Disease Detectives Key

SSSS 2019

Please write your answers legibly in the spaces provided. Point values will be indicated next to the question or heading. Partial credit may be awarded, so please make sure to show all you work.
You have 50 minutes to complete this test. Good luck!

If you have any questions about this test, please contact me at harshitha.uppada@gmail.com.

Names: _____

School: _____

Team Number: _____

Part I: Multiple Choice

➢ Each question is worth 1 point.

Use the following answer choices to identify the types of surveillance for Questions 1-6. Some answer choices may be used more than once, while some may not be used at all.

a. Active Surveillance
b. Passive Surveillance
c. Sentinel Surveillance
d. Syndromic Surveillance

1. A physician diagnoses a patient with mononucleosis, and then proceeds to report the case to the local health department.

B

2. Epidemiologists receive a case report of Salmonella infecting a man who recently ate at Chipotle. Their team recruits a group of local health practitioners to monitor and report any further cases of Salmonella acquired from eating at Chipotle.

A, C

Must have both answer choices to receive the point.

3. Health professionals track cases of hematuria (blood in the urine) in order to capture possible cases of kidney failure.

D

4. A local health department decides to do their annual monitorization of the number of influenza cases during the winter season in the city of Chicago.

C

5. After diagnosing a patient with poliomyelitis, a doctor reports this patient file to local epidemiologists.

B

6. To capture cases of tuberculosis in patients with a suppressed immune system, health professionals record cases of those who were exposed to the suspected exposure and complained of spinal pain.

D

7. What type of diagram did John Snow use when he conducted his investigation of the cholera epidemic in 1854?
    a. Choropleth map
    b. Spot map
    c. Scatter plot
    d. Population pyramid

8. Which of the following major determinants has the greatest influence on health at a population level?
    a. Social/societal characteristics
    b. Genes and biology
    c. Health behaviors
    d. Medical care

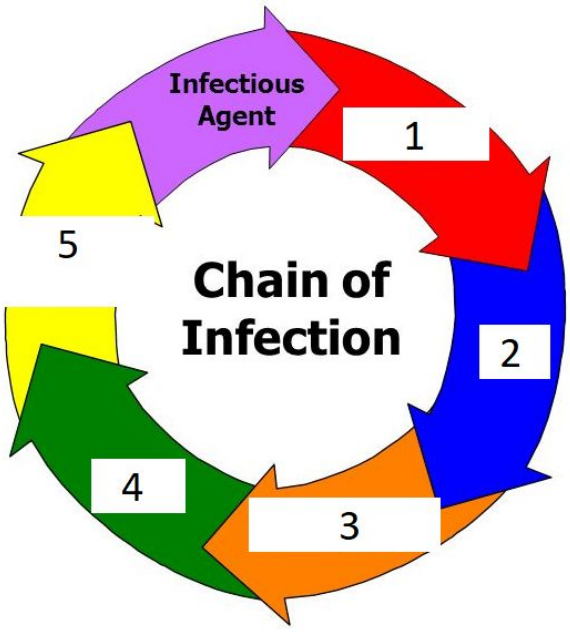
9. What types of cases may be used when validating a hypothesis?
    a. Undetermined
    b. Possible
    c. Probable
    d. Confirmed

10. Termination of all transmission of infection by extermination of infectious agents refers to which of the following steps for disease control?
    a. Control
    b. Elimination
    c. Eradication
    d. Extinction

11. Screening for type 2 diabetes is an example of what level of prevention?
    a. Primordial
    b. Primary
    c. Secondary
    d. Tertiary

12. Treatment given to exposed individuals to prevent illness prior to onset of symptoms is known as…
    a. Latent
    b. Nosocomial
    c. Incubation
    d. Prophylaxis

Use the following image to answer Questions 13-15.



13. At which point in the chain of infection would the spread of infection begin to occur?
    a. 1
    b. 2
    c. 3
    d. 4
    e. 5

14. Excretions and secretions, non- intact skin, the respiratory tract, the gastrointestinal tract, and mucous membranes are examples of which event(s) in the chain of infection? (Circle all that apply)
    a. 1
    b. 2
    c. 3
    d. 4

e. 5

15. Vectors are responsible for…
    a. 1
    b. 2
    c. 3
    d. 4
    e. 5

16. What is it called when the infectious agent begins its invasion of the host tissue?
    a. Contamination
    b. Infection
    c. Disease
    d. Virulence

17. Exposure to the infectious agent marks the beginning of what stage?
    a. Stage of susceptibility
    b. Stage of subclinical disease
    c. Stage of clinical disease
    d. Stage of disability

18. What type of carrier is able to transmit the infectious agent after the clinical signs of the disease have disappeared?
    a. Asymptomatic
    b. Incubatory
    c. Convalescent
    d. Chronic

19. Which of the following characteristics usually are not present in a line listing?
    a. Patient name
    b. Age
    c. Date of onset
    d. Marital status

