

MY SO PRACTICE TEST

DIVISION B - MIDDLE SCHOOL, GRADES 6-9

PRACTICE TEST

Instructions

- There are 30 questions on this test.
- You have 50 minutes to complete this test.
- You may write your answers directly in the test.
- You may use any notes or resources you have created or collected.
- You may use a calculator and scratch paper if necessary.
- The scenarios presented here are hypothetical but based on actual outbreaks and public health problems
- Good Luck!

Test Questions

Part A

In May 2012, the University of Central Florida (UCF) hosted the National Science Olympiad. UCF, the second-largest university campus in the United States, is located in Orlando, which has a population of nearly 250,000 people. During the last week of the month, after the competition, physicians from a hospital near UCF contacted the Florida Department of Health (FDOH) to report an increase in people seeking care for acute asthma symptoms. Specifically, on May 16, 100 children (younger than 18 years) and 32 adults sought care for sudden, severe breathing difficulty at a local emergency department (ED). Several people were hospitalized, and two died. The FDOH contacted the Disease Detectives to help investigate.

Asthma is a common chronic respiratory disease in the United States; more than 7 million children and 18 million adults were reported to have asthma in 2010. Asthma is characterized by episodes of airflow obstruction—with symptoms including wheezing, coughing, and shortness of breath—triggered by exposure to environmental factors. Respiratory infections, exercise, airborne allergens (e.g., pollen, mold, animal dander, dust mites, and cockroach allergens), occupational exposures (e.g., chemicals or dusts), and airborne irritants (e.g., tobacco smoke) are some of the things that may make symptoms worse. The key to managing asthma is to control symptoms by using appropriate medication, getting health care, and avoiding exposure to things that make symptoms worse.

1. Which of the below terms is defined as the systematic, ongoing collection, analysis, interpretation, and dissemination of health data for disease control and prevention? (circle best answer)
 - a. Epidemiology
 - b. Public health surveillance
 - c. Research epidemiology
 - d. Public health
 - e. None of the above

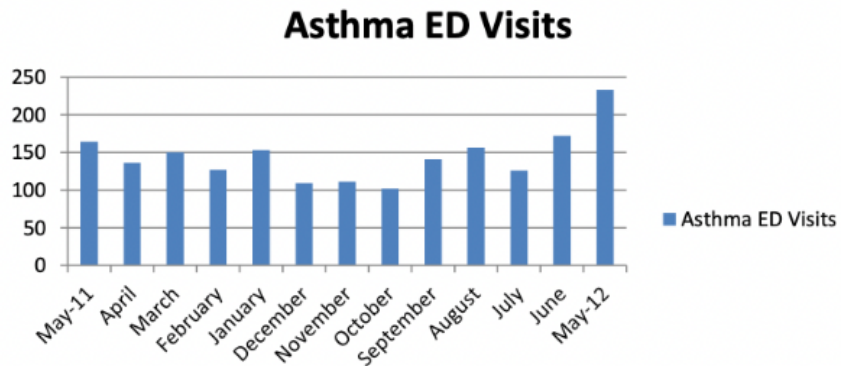
Table 1: Estimated number of emergency department (ED) visits for asthma, by age group for May: Orlando and Florida, 2012

Age (Years)	Orlando			Florida		
	# of ED Visits on May 16	Population	Rate (per 100K/day)	# of ED Visits on May 16	Population	Rate (per 100K/mo)
0-17	100	52,408	190.8	3978	4,057,357	98.0
18 +	32	197,154	16.2	4676	15,263,392	30.6
Total	132	249,562	52.9	8654	19,320,749	44.8

