

Name: _____

VMP 930 -- Final Exam
(100 questions @ 2 points each = 200 points total)

Protozoa (60 points)
Arthropods (30 points)

Nematodes (80 points)
Platyhelminthes (30 points)

Protozoa (60 points)

Multiple Choice (There is one best answer for each question.)

1. A 5-year-old gelding presents with ataxia and incoordination in all four limbs. A CSF tap reveals antibodies to *Sarcocystis neurona*. How did the horse most likely acquire this infection?
A. ingestion of sarcocysts in the muscle tissue of an infected opossum
B. accidental ingestion of caddisflies from the pasture creek
C. transmission of sporozoites via the bite of a tabanid fly
D. ingestion of sporocysts from opossum feces in contaminated feed or water
E. direct contact or interaction with an infected horse
2. A woman owns 3 cats and has just found out she is pregnant. Her doctor advises her to consult her veterinarian to determine her risk of parasite-associated complications. What should you do?
A. Request a stool sample from both the cats and the woman. And do a fecal exam to try to find *Toxoplasma gondii* oocysts.
B. Recommend serological testing for only the cats for *Toxoplasma gondii*.
C. Recommend serological testing for the cats for *Toxoplasma gondii* and recommend she ask her doctor that she also be serologically tested for *Toxoplasma gondii*.
3. Which feline protozoan causes a disease that is seasonal (spring & summer), with clinical signs of febrile disease, dyspnea, jaundice, and lab diagnostics showing pancytopenia, hyperbilirubinemia and schizont-laden macrophages on blood smear?
A. *Toxoplasma gondii* B. *Cytauxzoon felis* C. *Babesia gibsoni*
D. *Cystoisospora rivolta* E. *Tritrichomonas foetus feline*
4. *Toxoplasma gondii* is a serious zoonotic disease for pregnant women, with the potential for causing fetal defects. Which of the following has the most potential for transmitting *T. gondii* ?
A. A young indoor/outdoor cat B. An old feral dog C. An old indoor cat
5. There are many species of protozoa that cause diarrhea in cattle. Which of the following protozoa causes watery diarrhea (calf scours) in 7 to 14 day old calves?
A. *Eimeria leuckarti* B. *Eimeria tenella* C. *Eimeria bovis*
D. *Cystoisospora rivolta* E. *Cryptosporidium parvum*
6. *Toxoplasma gondii* is a serious zoonotic disease for pregnant women, with the potential for causing fetal defects. Which of the following is NOT a potential threat for human infection?
A. Oocyst from cat feces B. Uncooked pork C. Uncooked salmon
D. Uncooked free-range chicken E. Raw, unwashed garden vegetables

7. Because Imidocarb is used for the treatment of *Babesia canis*, while a combo of Atovaquone & Azithromycin is used for *Babesia gibsoni*; it is best to distinguish between an infection of *Babesia canis* and *Babesia gibsoni*. Which is the best, most reliable test to determine between the *Babesia* species?
- A. PCR
D. Fecal Centrifugation
- B. Serology
E. CBC & Chemistry Panel
- C. Blood Smear
8. There are many species of protozoa that cause diarrhea in cattle. Which of the following protozoa causes bloody diarrhea (bloody scours) in 21+ day old calves?
- A. *Eimeria leuckarti*
D. *Cryptosporidium parvum*
- B. *Eimeria bovis*
E. *Cystoisospora rivolta*
- C. *Eimeria tenella*
9. Which of the following protozoa infects the microvilli of intestinal cells, causing intestinal cell dysfunction?
- A. *Eimeria leuckarti*
D. *Cryptosporidium parvum*
- B. *Eimeria bovis*
E. *Cystoisospora rivolta*
- C. *Eimeria tenella*
10. During a visit to a back-yard chicken coop you notice bloody diarrhea in some the chickens. You also notice the coop has an elevated wire-mess floor, with food & water dispensers sitting on the floor. Which most exposes the chickens to coccidian (*Eimeria* sp.) infections?
- A. Elevated wire-mesh floor
B. Food & water dispensers on the floor
11. Which of the following production methods is more likely to experience a coccidian (*Eimeria* spp.) disease outbreak?
- A. 3-year old Dairy cows on a pasture
C. 1-month old Calves on a Feedlot
- B. Free-range Chickens
12. Whether *Cryptosporidium parvum*, an Eimerian coccidian or an Isosporan coccidian that is causing diarrhea, the primary concern is _____.
- A. Anemia
D. Dehydration
- B. Paralysis
E. Respiratory distress
- C. Colitis
13. *Sarcocystis cruzi* has a typical *Sarcocystis* life cycle. It has a heteroxenous life cycle involving which of the following pairs of hosts?
- A. Felids and rodents
C. Marsupials and dogs
- B. Cattle and canids
D. Birds and cattle

Matching

Tritrichomonas foetus (feline) and *Giardia* sp. can cause diarrhea in cats. Match each of these Mucoflagellates with the appropriate association.

