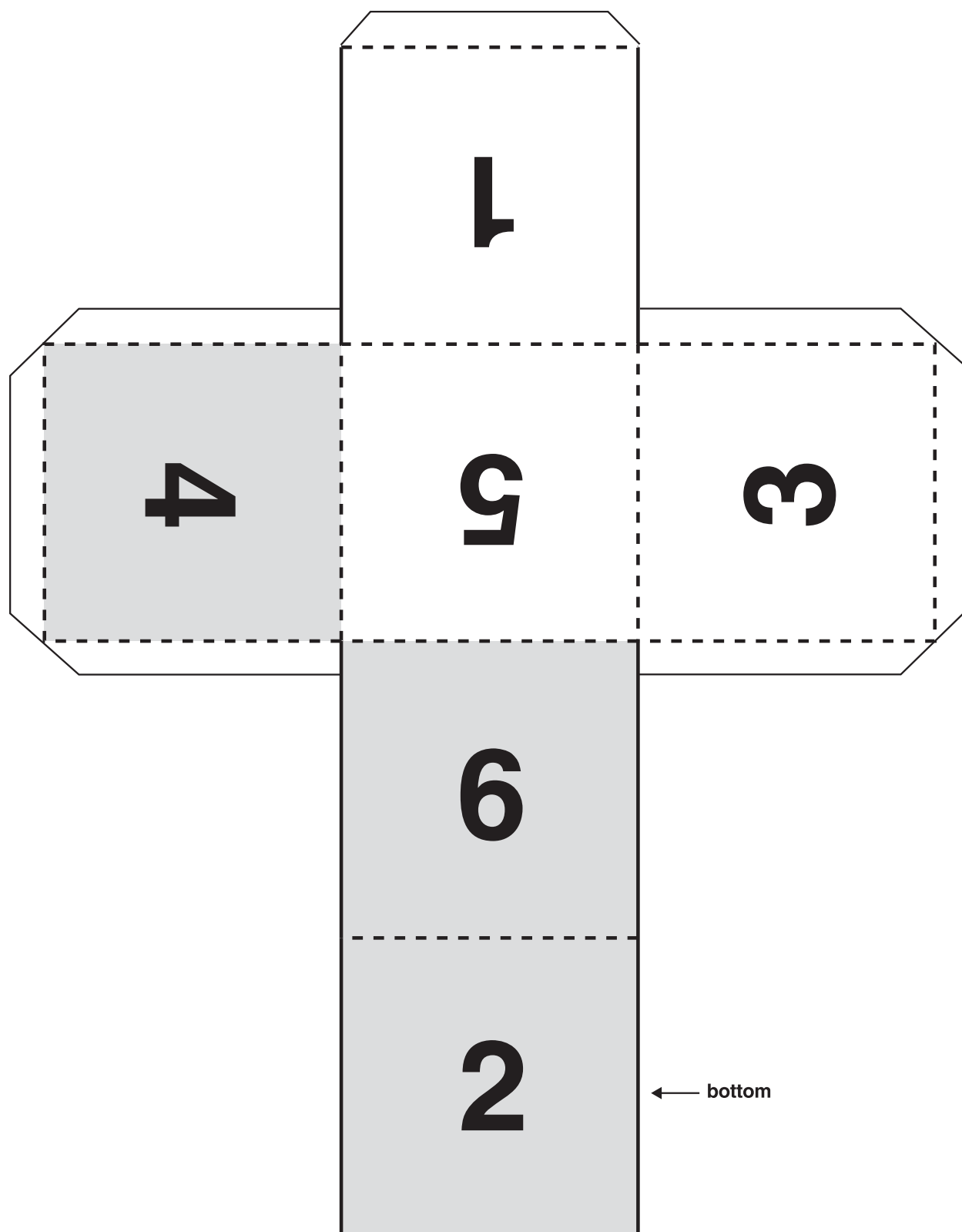
