School name _____

Team Number_____

Participant Names_____

UT Spring 2017 Science Olympiad Regional tournament Saturday March 25th

Disease Detectives

Division B

1. The founder of modern nursing is_____ and he/she is famous for _____
A. John Snow; mapping of London Cholera outbreak
B. Ignaz Semmelweis; work to improve sanitation in the Crimean war
C. Marie Curie, making doctors wash their hands before surgical procedures
D. Florence Nightingale, improving sanitation in military infirmary wards

		Diseased	Not Diseased	Total
Screening Test Results	+	29	3	32
	-	4	22	26

What is the specificity of the test?
A.) 0.88
B.) 0.85
C.) 0.09
D.) 0.18

How many false negatives are in the table above?
A.) 3
B.) 4
C.) 22
D.)29
E.) 26

A study starts with 5,000 people. Of these, 125 have the disease in question. What is the prevalence of disease per 1000 people?
A.) 250
B.)2.5
C.)25
D.) 2.5%
E.) .25%

5. This foodborne pathogen normally lives in the intestines of people and animals. It is usually harmless and actually is an important part of a healthy human intestinal tract. However, this foodborne pathogen can cause illness, either diarrhea or illness outside of the intestinal tract. It can be transmitted through contaminated water or food, or through contact with animals or persons.

What is the identity of this pathogen and is it classified as viral, fungal, bacterial, or other?

_____;_____

6. What is one reasonable way of preventing the outbreak of such an illness, from a non-individual standpoint?

A. Outlaw common food sources carrying this pathogen
B. Cleaning and properly cooking food before it is eaten.
C. Treating livestock with a variety of antibiotics
D. Imposing sanitation and health regulations for agricultural companies

7. In Travis County, 2500 live births occurred in 2016. There were 150 stillbirths that occurred in Travis County in 2016. Before the age of one, 67 infants died in Travis County during 2016. The population of Travis County was 2 million in 2016. What is the infant mortality rate for Travis County in 2016? Per 1000 births

A.) 26.8
B.) 29.7
C.) 25
D.) 67

8. Fred the public health official is pleased to see that _____'s are increasing in his county

   a. DALY
   b. Maternal mortality
   c. HALE
   d. morbidity

9. What makes ground beef dangerous when undercooked?
A.) ground beef can be made from multiple cows
B.) ground beef is not stored in a sealed container
C.) ground beef is ground in unsanitary conditions
D.) ground beef is easily exposed to E.coli

10.) Sally went to the doctor to get a mammogram, and does not present symptoms for breast cancer. This is an example of:

A.) Primary Prevention
B.) Secondary Prevention
C.) Tertiary Prevention
D.) None of the above
E.) Primary and Secondary Prevention

11.) A mosquito that transmits a disease is an example of:
A.) Vehicle-borne transmission
B.) Airborne transmission
C.) Vector-borne transmission
D.) Direct transmission

12.) An infection or infectious disease that may be transmitted from vertebrate animals (such as a rodent) to humans is an example of:

A.) Airborne transmission
B.) Direct transmission
C.) Zoonotic disease
D.) None of the above

13.) Which of the following is an effective control measure used to control and prevent foodborne infections?

A.) Animal Health
B.) Pasteurization
C.) Food process regulations
D.) Handwashing
E.) All of the above are correct

14.) True or False: A virus does not require a living host to grow.

A.) True
B.) False

15.) Why is Norovirus particularly difficult to control?
A.) It is stable in the environment
B.) It is unstable in the environment
C.) It has no cure
D.) It has low infectivity

16.) What factor(s) affect the ease with which a communicable disease is transmitted? Circle all that apply.
A.) route of transmission
B.) asymptomatic transmission
C.) reproductive ratio
D.) virulence
E.) specificity

17.) What study design helps establish that a cause is associated with an effect at an individual level?

A.) population/ecological studies
B.) Case control studies

C.) cohort studies
D.) randomized controlled trials

18.) What foods are major sources for salmonella poisoning? Circle all that apply
A.) poultry
B.) unpasteurized milk
C.) old bread, and wheats
D.) nuts

19.) A disease is considered communicable when it
A.) has an infectious agent
B.) can be spread from person to person
C.) is caused by a non-infectious agent
D.) has long term health effects

20.) List three ways in which someone might help protect themselves from salmonella poisining?

Section II

Hepatitis A is a contagious liver disease that results from infection with the hepatitis A virus. It can range in severity from a mild illness lasting a few weeks to a severe illness lasting several months. Although rare, people have died from infection with hepatitis A. Symptoms appear between 15 and 50 days after infection and can include yellow eyes or skin, abdominal pain, or pale stools.

