
3. Class II, Type B2
4. Class III

Question 105: An investigator calls you about necropsy findings in some of the control animals in her work. She has just started working with gnotobiotic mice and on necropsy, there was a large swollen section of the gut. The picture on the left is one of the gnotobiotic animals and the picture on the right is typical for her conventionally housed control animals. What can you tell the investigator about her gnotobiotic mice?

1. The swollen area is an enlargement of the colon, indicating a helicobacter infection
2. The swollen cecum indicates bacterial contamination of the gnotobiotic colony
3. The substantial enlargement of the cecum is typical for gnotobiotic mice
4. The enlarged structure is the spleen and the investigator should submit an animal for you to examine
5. The enlarged colon is secondary to torsion of the intestine

Question 106: Which metabolic or physiologic metrics are altered in rats housed in these cages?

1. Body growth rates
2. Dietary and water intake
3. Total fatty acids
4. Daily melatonin levels

Question 107: The following statement is **FALSE** about this device:

1. Is operated by biting or licking
2. Provides adequate airflow through piped systems
3. Has various flow rates dependent on species
4. Has a shield to prevent bedding from entering the system

Question 108: According to the AWA and Regulations, which of the following **cannot** be used to sanitize primary enclosures for the following species?

1. Soap or detergent and hot water - 180 °F in a mechanical cage washer
2. Detergent solution followed by a safe disinfectant
3. Live steam
4. Flame
5. Wash and rinse water at 143 - 165 °F for 30 minutes

Question 109: This equipment is required when what environmental parameters exist?

1. Temperatures exceed 72F
2. Carcinogens are in use
3. Noise levels exceed 85 dBA
4. Biological hazards are in use

Question 110: The following lesion found in a squirrel monkey is caused by

1. Osteosarcoma
2. Hydrocephalus
3. Hypovitaminosis C
4. Hypovitaminosis A
5. Hypocalcemia

Question 111: Of the depicted animals used in biomedical research, which would be covered by the PHS policy but not the Animal Welfare Act?

a. A

b. B

c. C

d. D

Question 112: According to the 2013 AVMA Guidelines for the Euthanasia of Animals, the following are acceptable without conditions methods of euthanasia for the following species **except**?

1. Injected barbiturates
2. Inhaled anesthetics
3. Topical buffered tricaine methanesulfonate
4. Topical buffered benzocaine hydrochloride

Question 113: In what species would this general cage and feeder design be inappropriate?

1. Mice
2. Rats
3. Syrian hamsters
4. Gerbils

Question 114: The images below depict the gross and histologic lesions associated with a certain pathogen in a rhesus macaque. When working with this pathogen in a laboratory, which activity can be conducted at the BSL-2 level?

1. Preparation of acid-fast smears from clinical specimens
2. Manipulation of cultures of the pathogen
3. Handling of experimentally infected mice
4. Handling of experimentally infected nonhuman primates

Question 115: According to the Guide for the Care and Use of Laboratory Animals, which of the following should **not** be part of a Pest Control Program when possible?

1. A
2. B
3. C
4. D

Question 116: Name the equipment pictured.

1. Irradiator
2. Ferret nesting box
3. Micro-CT
4. PET-CT

Question 117: This animal is being imported to the US from its native country and will be transported to your research facility from an adjacent state. Special written approval is needed from which agency or agencies?

1. CDC Division of Global Migration and Quarantine
2. CDC Division of Global Migration and Quarantine and FDA
3. CDC Etiologic Agent Import Permit Program
4. CDC Etiologic Agent Import Permit Program and DoT
5. USDA and FWS only

Question 118: For what reason is the procedure depicted in the images typically performed?

a. Collection of tissue for genotyping

b. Collection of samples for disease testing

c. Identification of the animal

d. Treatment of a disease

Question 119: The following image depicts what piece of equipment that may be found in an animal facility?

1. Autoclave test strip
2. Radio frequency identification (RFID) tag
3. A sample capture unit to perform environmental PCR testing
4. Device to monitor light levels in animal holding rooms
5. Device to monitor vibration levels in animal holding rooms

Question 120: You identify the following organism during routine surveillance of your *Rattus norvegicus* colony. What is it?

1. *Radfordia ensifera*
2. *Myocoptes musculinus*
3. *Radfordia affinis*
4. *Syphacia obvelata*
5. *Lumbricus terrestris*

**END OF EXAM!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!**