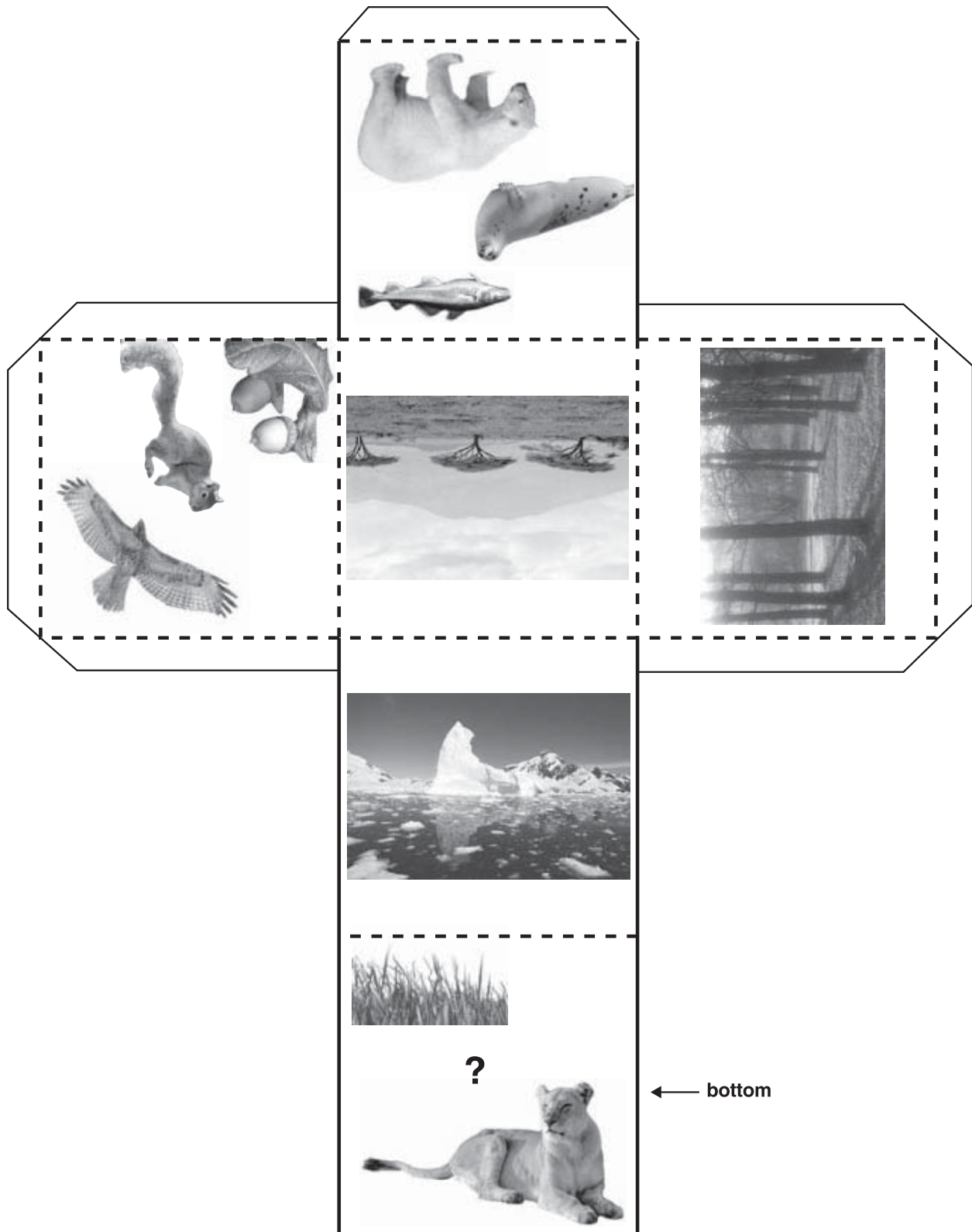


