Name: 1) __________________________________________
2) __________________________________________

Science Olympiad

Eastside Invitational- Division C

January 28th, 2017

Part I: ________/10  Part II: ________/15
Part III: ________/30  Part IV: ________/10  Part V: ________/15

Raw Score: ________/80  Points: ____________
Rank: ____________

* Highest number of points will determine the winner. Selected questions may be used as tiebreakers. Tiebreaker questions will be used only to break tie between teams.
Part I:

Complete the following sentences with the most logical vocabulary word:(Total 10 Pts)

1) With regard to mode of disease transmission, respiratory pathogens are generally spread by ______ airborne/air ______, and intestinal pathogens are generally spread by contaminated ___Food /water_____ and contaminated ____food/water____.
   (Last two either order) (2 Points)

2) A cluster of cases in a specific population occurring in a brief period of time is called a(n) ______ Outbreak_____. (1 Point)

3) Diseases that primarily exist in animals, but may be transmitted to humans are called ___________ zoonoses/zoonotic_____. (1 Point)

4) The study of the occurrence, distribution, and determinants of health and disease in a population is the field of ______ epidemiology ______. (1 Point)

5) Cluster_____ an aggregation of cases over a particular period closely grouped in time and space, regardless of whether the number is more than the expected number. (1 Point)

6) Prospective __________________ studies starts at present exposure and moves forward in time to outcome and retrospective________________ studies starts at exposure in past and moves forward to outcome. (2 Points)

7) Infectivity_______________ is a capacity to cause infection in a susceptible host and Pathogenicity______________ is a capacity to cause disease in a host (2 Points)
### Part II:

**Match the column A with column B. Q. 8-22:**

Each question 1 point
(15 Points)

<table>
<thead>
<tr>
<th>Column A</th>
<th>Answer</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>8) The period of time between exposure to an agent and the onset of disease signs and symptoms is called the ______</td>
<td>H</td>
<td>A. Endemic</td>
</tr>
<tr>
<td>9) When an individual's immune system comes into contact with an appropriate antigenic stimulus during the course of daily activities, this is called : ______</td>
<td>M</td>
<td>B. Epidemic</td>
</tr>
<tr>
<td>10) Disease ______ is measured by the total number of new reported disease cases within a population over a period of time.</td>
<td>I</td>
<td>C. Artificially acquired passive immunity.</td>
</tr>
<tr>
<td>11) A vaccination is a good example of ____</td>
<td>K</td>
<td>D. Nosocomial</td>
</tr>
<tr>
<td>12) The transfer of antibodies in breast milk is a good example of ____</td>
<td>J</td>
<td>E. Morbidity Rate</td>
</tr>
<tr>
<td>13) Botulinum antitoxin produced in a horse and given to a human suffering from botulism food poisoning is an example of :_____</td>
<td>C</td>
<td>F. Reservoir</td>
</tr>
<tr>
<td>14) An epidemic that spreads worldwide is called:__</td>
<td>O</td>
<td>G. Fomite</td>
</tr>
<tr>
<td>15) A dramatic increase in the incidence of a specific disease in a given population is referred to as a(n) ______</td>
<td>B</td>
<td>H. Incubation Period</td>
</tr>
<tr>
<td>16) Develops during a hospital stay ____</td>
<td>D</td>
<td>I. Incidence</td>
</tr>
<tr>
<td>17) A nonliving source of infectious agents that infects large populations of people is called:</td>
<td>N</td>
<td>J. Naturally acquired passive immunity.</td>
</tr>
<tr>
<td>18) The number of cases of a specific disease per one hundred people exposed is called:</td>
<td>E</td>
<td>K. Artificially acquired active immunity.</td>
</tr>
<tr>
<td>19) Diseases constantly present in a population are called :</td>
<td>A</td>
<td>L. Mortality Rate</td>
</tr>
</tbody>
</table>
20) Site where the pathogen normally resides

21) An inanimate object that may be contaminated with a pathogen is called

22) The fraction of a population who die from a specific disease is called

Part III:

Short answers: Please write legibly (Total 30 Points)

23) What are five methods are used reducing the risk or food-borne illnesses? (5 Points)

1) Cook -to proper temperatures

2) Separate- Don't cross contaminate one food with another

3) Chill – refrigerate leftovers promptly

4) Clean – wash produce; wash hands and surfaces often

5) Report -suspected food borne illnesses to the local health department

24) List the 3 classifications of Epi-Curves (3 Points)

1) Point source

2) Continuous common source

3) Propagated (progressive source)

25) a) What is the difference between food poisoning and food infection? (2 Points)

Answer: Food poisoning, also called food intoxication, results from the ingestion of foods containing preformed microbial toxins. Food-borne infections result from ingestion of pathogen-contaminated food.
b) Are antibiotics useful in either of them?  