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| _____ 14. Persistent smelly diarrhea | A. <i>Tritrichomonas foetus</i> feline |
| _____ 15. Infective trophozoite | B. <i>Giardia</i> sp. Assemb. F |
| _____ 16. Large Intestine | C. Both |
| _____ 17. Lethargy, Weight-loss | |

Eimeria spp. and *Cystoisospora* spp. are coccidians that cause diarrhea in domestic animals. Match each of these coccidians with the appropriate association.

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| _____ 18. Two sporocysts | A. <i>Eimeria</i> spp. |
| _____ 19. Ingest infective oocyst | B. <i>Cystoisospora</i> spp. |
| _____ 20. Calf | C. Both |
| _____ 21. Ingest infected paratenic host | |
| _____ 22. Very High Host Specificity | |

Tritrichomonas foetus bovine and *Neospora caninum* are protozoans that cause abortions in cattle. Match each of these protozoa with the appropriate association.

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| _____ 23. Early abortions | A. <i>Tritrichomonas foetus</i> bovine |
| _____ 24. Mucoflagellate | B. <i>Neospora caninum</i> |
| _____ 25. Sexual transmission | C. Both |
| _____ 26. Ingest tissue cysts from cow placenta | |

Babesia canis and *Cytauxzoon felis* are important blood protozoans of pets. Match each of these protozoa with the appropriate association.

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| _____ 27. <i>Amblyomma</i> sp. | A. <i>Cytauxzoon felis</i> |
| _____ 28. Piroplasm | B. <i>Babesia canis</i> |
| _____ 29. Pancytopenia | C. Both |
| _____ 30. Greyhounds | |

36. You work with a rescue group, which treats animals that have been subjected to hoarding conditions. At one such facility you find a female dog in a pen with 5 other dogs. The female dog has generalized crusting, erosions, ulcers, pustules, erythema. Practicing your Pathology, you describe the morphology as: marked subacute multifocal to coalescing hyperkeratotic, ulcerative and pustular dermatitis with deep pyoderma and cellulitis. Later during the inspection of the facilities you come across a male dog with a similar condition, but housed in a different pen. You are informed that the male dog is an offspring of the female dog. Of the 20 neglected dogs at this facility, these are the only 2 dogs demonstrating this pathology. What should be at the top of your differential list?
- A. *Demodex canis* B. *Linognathus setosus* C. *Trichodectes canis*
D. *Otodectes cynotis* E. *Sarcoptes scabiei* (var. *canis*)
37. Which of the following control measures provides the most immediate efficacy for decreasing the over-all flea population in a house environment?
- A. Treatment of pets with an Adulticide.
B. Treatment of pets with a Larvicide
C. Treatment of pets with a Larvicide and an Adulticide.
D. Vacuum carpets and upholstery
38. There are several reasons why ticks are excellent vectors. One is the biological mechanism of transstadial transmission. What is transstadial transmission?
- A. A pathogen is transmitted from the mother tick to her eggs.
B. A pathogen is transmitted from male tick to female tick during copulation.
C. A pathogen remains viable in all tick life cycle stages - from egg to larvae to nymph to adult.
D. A pathogen is transmitted from female tick to male tick during copulation.
39. Neighbors of a dairy complained to the farm manager that during the summer, when seated outside, they would frequently experience painful fly bites that they suspected were coming from his farm. The manager assured his neighbors that he was controlling flies by giving his cows an in-feed insecticide that kills developing larvae in cattle manure, and he had seen a major reduction in flies on the faces and backs of his cattle. However, the neighbors continued to experience fly bites. Which fly is likely to be the source of the neighbors' irritation?
- A. *Musca domestica* B. *Stomoxys calcitrans* C. *Musca autumnalis*
D. *Haematobia irritans* E. *Gasterophilus nasalis*
40. Which fly is a mechanical vector for pinkeye (*Moraxella bovis*) in cattle?
- A. *Musca domestica* B. *Stomoxys calcitrans* C. *Musca autumnalis*
D. *Haematobia irritans* E. *Gasterophilus nasalis*