2. Public Health officials compare cause-specific rates to determine whether there is evidence to support claims that this is a large number of cases. Which of the below best describes how the cause-specific rate for Orlando compares to that for Florida?
 - a. The cause-specific rate for ED visits among Orlando residents is about 1.3 times that among Florida residents.
 - b. The cause-specific rate for ED visits among Orlando residents is 0.5-1.9 times that among Florida residents.
 - c. The cause-specific rate for ED visits among Orlando residents is more than 65 times that among Florida residents.
 - d. The cause-specific rate for ED visits among Orlando residents is about 35 times that among Florida residents.
3. Circle three reasons why is it important for Disease Detectives to confirm that an event is unusual before proceeding with the next step.
 - a. To be sure they are dealing with a real problem
 - b. To be sure their research papers are published after the investigation
 - c. To make the most efficient use of limited resources
 - d. To support the need for additional public health funding and resources
 - e. To respond to public concerns
4. Which of the below is a good reason to further investigate the problem of ED visits for asthma?
 - a. Control or prevention of the health problem
 - b. Opportunity to learn (research opportunity)
 - c. Public, political, or legal concerns
 - d. Public health program considerations
 - e. All the above.

The team collected data on the number of ED visits for asthma in each of the three hospitals for each month from May 2011 to May 2012 (Figure 1).

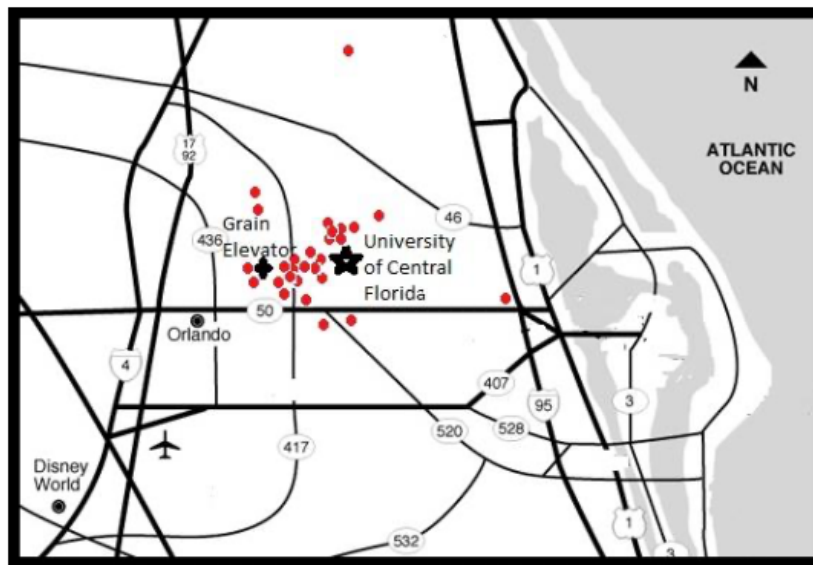
Figure 1: Number of visits for asthma at three Orlando emergency departments, by month, May 2011 to May 2012



5. Some of these diagrams may provide clues to only one characteristic of an outbreak, others may provide clues to two, and still others may provide clues to three. However, these bar charts of histograms almost never provide hints about which of the following characteristics?
- Time of exposure
 - Source of exposure
 - Characteristics of case patients
 - Chain of transmission

The Orlando city map shows the geographic distribution of the place of onset of asthma attacks for the 103 persons who were treated in local EDs on May 16 (Figure 2).

Figure 2: Place of onset of asthma attacks, Orlando, May 16

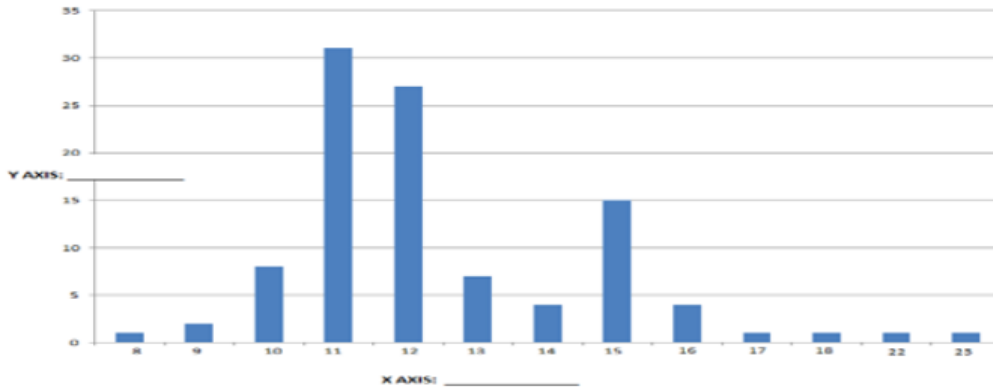


The geographic distribution of cases in Figure 2 suggests which of the following hypotheses?