Answer: Antibiotics are not normally used to treat food poisoning, because the toxin is causing the disease. Food infections can be treated with antibiotics to kill the pathogen(s) more quickly but are not always used if the immune system is expected to be strong enough to rid the body of the infection on its own.

26) Explain how the incubation period can influence the spread of an infectious agent. (1 Point)

*Depending on the microbe and the illness*, an asymptomatic carrier in the incubation period might be shedding infectious microbes to his/her surroundings. In such a case, a longer incubation period would lead to a greater spread of the disease as the carrier comes into contact with more individuals while he/she is generally appearing to be healthy.

27) List the three components of an epidemiologic triad. (3 Points)

1) External agent
2) Susceptible host
3) Environment (host + agent)

28) Which five different groups of people are at risk of foodborne illness? (5 Points)

1) Pregnant women
2) Younger children
3) Older adults
4) People with Immune Systems Weakened by Disease
5) People on immunosuppressesant drugs after transplants
29) These are 10 steps in an outbreak investigation. Arrange all steps numerically.

Each correct order of step = 1 point (10 Points)

- Develop hypothesis: 6
- Prepare for field work: 1
- Communicate findings: 10
- Implement control and prevention measures: 9
- Define and identify cases: 4
- Verify the diagnosis: 3
- Establish the existence of an outbreak: 2
- Evaluate hypothesis with analytical studies: 7
- Refine hypothesis; conduct additional studies: 8
- Describe the data by person, place, and time: 5
Part IV:

Write only one appropriate choice of alphabet from given multiple choice Q. 30-39
Each 1 point (Total 10 Points)

30) Which of the following is an example of herd immunity?
   A) Brucellosis is no longer found in farm animals in the United States.
   B) If 70% of the population is immunized against polio, the disease will be essentially absent from the population.
   C) Federal law requires that all cattle not immune to anthrax be destroyed.
   D) All farm animals used for food must be immunized against all the common agents of disease that infect humans.

31) Which body site is preferentially infected by nosocomial pathogens?
   A) gastrointestinal tract
   B) respiratory tract
   C) cerebrospinal fluid
   D) liver

32) Which of the following types of pathogens is responsible for most cases of "traveler's diarrhea"?
   A) Viruses
   B) Worms
   C) Protozoans
   D) Bacteria

33) ________ causes watery (occasionally bloody) diarrhea, abdominal cramps, nausea, vomiting, fever and can be fatal to persons with liver disease or weakened immune systems due to consuming undercooked or raw seafood, such as shellfish.
   A) Vibrio vulnificus
   B) Listeria monocytogenes
   C) Hepatitis A
   D) Noroviruses
34) Unpasteurized milk, soft cheeses made with unpasteurized milk, ready-to-eat deli meats causes______

A) Shigellosis  
B) Cyclosporiasis  
C) Listeriosis  
D) Campylobacteriosis

35) Disease cases that exhibit new syndromes or characteristics, or are linked to new pathogens, are surveyed through regional laboratories and are called ________.

A) Index cases  
B) Cluster  
C) Control  
D) Determinant

36) Severe (often bloody) diarrhea, abdominal pain, vomiting, usually, little or no fever are the classic symptoms of infection which can lead to kidney failure and more common in children 4 years or younger. Infection is due to consumption of undercooked beef (especially hamburger), unpasteurized milk and juice, raw fruits and vegetables (e.g. sprouts), and contaminated water______

A) Bacillus cereus  
B) Salmonella typhimuirium  
C) Escherichia coli infection  
D) E. coli O157:H7

37) Which of the following can be stored for the longest time without suffering spoilage?

A) Perishable food  
B) Semi perishable food  
C) Nonperishable food  
D) All of the above
38) The most common source of individual foodborne botulism outbreaks are due to consumption of ________
   A) honey.
   B) dairy products.
   C) non-acid, home-canned vegetables.
   D) egg and meat salads.

39) Which of the following foods is likely to be a source of Salmonella?
   A) Canned applesauce
   B) Honey
   C) Dry milk powder
   D) Raw chicken

Part V

Examine the following 2 outbreak cases in community and answer the questions.

40) Outbreak Case 1: Each 1 Point
    (7 Points)

Cyclosporiasis is an infection with the protozoan *Cyclospora cayetanensis*, a pathogen transmitted by feces or feces-contaminated fresh produce and water. Within 10 days after attending a June wedding, an outbreak of Cyclosporiasis occurred among attendees. Of the 83 guests and wedding party members, 79 were interviewed; 54 of the 79 met the case definition. The following two-by-two table shows consumption of strawberry pie and illness status.