50. What are the pathological changes caused by small strongyles (cyathostomes) in horses?
- A. blood loss anemia and hypoproteinemia
 - B. gastric gland dysfunction, abomasal mucosal cell hyperplasia, increased systemic protein catabolism
 - C. colitis caused by emergence of larvae from the mucosa of the large intestine
 - D. thromboembolism causing ischemia and infarction of the arteries flowing to the large intestine, subsequent necrosis of the bowel .
51. Heavy infections with *Haemonchus contortus* in sheep present with what set of clinical signs?
- A. pale mucous membranes, intramandibular edema, dark pasty feces
 - B. watery diarrhea, intramandibular edema, anorexia (lack of appetite)
 - C. bloody diarrhea, loss of weight, pale mucous membranes
 - D. constipation, loss of weight, jaundice
52. Large numbers of trichostrongyle infective larvae on pasture is due to what?
- A. large numbers of adult worms in grazing hosts
 - B. replication of infective stage larvae in fecal pats
 - C. adult stage worms outside of the host
53. Most trichostrongyles are host specific. An important exception is a trichostrongyle that infects the stomach of cattle, small ruminants and horses. It can cause disease in horses co-grazed with sheep that can tolerate higher levels of infection than horses. What trichostrongyle is this?
- A. *Haemonchus contortus*
 - B. *Ostertagia ostertagi*
 - C. *Trichostrongylus axei*
 - D. *Cooperia oncophora*
54. Heavy infections with *Ostertagia ostertagi* in cattle present with what set of clinical signs?
- A. pale mucous membranes, intramandibular edema, dark pasty feces
 - B. watery diarrhea, intramandibular edema, anorexia (lack of appetite)
 - C. bloody diarrhea, loss of weight, pale mucous membranes
 - D. constipation, loss of weight, jaundice
55. Arrested development by *Ostertagia* larvae in the abomasum occurs at what time for calves grazing pastures in southern states with semi-arid summer pastures?
- A. during the Spring
 - B. during the Summer
 - C. during the Fall
 - D. during the Winter
56. Treatment and control of *Haemonchus contortus* infection in small ruminants is very difficult due to what feature of this nematode?
- A. it has developed drug resistance to almost all of the current anthelmintic drugs
 - B. it is transmitted by transmammary infection
 - C. it has infective larvae that are highly resistant to cold
 - D. it has adult worm stages outside of the host that can generate infective larvae

71. Experimentally, all mammals can be infected with *Trichinella spiralis* by feeding isolated infective larvae, but under most circumstances in nature infections are not found in herbivores (plant eaters). Why is that so?
- A. herbivore digestive tracks lack the ability to activate the infective larvae
 - B. infective larvae are found in muscle tissue
 - C. eggs containing *Trichinella* infective larvae will not hatch in herbivore digestive tracks
 - D. plant polyphenols and tannins found in herbivore digestive tracks kill infective larvae of *Trichinella*.
72. Which of the following food items presents the highest risk for infection with *Trichinella* when eaten by humans?
- A. bear meat eaten after a hunt and cooked over a camp fire
 - B. frozen or well cooked pork from pigs raised in confinement with good biosecurity
 - C. beef
 - D. lamb
73. What is an important aid in diagnosing *Trichinella spiralis* infection in humans (and dogs)?
- A. presence of bipolar ova in feces
 - B. presence of bipolar ova in sputum
 - C. clinical signs of anemia
 - D. serum with antibody titers specific for *Trichinella*
74. Your client in Raleigh has a 4 year old spayed female boxer dog and has purchased a house with a sunny (no shaded areas) backyard that the previous owner fenced for his dogs. The previous owner raised two litters from a female dog that he did not have on monthly prophylaxis, and complained about having "worms" in the puppies and the female dog having bouts of bloody diarrhea. Your client would like her dog to have access to the backyard but is concerned about her dog getting infected with "worms". The house has been vacant for 3 months over the summer. What nematode presents the highest risk for establishing a patent infection with adult worms in your client's dog from being in the backyard?
- A. *Ancylostoma*
 - B. *Toxocara*
 - C. *Strongyloides*
 - D. *Trichuris*
75. *Trichuris vulpis* infections are often difficult to treat because of what two factors?
- A. reinfection from long-lived ova in the environment, and a long prepatent time with larvae in the host that are not easily killed
 - B. female worms produce large numbers of ova continuously, and a long prepatent time with larvae in the host that are not easily killed
 - C. reinfection from long-lived ova in the environment, and a very rapid development with 2 - 3 days of infective larvae in ova
 - D. adult stage *Trichuris* has developed resistance to most current anthelmintic drugs, and infective larvae in the soil can infect by skin penetration