20. Which of the following conditions is NOT required to establish a cause-and-effect relationship?
    a. The symptoms present must be recurrent in majority of cases
    b. The association should be compatible with existing theory and knowledge
    c. Multiple hypotheses must be considered before making conclusions about association

d. An increasing amount of exposure increases the risk of contracting the illness

Use the following answer choices to match the diseases with their respective modes of transmission for Questions 21-30.

a. Airborne transmission
b. Water-borne transmission
c. Food-borne transmission
d. Vector transmission

21. Tuberculosis
A

22. Shigellosis
B, C

23. SARS
A

24. Chagas disease
D

25. Giardiasis
B

26. Hepatitis
C

27. Lyme disease
D

28. Varicella
A

29. Typhoid fever
B

30. Influenza
A

Part II: Free Response

- ➢ The point value for each question will be indicated next to it.
- ➢ The answers don't have to be exactly the same, the point is earned as long as the message is conveyed in any sense

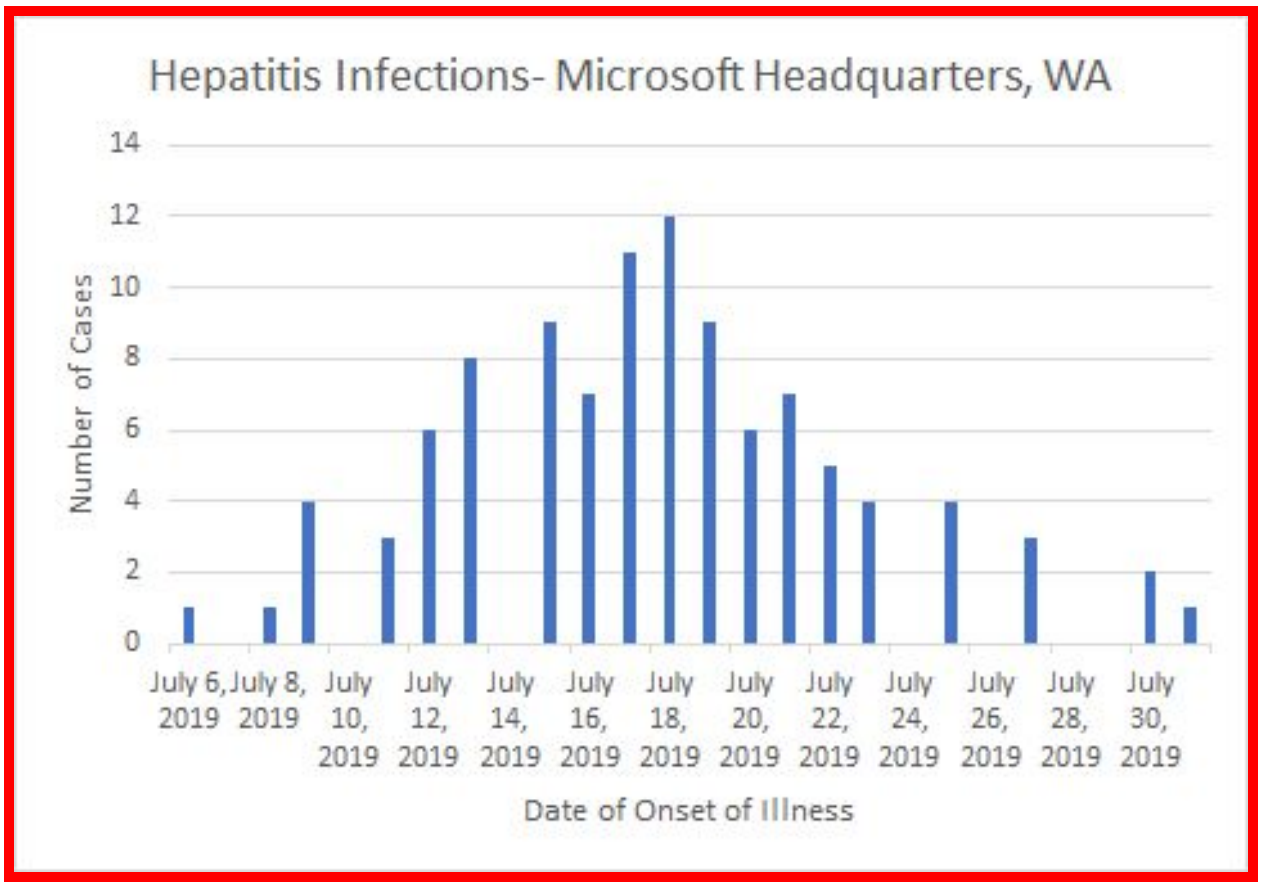
Read the following case study to answer the following questions.

"During the summer of 2019, a weeklong convention was held where 120 Microsoft employees attended. Soon after the gathering, the CDC local health department began receiving reports of Hepatitis cases."