- a. Asthma attacks might have been linked to proximity to major roadways.
- b. Asthma attacks might have been caused by something near the water.
- c. Something might have happened near the grain elevator that caused the attacks.
- d. Whatever caused the attacks was spread out evenly across all of Orlando.

On the basis of the information in Table 3, the epidemiologists created a bar chart (Figure 3) to help visualize patterns in the data.

Figure 3: Asthma attacks by time of onset, Orlando, May 16



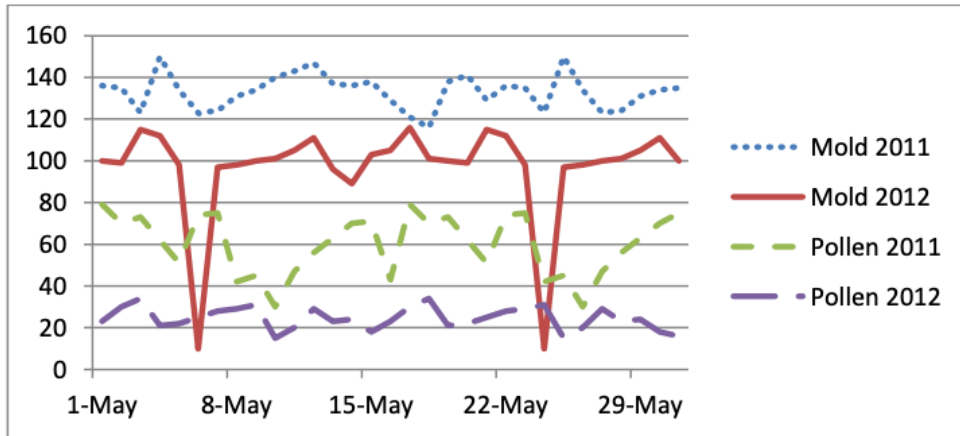
- 7. Which of the following is the best title for the Y-axis?
 - a. Type of Disease
 - b. Number of Cases
 - c. Location
 - d. Time of Day

- 8. Which of the following is the best title for the X-axis?
 - a. Incubation Time
 - b. Type of Disease
 - c. Mortality Rate
 - d. Time of Day

- 9. Which of the below hypotheses are suggested by this time distribution?
 - a. The causal exposure was continuous and ongoing.
 - b. Person-to-person transmission played a role.
 - c. The causal exposure was acute and represented a point source.
 - d. The causal exposure involved a long incubation or latency period.
 - e. None of the above.

Because of Orlando's history of hurricane and flood damage, media speculated that mold might be the cause of the asthma epidemic. Given the potential for a seasonal component to the exposure and the clustering of asthma attacks by place and time, the team requested data on air pollution levels in the city for the past 2 years. Meteorological data indicated that wind speed and precipitation and moisture levels were low during the week of May 16. The graph in Figure 4 shows daily counts of naturally occurring airborne pollutants (pollen and mold) for Orlando in May 2011 and 2012.

Figure 4: Daily pollen and mold counts for Orlando, May 2011 and 2012



10. Which of the below conclusions can you draw from the information in Figure 4?
- Mold levels have increased between 2011 and 2012.
 - Pollen levels appear to be much higher than mold levels for all time periods shown.
 - The data support a link between mold and pollen levels and ED visits for asthma.
 - There appear to be clear seasonal patterns to both mold and pollen levels.
 - None of the above.
11. Which of the below groups would you select to serve as controls if you were to do a case-control study looking for risk factors associated with being seen in an Orlando ED for asthma during the time period in question?
- Residents of a local nursing home.
 - Age-matched neighbors who had no history of asthma.
 - Age-matched asthmatics from Miami.
 - Age-matched Orlando residents who had a previous history of asthma but did not need go to the ED during the period in question.
 - None of the above.