<table>
<thead>
<tr>
<th></th>
<th>Disease Yes</th>
<th>Disease No</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed – ate pie</td>
<td>(a) 50</td>
<td>(b) 3</td>
<td>53</td>
</tr>
<tr>
<td>Unexposed - did not eat pie</td>
<td>(c) 4</td>
<td>(d) 52</td>
<td>26</td>
</tr>
<tr>
<td>Totals</td>
<td>54</td>
<td>25</td>
<td>79</td>
</tr>
</tbody>
</table>

1. Which group is the experimental group for this outbreak?
   
   Those that ate the strawberry pie – exposed group

2. What is the control group for this outbreak?
   
   Those that did not eat the strawberry pie– unexposed group

3. Determine the Attack Rate for the Exposed Group who ate the strawberry pie.
   
   Attack Rate for the Exposed Group = \( \frac{a}{a+b} = \frac{50}{53} = 94\% \)

4. Determine the Attack Rate for the unexposed group who did not eat the strawberry pie
   
   Attack Rate for the Unexposed Group = \( \frac{c}{c+d} = \frac{4}{26} = 15\% \)

5. Determine the Relative Risk for this outbreak.
   
   Relative Risk = \( \frac{a ÷ (a+b)}{c ÷ (c+d)} = 6 \)

6. Interpretation of Results: - Explain what the Relative Risk means?
   
   A person who ate the strawberry pie was 6 times more likely to develop Cyclosporiasis than one that did not eat the strawberry pie.

7. What caused the contamination of the pie at the dessert table?
   
   Contamination of the imported strawberry in the pie’s filling

41) Outbreak Case 2: Each 1 Point (8 Points)

Please show all work for calculations Round all solutions to two decimal places.

An outbreak of severe stomach illness occurred following a graduation party. Disease detectives took up the challenge to investigate the problem and obtained the following data of association of specific food eaten at the party and having the illness.
<table>
<thead>
<tr>
<th>Food</th>
<th>Cases</th>
<th></th>
<th>Controls</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ate</td>
<td>Did Not Eat</td>
<td>Total</td>
<td>%Ate</td>
</tr>
<tr>
<td>Baked Ham</td>
<td>29</td>
<td>17</td>
<td>46</td>
<td>63.04</td>
</tr>
<tr>
<td>Spinach</td>
<td>26</td>
<td>20</td>
<td>46</td>
<td>56.52</td>
</tr>
<tr>
<td>Mashed potatoes</td>
<td>23</td>
<td>23</td>
<td>46</td>
<td>50.00</td>
</tr>
<tr>
<td>Jello</td>
<td>16</td>
<td>30</td>
<td>46</td>
<td>34.78</td>
</tr>
<tr>
<td>Rolls</td>
<td>21</td>
<td>25</td>
<td>46</td>
<td>45.65</td>
</tr>
<tr>
<td>Cake</td>
<td>27</td>
<td>19</td>
<td>46</td>
<td>58.70</td>
</tr>
<tr>
<td>Ice cream</td>
<td>43</td>
<td>3</td>
<td>46</td>
<td>93.48</td>
</tr>
<tr>
<td>Milk</td>
<td>2</td>
<td>44</td>
<td>46</td>
<td>4.35</td>
</tr>
<tr>
<td>Water</td>
<td>13</td>
<td>33</td>
<td>46</td>
<td>28.26</td>
</tr>
</tbody>
</table>

1) Which food had the highest risk associated with it? **Ice cream**

2) Write out the arithmetic expression using the numbers in the chart for calculating the relative risk of eating the food with the highest risk.

\[
\frac{43/(43+11)}{3/(3+18)}
\]

3) Simplify the expression in Q.2 (case 2) and write the result. **5.6 (5.57)**

4) Write out the arithmetic expression (with numbers from the chart) for calculating the percentage of those who ate food at the party who developed illness?

\[
\frac{46*100}{(46+29)}
\]

5) Simplify the expression in Q. 4 (case 2) and write the result. **61**

6) Write the arithmetic expression (with numbers from the chart) for the odds ratio for those who ate Ice cream

\[
\frac{43/3}{11/18} \text{ or } \frac{43*18}{3*11}
\]

7) Simplify the expression Q. 6 (case 2)and write the result. **23**

8) How many students ate at the party? **75**
Tie Breaker:

(Write complete name of the organism, spelling will be used as a final tie breaker)

1) The most prevalent reported cause of food poisoning in the United States is ____
   A) *Bacillus cereus*.
   B) *Clostridium perfringens*.
   C) *Clostridium botulinum*.
   D) *Salmonella typhimurium*.

2) Uncooked pork is most associated with what foodborne pathogen or disease?
   Trichinosis

3) What is Fischers exact test? Give answer in one sentence
   A statistical test used to determine if there are non-random associations between two categorical variables

4) ____*Staphylococcus aureus_______ causes sudden onset of severe nausea and vomiting, abdominal cramps, diarrhea, and may be fever due to mainly consumption of unrefrigerated or improperly refrigerated meats, egg and potato salads.

5) What is the name of the national network of public health and food regulatory agency laboratories coordinated by the Centers for Disease Control and Prevention (CDC). The network consists of: state health departments, local health departments, and federal agencies (CDC, USDA/FSIS, FDA)? PULSENET