31. Here is the data for the number of cases received. Using the following chart, create an epidemiology curve on the provided grid lines. (4 pts)

July 6, 2019	1
July 8, 2019	1
July 9, 2019	4
July 11, 2019	3
July 12, 2019	6
July 13, 2019	8
July 15, 2019	9
July 16, 2019	7
July 17, 2019	11
July 18, 2019	12
July 19, 2019	9
July 20, 2019	6
July 21, 2019	7
July 22, 2019	5
July 23, 2019	4

July 25, 2019	4
July 27, 2019	3
July 30, 2019	2
July 31, 2019	1



Includes appropriate title (1 pt)
Includes title for horizontal axis (1 pt)
Includes title for vertical axis (1 pt)
Axes and bars are evenly spaced and correctly displayed (1 pt)

32. Identify the type of epi curve. (1 pt)

Point source

33. The incubation period for Hepatitis is 15-50 days, the average being 28 days. Knowing this, what is the most likely period of exposure? (2 pts)

(July 6) - 15 days = June 21
(July 31) - 50 days = June 11
Most likely period of exposure: June 11 - June 21

Correctly subtracting minimum incubation period from earliest case and minimum incubation period from last case (1 pt)
Correct date range (1 pt)

34. Identify the index case. What may this specific case represent in this outbreak? (2 pts)

Index case- July 6
This case may represent:
The baseline level of the illness
The source of the outbreak
A case that was exposed earlier than others

Correctly identifying index case (1 pt)
Correctly identifying one possible representation of the index case; any one of those three gives you the point (1 pt)

Epidemiologists believe that the food eaten during the convention may have caused the outbreak. The following is a table consisting of the food eaten by the employees who attended.

	CASES			**CONTROLS**		
FOOD	**Ate**	**Did not eat**	**Total**	**Ate**	**Did not eat**	**Total**
Salad	12	91	103	10	7	17
Shrimp tempura	34	69	103	4	13	17
Pasta	14	89	103	13	4	17
Chicken parmesan	78	25	103	5	12	17
Macarons	25	78	103	2	15	17

35. Which food has the highest risk of illness associated with it? Calculate the relative risk. (2 pts)

Chicken parmesan
(78/103)/(5/17) = 2.57

Correct food is identified (1 pt)
Correct relative risk is calculated; answer may be rounded (1 pt)

36. Interpret the relative risk; what does this calculation mean in context? (1 pt)

It means that those who ate the chicken wings are 5.18 times more likely to contract the illness than those who didn't.

Answer the following questions about the disease:

37. What type of agent causes this illness (e.g. bacteria, virus, prion, etc.)? (1 pt)

Virus

38. List three symptoms of Hepatitis. (3 pts)

Fatigue
Flu-like symptoms
Dark urine
Pale stool
Abdominal pain
Loss of appetite
Unexplained weight loss
Yellow skin and eyes, which may be signs of jaundice

Any three of these (1 pt each)

39. List three prevention measures that may be taken beforehand. (3 pts)

Keep raw poultry away from other foods
Cook food to the right temperature, minimum 165F
Drink pasteurized milk, avoid raw milk
Avoid unclean food and water
Always wash your hands thoroughly
Get vaccinated

Any three of these (1 pt each)

To analyze the data, investigators will do a Chi-Square test.

40. Create a 2X2 contingency table for the food that has the highest risk of illness associated with it. (10 pts)

	Disease	**No disease**	**Totals**
Ate chicken parmesan/Exposed	78	25	103
Did not eat chicken parmesan/No	5	12	17
Totals	83	37	120

Each cell with a number is correct (9 pts)
All titles correct (1 pt)

41. Provide a null and alternative hypothesis for a Chi-Square test. (4 pts)

Null (Ho)- There is no association between consuming chicken parmesan and contracting Hepatitis.

Alternative (Ha)- There is an association between consuming chicken parmesan and contracting Hepatitis.

Correctly state null hypothesis (2 pt)

Correctly state alternative hypothesis (2 pt)

42. Assume that the null hypothesis is true and create a 2X2 table consisting of the expected counts of people in each category. (4 pts)

	Disease	**No disease**	**Totals**
Ate chicken parmesan/Exposed	71.24	31.76	103
Did not eat chicken parmesan/No exposure	11.76	5.24	17
Totals	83	37	120

(83/120)*103 = 71.24

(37/120)*103 = 31.76

(83/120)*17 = 11.76

(37/120)*17 = 5.24

Correctly calculated expected counts (4 pts)

43. Calculate the Chi-Square statistic. (5 pts)

$$\frac{(78-71.24)^2}{71.24} + \frac{(25-31.76)^2}{31.76} + \frac{(5-11.76)^2}{11.76} + \frac{(12-5.24)^2}{5.24} = 14.69$$

Each fraction is correctly calculated (4 pts)

Correct Chi-Square statistic is calculated (1 pt)