Part B

It is a warm Monday morning in mid-September. You are the chief epidemiologist at a large city health department. As you review reports electronically transmitted to your office over the weekend, the phone rings. The caller is Beth Stover, director of Fun Time Academy—a child care center in your jurisdiction. She says she got a call from the parents of a young boy who was hospitalized over the weekend with severe diarrhea and dehydration. She says her staff noticed a slight increase in children with loose stools over the last few weeks. The staff was not too concerned because the stools were not bloody, and pediatricians were telling parents the diarrhea was due to teething, food allergies, or antibiotic use.

12. Which of the following represents a key component of the definition of an outbreak?
- It happens suddenly.
 - It involves a lot of people.
 - Some of the people are hospitalized or die.
 - There are more cases than expected.
 - It is caused by an infectious agent.
 - It is widespread.

13. Which of the below pieces of information do you need to determine if this represents an outbreak?
- The causative agent,
 - The source of infection,
 - The index case,
 - The number of children who had diarrhea during the same time period last year,
 - The number of secondary cases,
 - None of the above.

You ask Beth for the child's name and age, the hospital where he was admitted, his pediatrician's name, whether she knows of any testing or test results, and the last date the boy attended the center. Beth tells you the child is 3 years old and is at Children's Hospital under the care of Dr. Pickering. She does not know whether a stool culture was done. The boy last attended child care the previous Thursday and was well that day. You have worked with Dr. Pickering and know him to be an excellent physician who understands public health as well as clinical medicine. However, you are concerned about the recent increase in children with diarrhea at Fun Time Academy and need more information before you can develop a hypothesis.

14. Which of the following is the most important question you would ask about the children with diarrhea to address place?
- Where do they live?
 - What classroom are they in?
 - Have they traveled out of the area?
 - What other exposures did they have in the week before they became ill?
15. Which of the following is the most important question you would ask about the children with diarrhea to address time?
- When was the last day they were at the center?
 - What time of day did they become ill?
 - When did they first attend the center?
 - What day did they become ill?
16. Which of the below modes of transmission is most often involved in transmission of diarrheal diseases?
- Direct
 - Vector borne
 - Airborne
 - Vehicle borne
17. How many seconds, at least, must you wash your hands with warm, soapy water to wash them properly?
- 10 seconds
 - 20 seconds
 - 45 seconds
 - 60 seconds
18. Which of the following temperature ranges represents the "Danger Zone" for food storage?
- 0 degrees F
 - 40 – 140 degrees F
 - 140 – 180 degrees F
 - 180 – 210 degrees F

19. What federal agency in the United States is responsible for regulating meat and poultry in the United States?
- Centers for Disease Control (CDC)
 - Food and Drug Administration (FDA)
 - U.S. Department of Agriculture (USDA)
 - U.S. Farm Bureau (USFB)

Part C

Botulism is a rare but serious paralytic illness that causes disability and death; foodborne botulism is one of the more serious foodborne illnesses. The following describes one of the largest outbreaks of foodborne botulism reported in the United States in recent times. Although this was an unusual event, foodborne botulism continues to be a problem with approximately 20 cases reported each year. Most cases of foodborne botulism come from home-canned or other home-prepared foods.

On Sunday morning, April 10, 1994, a physician at an El Paso, Texas hospital notified the local health department that two people arrived at the hospital emergency room with blurred or double vision, difficulty breathing, and weakness. The sudden onset and nature of these symptoms suggested botulism.

Botulism is caused by *Clostridium botulinum*, an anaerobic, spore-forming gram-positive bacillus. Spores are dormant forms that are highly resistant to heat, drying and other environmental conditions. They are commonly found in soil and on food items contaminated with soil and can survive improper canning, cooking, or other processing methods used to preserve food. Under low-acid (pH > 4.6), anaerobic conditions, the spores germinate and produce a potent neurotoxin. This botulinum toxin is inactivated by heating to >80°C for at least ten minutes. When a person ingests toxin-contaminated food, the toxin molecules are absorbed into the bloodstream. They then spread throughout the body and bind to the ends of neurons. This prevents a neurotransmitter, acetylcholine, from carrying messages to muscles. A person who has botulism will become paralyzed, starting with the top of their body (descending paralysis), as more and more nerve endings become blocked. The classic symptoms of botulism include double vision, blurred vision, drooping eyelids, slurred speech, difficulty swallowing, dry mouth, and muscle weakness. Although the most frequent source of botulism today is home-canned foods, outbreaks associated with restaurants or with commercially prepared foods do occur. The toxin does not change the taste or smell of the food. Botulism cannot be transmitted from one person to another because the illness results from eating the spores or the toxin.