21. Please provide a case definition of hepatitis A infection. (2pts)

22 .Syndromic surveillance would identify a possible hepatitis A outbreak when what occurs?(2pts)

23. What characteristic of hepatitis A might complicate the identification of a source of infection during a hepatitis outbreak?(1 pt)

(FDA) have completed investigation of a multistate outbreak of foodborne hepatitis A. Epidemiologic and traceback evidence indicate frozen strawberries imported from Egypt were the likely source of this outbreak. In interviews, nearly all ill people interviewed reported drinking smoothies containing strawberries at Tropical Smoothie Café locations prior to August 8 in a limited geographical area, including Maryland, North Carolina, Virginia, and West Virginia, but there have been a small number of cases outside of that geographic area with no Tropical Smoothie Café exposure. 143 people with hepatitis A have been reported from nine states: Arkansas (1), California (1), Maryland (12), New York (5), North Carolina (4), Oregon (1), Virginia (109), West Virginia (7), and Wisconsin (3).129 of these cases reported eating a smoothie from Tropical Smoothie Café. There have been no cases reporting illness from this same exposure since September 23, 2016.
14 cases had no direct exposure to Tropical smoothie café. The latest illness onset date among these cases was October 25, 2016.56 ill people were hospitalized. No deaths were reported.

24. Describe the three main characteristics of the situation above that helps qualify it as an outbreak. If it does not qualify as an outbreak please list the missing criteria. (3pts)

25. What is the incidence and prevalence of Hepatitis A in each state as a result of the outbreak per 1000 people?(5 pts)

State	Population	Incidence	Prevalence
California	38,332,521		
Mayland	5,928,814		
New York	19,651,127		
Virginia	8,260,405		
North Carolina	9,848,060		
Oregon	3,930,065		
Arkansas	2,959,373		
Wisonsin	5,742,713		

Shyawn Saldana is tracking a cholera outbreak in the in New Town. He is attempting to map out the areas most affected by the outbreak in hope to find an eventual source of infections. While this is going on he attempts to show the members of the New Town community how to prevent further spread of the outbreak.

26. What sources of cholera infection is Sean likely paying attention to ?(2pts)

27. What are two things that Sean could tell the good people of New Town to help prevent cholera infection?(2pts)

Shyawn has identified a pond he believes to be the source of the cholera outbreak. He assembles the following data of the new town people:

	Contracted cholera	Did not contract cholera
Used pond as primary source of water	25	450
Did not use pond as primary source of water	17	384

28. What is the prevalence of cholera in New Town. (2pts)

29. Calculate the relative risk of contracting cholera when using the pond as the main water source (2pts)

30.) Is there strong evidence that the pond is the primary source of cholera infection in the town?(1pt)

31. (25pts total) At the end of the school year, students in the AP French program travel to Arles, France to study the Roman ruins of that region. Students start in Paris for a quick tour of the capital before spending 2 weeks in the Camargue. Forty students from three US high schools were chosen. Twenty five came from the Washington DC region, five from Portland, Maine, and ten from Houston, Texas.

A picnic was sponsored by the Washington DC Sister City Program the weekend immediately after the students returned to Washington D.C. The day after the picnic, eight participants became severely ill and three were hospitalized. A day later, there were two more cases, both hospitalized.

31ai.After meeting with hospital staff the epidemiologist in charge is convinced that these cases are an unusual cluster of cases and begins to evaluate them as an outbreak. When gathering information what does she want to know from the patient, the family, and the health care setting? (6pts, 2pts each topic)

The epidemiologist rapidly realizes that the patients all attended the picnic and were participants in the trip to France. The epidemiologist calls the other participants at the picnic and the other students who went to France. After hours of data collation, the epidemiologist has the following table.

	No	Fever	Heada che	Fatigue	nausea	vomit ing	Muscle &j oint pain	Ras h	Hos p	More than three symptomes
France only	5	3	3	3	3	2	3	2	2	3
Picnic Only	45	1	6	3	1	0	4	0	0	1
Picnic and Frace	20	5	8	10	4	3	5	3	1	5
Total	70	9	17	16	8	5	12	5	3	9

31aii. The epidemiologists suspects that this might be related to something eaten at the picnic. Why? (2pts)

The epidemiologist's assistant finally finishes the following tables. No. potato salad ham hot dogs ice cream macaroni salad

	NO	Potato salad	ham	Hot dogs	Ice cream	Macaroni salad
France only	5	0	0	0	0	0
Picnic only	45	40	30	10	45	5
Picnic and France	20	10	17	0	19	10
Total		50	47	10	64	15

	Fatigue	rash
Potato salad	10	2
ham	9	2
Hot dogs	2	0
Ice cream	13	3
Macaroni salad	3	1

Using all the data provided, answer the following questions and show work for full credit.
31b. What is the headache attack rate for those traveling to France, going to picnic and both going to France and picnic? (3 pts)

31c. What is the odds ratio of fatigue given you ate potato salad? (2pts)

31d. What is the odds ratio of fatigue given you went to France? (2pts)

31e. Why does the epidemiologist shrug off the fatigue and France association? (2pts)

Jet lag would be common.

31f. TIEBREAKER The epidemiologist gets a call from the hospital. It is not a bacterial illness, but is viral. The doctor who handles the case is a retired military physician and he thinks it looks like dengue! The epidemiologist says that isn't very likely and the doctor agrees. Why?
The cases haven't reported travel to a dengue endemic area.