76. In dogs adult *Capillaria* infect sites other than the intestine that present with signs characteristic for inflammation of the tissue site. Where are adult *Capillaria (Eucoleus) bohmi* found in the dog?
- A. arterial blood vessels of the lung
B. nasal mucosa
C. subcutaneous tissue
D. liver
77. Knowing that a parasitic nematode belongs to the order Spirurida informs you that the nematode life cycle requires an arthropod intermediate host. This information is important in how you proceed to prevent further infection. Which one of the following is NOT in the order Spirurida?
- A. *Physaloptera*
B. *Habronema*
C. *Trichuris*
D. *Dracunculus*
78. *Habronema* infective larvae when deposited on the surface of an open wound or near lips or eyes of a horse by feeding flies, such as *Musca*, can remain at the site and cause an eosinophil infiltrated granulomatous reaction or continue migration to establish adult worms. Where are adult *Habronema* nematodes found in the horse?
- A. mucosal surface of the stomach
B. subcutaneous nodules
C. tracheal lumen
D. small intestine
79. Which adult parasitic nematode infection of dogs and cats is readily diagnosed by endoscopic exam of the stomach?
- A. *Toxocara*
B. *Ancylostoma*
C. *Trichuris*
D. *Physaloptera*
80. What is the risk of establishing an adult worm infection of *Dirofilaria immitis* by transfusing blood from a microfilaremic dog to a non-infected dog?
- A. no risk
B. moderate risk, depending on age of recipient
C. high risk
81. Most cats diagnosed with heartworm infection are treated by which one of the following approaches?
- A. immiticide adulticide drug treatment using the same protocol as dogs
B. immiticide adulticide drug treatment as two single injections spaced one month apart
C. treat with corticosteroid in reducing doses during episodes of clinical signs, do not give immiticide, there is no safe immediate-kill drug treatment for heartworm in cats
D. do not treat with any drug, stop monthly prophylaxis treatments.

82. For all dogs having the possibility of patent infection with *Dirofilaria* the Heartworm Guidelines state that "all dogs should be tested for microfilariae". Which one below is NOT a valid reason to do microfilaria tests?
- A. microfilaremia validates antigenemia serological results
 - B. microfilaremia identifies the patient as a reservoir infection
 - C. microfilaremia alerts you to a high microfilaria burden that may precipitate a severe reaction following administration of a microfilaricidal preventative
 - D. the number of microfilariae is highly correlated with lung pathology
83. The pathology and clinical signs associated with *Dirofilaria immitis* in dogs is associated most often with which organ?
- A. heart
 - B. liver
 - C. lungs
 - D. kidneys
84. The pathology and clinical signs associated with *Dirofilaria immitis* in cats is associated most often with which organ?
- A. heart
 - B. liver
 - C. lungs
 - D. kidneys
85. Why is there no *Dirofilaria immitis* transmission among canids, domestic or wild, in central and northern Alaska even though there are many mosquitoes?
- A. only one or two species of mosquitoes will transmit *Dirofilaria immitis* and they do not exist in Alaska
 - B. *Dirofilaria immitis* larval development in the mosquito requires sustained warm temperatures to complete development before the mosquito dies
 - C. Alaskan mosquitoes do not feed on dogs
 - D. the thick hair coat of dogs in Alaska prevent mosquito bites

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Platyhelminthes (30 points)

Multiple Choice

86. Which one of the following groups do ALL the flatworms (flukes and/or tapeworms) listed result in economic loss to a cattle farmer because of condemnation of cattle meat and/or liver?
- A. *Echinococcus granulosus*, *Moniezia sp.*, *Taenia pisiformis*
 - B. *Fasciola hepatica*, *Taenia saginata*, *Fascioloides magna*
 - C. *Moniezia sp.*, *Dipylidium caninum*, *Fascioloides magna*
 - D. *Taenia solium*, *Taenia taeniaformis*, *Taenia pisiformis*
 - E. *Dicrocoelium dendriticum*, *Taenia pisiformis*, *Spirometra sp.*