20. What type of organism is *C. botulinum*?
- A parasite
 - A virus
 - A fungus
 - A bacterium

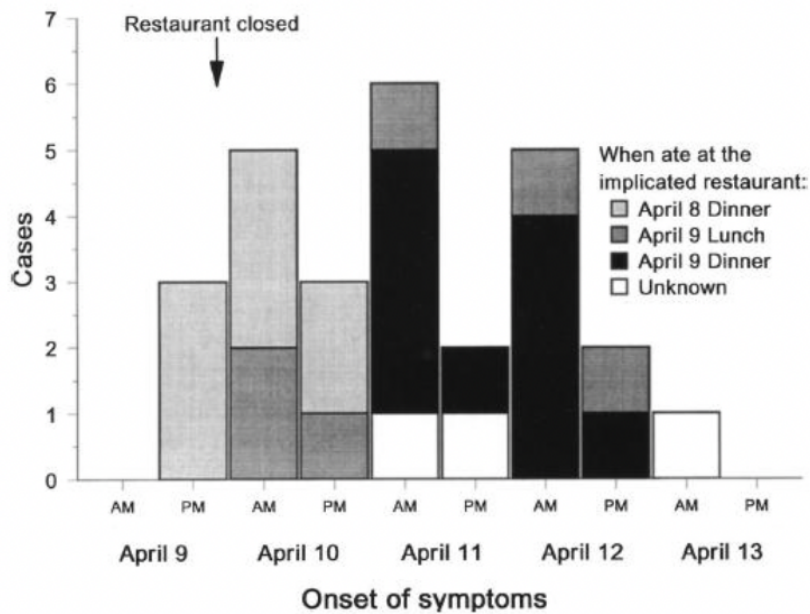
The physician contacted the El Paso Public Health Department after learning that the patients, a father and son, had recently shared a meal at a Greek restaurant in El Paso. An epidemiologic investigation was started immediately. Other area hospitals were contacted and an additional 4 suspect cases were identified within 4 hours of the initial report. Each of these persons had eaten at the same Greek restaurant.

On learning of these additional cases, the health department closed the restaurant and issued a press release informing the general public that persons who had symptoms of botulism should seek immediate medical attention. The next day, area physicians were notified of the outbreak and asked if they had seen any patients with symptoms of botulism. Interviews with the initial group of case-patients suggested that exposure most likely took place on April 8 or April 9. Investigators got a list of employees and used meal tickets, credit card receipts, cancelled checks and interviews of staff and patrons to identify persons who might have eaten at the restaurant on those two days. They

persons who ate food from the restaurant on April 8 or 9, 1994 (230 patrons and 5 employees). All restaurant patrons were interviewed using a standard questionnaire regarding food and beverages consumed, signs and symptoms of illness, and onset and duration of illness.

21. What was the purpose of these interviews? (mark all that apply)
- a. To determine if the restaurant was involved
 - b. To determine the gender of the patients
 - c. To identify the particular food item that was involved
 - d. To determine the ages of the patients
 - e. To find out if the patients were going to sue the restaurant
 - f. To determine if the patients liked their doctors

Figure 2. Symptomatic cases of botulism (N=27) by date of illness onset and date persons ate at implicated restaurant, El Paso, Texas, April 1994.



22. Based on the background and incubation periods of the ill patrons, what type of outbreak is this?
- a. Continuous common source
 - b. Propagated common source
 - c. Progressive source
 - d. Contiguous point source
 - e. Point source
 - f. Propagated source

Disease detectives were able to interview 198 of the 235 people that may have been exposed during this outbreak. They learned the following information from Table 5.

