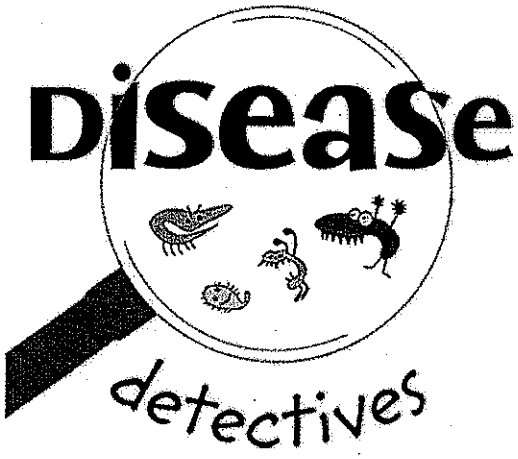
School Name: _____ Team #: _____

Name(s): _____ _____

Science Olympiad

TEST: Disease Detectives



DO NOT OPEN TEST PACKET UNTIL INSTRUCTED TO DO SO!!!

Welcome to Disease Detectives! Before you get started, here are a couple of reminders:

1. Teams are only permitted ONE 8.5" x 11" page of notes (2 sided), and a non-graphing calculator- no other resources.
2. You may separate the test, but make sure to reattach the test before turning it in.
3. Tiebreakers will be selected questions within the test.
4. You will have 50 minutes to complete the test. You may turn your test in early.
5. Use your time wisely, try not to spend all of your time on just one part.
6. Good Luck!

SCIENCE OLYMPIAD™

Exploring the World of Science

Score: _____

Place: _____

Part I: Case Studies

Case #1
"Dozens Sickened by Apparent Food Poisoning"
Outbreak Summary

On June 6th, 2016, at least 70 people attending a national conference at the Dallas Convention Center in Dallas, Texas became ill with what appeared to be food poisoning. Three hospitals in the area treated and released 48 attendees who complained of nausea, diarrhea, vomiting and fever; others with similar symptoms were hospitalized overnight. A health official noted that all of the patients had eaten brunch or lunch at the same hotel.

The hotel's lunch menu included roast chicken, roast beef, and a vegetable pasta dish. Because some of the people who became ill were vegetarian, there was particular interest in determining whether the pasta dish might be contaminated. At the time of the report, health officials were still looking for the source of the outbreak. The hotel was cooperating in the investigation and had voluntarily halted food service for the time being.

Questions

1. Explain why you might consider this problem important enough to investigate. Give at least three reasons for investigating. (8pts)

2. Briefly describe the initial steps that you would take in investigating this problem. Indicate the type of data needed to accomplish each step and give examples of sources of such data in a community. (12pts)

3. Develop and specify probable hypotheses to explain the cause, source, and spread of the outbreak. (2pts each)

4. Establish a case definition based on the information provided above. (4pts)

5. Develop suitable recommendations and interventions for controlling the problem. (2pts each)

Case #2

"Picnic in the Park"

A group of people developed a variety of intestinal problems a day after attending a picnic. The variety of foods they ate appear below.

Sickness among people eating various foods

Food Consumed	Number eating this food	Number developing symptoms
Green salad and sliced Chicken	100	73
Noodles and black beans	80	21
Noodles and egg salad	50	24
Egg salad and sliced chicken	40	0

6. What food is the most likely source of the problems? (2pts.)

7. Which food, noodles and beans or noodles and egg salad had the greatest percentage of people getting sick? (1pt.)

8. Which percentage was the highest? (1pt.)

9. Describe three ways that the suspected food may have become contaminated. (6pts.)

10. What term is used to describe a sudden increase in a disease? (1pt.)

Case #3

"4th of July Barbeque"

The information in the table below was acquired from information gathered from individuals who attended a BBQ in July of 2016. Use the information in the table to answer the questions below.

Ill	Ate watermelon	Did not eat watermelon	Total
Yes	72	115	187
No	5	122	127
Total	77	237	314

11. Calculate the odds ratio for the information above. (2 pts.)

Case Study #4
"My Big Fat Sick Wedding"

Use the information provided in the table gathered from guests at a wedding banquet to answer the questions below.

	Number of persons who ate food			Number of persons who did not eat foods		
Foods	**Ill**	**Not Ill**	**Total**	**Ill**	**Not Ill**	**Total**
Turkey	97	36	133	2	23	25
Dressing	88	33	121	11	26	37
Peas	77	28	105	22	31	53
Pumpkin Pie	22	14	36	77	45	122

Use the table to report

12. Calculate the attack rate for each of the foods above. (2pts each food)

13. Calculate the odds ratio for each of the foods above. (2pts each food)

14. Calculate the relative risk for each food above. (2pts each food)

15. Based on the information you calculated name the food that was most likely associated with this outbreak. (4pts.)

16. List the foods that would be categorized as "positive" for relative risk. (2 pts each)

Part II: Matching/ Chronological Problem

Match the disease with mode of transmission. (1 pt. each)

17. Hepatitis A
18. Hepatitis B
19. HIV
20. E. coli O157:H7
21. West Nile Virus
22. Lyme Disease
23. Kawasaki Disease
24. Campylobacter
25. Rocky Mountain Spotted Fever
26. Malaria
27. Rotavirus
28. Ringworm
29. Japanese Encephalitis
30. Botulism
31. Ebola

A. Tick-borne
B. Blood/sexual
C. Food-borne/fecal-oral
D. Mosquito-borne
E. Unknown/ Not given

32. The following is a list of steps that are completed for on outbreak investigation. Number the statements so that they are in the correct order. 1 point per statement (12 points total)
    A. _____Determine if legal action is required
    B. _____Notify local public health department
    C. _____Result comparison
    D. _____Determine whether an outbreak has occurred
    E. _____Meta-analysis of samples and ingredients from manufacturer with original outbreak sample
    F. _____List of ingredients and food products
    G. _____Formulate hypothesis to establish the cause of the outbreak
    H. _____Collection and analysis of human and food samples
    I. _____Develop a case definition
    J. _____Determine the scope of the outbreak and call in other governmental agencies as required
    K. _____Verify human (clinical) diagnosis
    L. _____Obtain product samples from manufacturer

33. On your answer sheet put an 'X' next to each organism in which the characteristic applies. You will receive 2pts. for each correct 'X' and -2pts. for each incorrect 'X'.

	Characteristic of Organism					
Organism	**Has a cell wall**	**Can act as a vector**	**Can infect and cause harm to at least two of the other organisms listed.**	**Vaccines are available for certain diseases caused by this organism.**	**A source of food or food production for humans.**	**Cells are eukaryotic.**
Virus						
Bacteria						
Protist						
Fungi						
Animal						

Use Answer Sheet

Match the disease or disease causing organism with the appropriate disease causing agent. (1 pt. each)

34. Typhoid Fever
35. Trichinella
36. *Giardia lamblia*
37. *Coxiella burnetii*
38. Bovine Spongiform Encephalopathy
39. *Clostridium botulinum*
40. Chronic Wasting Disease
41. Gyromitrin
42. *Listeria monocytogenes*
43. Hepatitis E

a. Virus
b. Bacteria
c. Fungi
d. Prion
e. Protist
f. Worm