87. Which one of the following is a good general statement about the life cycle of digenetic trematodes?
- A. A snail intermediate host is required.
 - B. The infective (metacercarial) stage always encysts on aquatic vegetation.
 - C. The miracidial stage is always aquatic: hatching from the ova and swimming to its next host.
 - D. The second intermediate host is always a vertebrate.
 - E. The adult fluke is always found in the small intestine of the definitive host.
88. Control measures for *Fasciola hepatica* may include:
- A. Elimination of ants and terrestrial snails
 - B. Elimination of aquatic snails and wet areas in the pasture
 - C. Prevent human defecation in pastures & human ingestion of raw meat
 - D. Prevent access of canids into the pasture and prevent canid access to offal
89. This lung fluke often causes respiratory signs like cough, but in rare cases it can cause acute pneumothorax and death.
- A. *Heterobilharzia americana*
 - B. *Nanophyetus salmincola*
 - C. *Dicrocoelium dendriticum*
 - D. *Paragonimus kellicotti*
 - E. *Platynosomum fastosum*
90. The pancreatic fluke of cats, _____, can cause a severe disease called "Lizard Poisoning".
- A. *Paragonimus kellicotti*
 - B. *Platynosomum fastosum*
 - C. *Spirometra* sp.
 - D. *Nanophyetus salmincola*
 - E. *Heterobilharzia americana*
91. Dogs may be infected with the blood fluke, *Heterobilharzia americana*. What is the 2nd intermediate host of *Heterobilharzia americana*?
- A. Crayfish
 - B. Aquatic Vegetation
 - C. Salmon
 - D. Ants
 - E. This fluke does not use a 2nd intermediate host
92. Dogs and Cats become infected with the lung fluke, *Paragonimus kellicotti*, when they ingest a _____, that contains metacercarial larval stages.
- A. Crayfish
 - B. Bird
 - C. Fish
 - D. Rodent
 - E. Rabbit
93. Which one of the following is a good general statement about the life cycle of cestodes?
- A. A snail intermediate host is required.
 - B. The intermediate host is always a vertebrate.
 - C. There is always an aquatic larval stage, such as the coracidium.
 - D. Cestodes always require 3 hosts to complete their life cycles.
 - E. The infective larval stage has to be ingested: either via the predator / prey interaction or due to accidental ingestion of the intermediate host.

94. Which one of the following groups do ALL the tapeworms listed can have larval stages in humans that can cause important human diseases?
- A. *Taenia pisiformis*, *Taenia solium*, *Taenia saginata*
 - B. *Dipylidium caninum*, *Echinococcus granulosus*, *Spirometra sp.*
 - C. *Taenia solium*, *Dipylidium caninum*, *Taenia saginata*
 - D. *Dipylidium caninum*, *Taenia taeniaeformis*, *Taenia pisiformis*
 - E. *Taenia solium*, *Echinococcus granulosus*, *Spirometra sp.*
95. The main pathology caused by adult *Taenia pisiformis* & *Dipylidium caninum* is
- A. Brain damage
 - B. Liver Necrosis
 - C. Segments in feces, client worry, aesthetics
 - D. Lung inflammation
96. Humans become infected with the adult tapeworm of *Taenia saginata* by:
- A. Ingesting tapeworm eggs from human feces
 - B. Ingesting raw beef
 - C. Ingesting tapeworm eggs from dog feces
 - D. Ingesting raw frog legs
 - E. Ingesting tapeworm eggs from cattle feces
97. Humans get infected with the hydatid cyst of *Echinococcus granulosus* when they ingest: --
- A. a flea that contains the larval tapeworm.
 - B. the tapeworm egg from dog feces.
 - C. the tapeworm cysticercus from raw beef.
 - D. the tapeworm egg from human feces.
 - E. the tapeworm proceroid stage in a freshwater copepod.
98. How does a horse become infected with the tapeworm *Anoplocephala perfoliata*?
While ingesting grass (grazing), a horse inadvertently ingests a _____, which is infected with a cysticercoid larval stage.
- A. flea
 - B. caddis fly
 - C. rodent
 - D. pasture mite
 - E. copepod
99. Which tapeworm requires complete elimination, as this tapeworm has the ability to asexually reproduce in the host. This allows the tapeworm to repopulate the host without reinfection?
- A. *Mesocestoides corti*
 - B. *Spirometra sp.*
 - C. *Moniezia expansa*
 - D. *Platynosomum fastosum*
 - E. *Dipylidium caninum*
100. Which one of the following canine tapeworms does NOT shed its proglottids in the host's feces? The lack of segments in the feces requires the veterinarian to utilize fecal sedimentation to diagnose this tapeworm infection.
- A. *Taenia pisiformis*
 - B. *Spirometra sp.*
 - C. *Mesocestoides corti*
 - D. *Dipylidium caninum*
 - E. *Taenia taeniaeformis*