Disease detectives were able to interview 198 of the 235 people that may have been exposed during this outbreak. They learned the following information from Table 2.

Table 2: Food Eaten by Diners

	Ate the Food			Did not Eat the Food		
	Ill	Total	Attack Rate	Ill	Total	Attack Rate
Black Olives	19	92	20.4%	11	105	10.5%
Eggplant Dip	6	9	66.7%	24	189	12.7%
Feta Cheese	22	106	20.8%	8	92	8.7%
Greek Salad	12	94	12.8%	18	104	17.3%
Gyros	12	90	13.3%	18	108	16.7%
Potato Dip	19	22	86.4%	11	176	6.3%
Spanakopita	5	27	18.5%	25	171	14.6%

23. Based on the information in the table above, what two foods are most likely to have been the cause of the outbreak?
- Black olives
 - Eggplant dip
 - Feta cheese
 - Greek salad
 - Gyros
 - Potato dip
 - Spanakopita
24. There are many infectious diseases that can be prevented. These measures can be used to prevent the spread of an outbreak or epidemic EXCEPT:
- Hand washing and hygiene
 - Respiratory precautions
 - Vaccination campaign
 - Institute strict quarantine measures
 - Avoid eating all vegetables because they are hard to clean of germs
25. Measles is a highly contagious disease spread through coughing or sneezing. Symptoms can include rash, high fever, coughing, and runny nose. The disease can also cause more serious problems, such as ear infections, pneumonia, encephalitis (inflammation of the brain)—even death. It remains a leading cause of death among young children globally, despite the availability of a safe and effective vaccine. An estimated 197,000 people died from measles in 2007, mostly children under the age of five. Measles is caused by a:
- Bacterium
 - Virus
 - Fungus
 - Parasite
 - Protozoa
26. What term is used to describe the severity of disease that an agent causes in the host?
- Infectivity
 - Lethality
 - Mortality
 - Virulence

27. Why is it important to be able to identify when trying to control an outbreak?
- Carriers are social influencers so they can encourage people to adopt safe behaviors.
 - Carriers don't exhibit obvious symptoms of the disease so they can unknowingly spread it to others.
 - Carriers are more infectious than normal individuals who may have the disease.
 - Carriers are more likely to die quickly from a disease.
28. In one case of a skin and soft tissue infection (SSTI) outbreak at a health club interviews with the individuals revealed that 10 people had shared towels and 4 of those people who had shared towels developed SSTIs. The interviewers also found out that 41 people did not share towels and 2 of the people who did not share towels developed SSTIs. Calculate the relative risk between sharing towels and SSTIs.
- 0.0784
 - 0.1225
 - 8.16
 - 11.7624
29. Which of the following situations might allow for a foodborne illness to be spread? (Circle all that may apply)
- A grocery store storing cooked shrimp in the same cooler as raw shrimp
 - A chef who uses separate cutting boards for raw meat and raw vegetables
 - A restaurant allowing raw beef on a prep table to reach 60 °F
 - A supermarket washing all produce before it is placed on display
 - A buffet that keeps soups at 165 °F
 - A cook who changes gloves between prepping meat and making a salad.
30. What do the following infectious agents; Giardia, E. coli, legionella, and Vibrio cholerae have in common?
- They are waterborne diseases.
 - They produce hemorrhagic symptoms.
 - They are all viruses.
 - They produce skin rashes.

ANSWER KEY

- | | | | | | |
|-----|----------------|-----|-------------|-----|-------------|
| 1. | B | 15. | D | 29. | A, C |
| 2. | D | 16. | D | 30. | A |
| 3. | A, C, E | 17. | B | | |
| 4. | E | 18. | B | | |
| 5. | C | 19. | C | | |
| 6. | C | 20. | D | | |
| 7. | B | 21. | C | | |
| 8. | D | 22. | E | | |
| 9. | C | 23. | B, F | | |
| 10. | E | 24. | E | | |
| 11. | E | 25. | B | | |
| 12. | D | 26. | D | | |
| 13. | D | 27. | B | | |
| 14. | B | 28. | C | | |