The Mystery Cube Template



The Biological Box Template



Thinking about Inquiry

Name: _____

Date: _____

The following table lists parts of the process you went through to investigate the cube and box. Think back to your work with the Mystery Cube and the Biological Box. On the right side of the table under the heading “Biological Box Activity,” provide an example of what you did in that activity that models the process of learning about the natural world.

Process	Biological Box Activity
Ask a testable question	
Gather evidence by making observations, recognizing patterns, and collecting data	
Share information	
Perform experiments	
Provide an evidence-based explanation	

Working with Questions

Name: _____

Date: _____

1. How is bug blood different from human blood?
2. Why do your fingers wrinkle after you take a bath?
3. Is rock music better than hip-hop music?
4. Why does bright light cause some people to sneeze?
5. Do smells affect people's moods?
6. Is vegetarianism better than eating meat?

Letters to the Editor

The Daily Bugle Newspaper

Letters to the Editor

Readers Sound Off about Proposed Quick and Tasty Restaurant:

Fast Food and Cancer?

When are Americans going to wake up to the dangers of restaurants like Quick and Tasty? The food they serve contains many chemicals known to cause cancer. It is no coincidence that as more people eat at these restaurants, more cases of cancer are being reported. Americans need to learn that organic foods are better than processed foods.

Signed, A Health-Conscious Reader

Healthy Diet? It's Up to You!

I for one will welcome Quick and Tasty to our neighborhood. Their food tastes great, is reasonably priced, and is good for you. People who say otherwise just eat too much or pick the wrong items. Their salads are just as good as those served at fancy restaurants but are much less expensive. I regularly eat at the Quick and Tasty near my business, and I'm in great shape.

Signed, Marathon Man

Weight a Minute!

Quick and Tasty is the last thing our community needs. The nation is in the midst of an epidemic of obesity, and fast-food restaurants are the biggest reason why. The food they serve has too many calories, and their portions are way too large. Society must be protected from companies like Quick and Tasty. They are more interested in making money than in the health of their customers.

Signed, Lean and Mean

Question and Investigation Form

Name: _____

Date: _____

Select one of the letters from Master 2.2, *Letters to the Editor*. Develop two scientific questions related to the letter. Then describe an investigation and the evidence you could gather to answer each question.

Letter you chose: _____

Question 1

Investigation

Question 2

Investigation



Investigative Report Form

Investigator: _____

Date: _____

Testable Question

Evidence Collected

Analysis and Explanation of Evidence

Next Questions

Letter from Principal



Truman Middle School

Where Knowledge Is Good

Director
Community Health Department

Dear Director:

I want to alert you to a possible health problem affecting students at the Truman Middle School. I just had a discussion with the director of our student band. He told me that in his class on Wednesday, May 20, fully one-third of his students were absent.

This situation reminds me of last year when we had a widespread outbreak of the flu. Can you help us determine if we should be concerned? If there is a problem, can you suggest measures we might take to prevent or contain the disease?

Thank you for your attention to this matter.

Sincerely,

Samantha Perez

Samantha Perez
Principal, Truman Middle School

First Memo from Director

MEMO

To: Members of the Health Department Investigative Staff

From: Director of the Community Health Department

About: School Absences

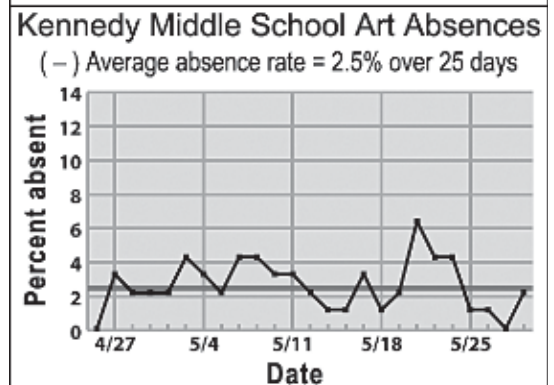
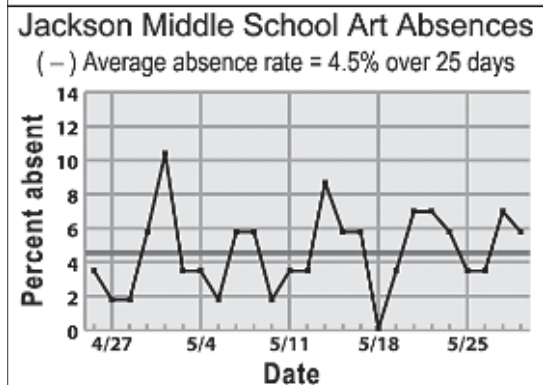
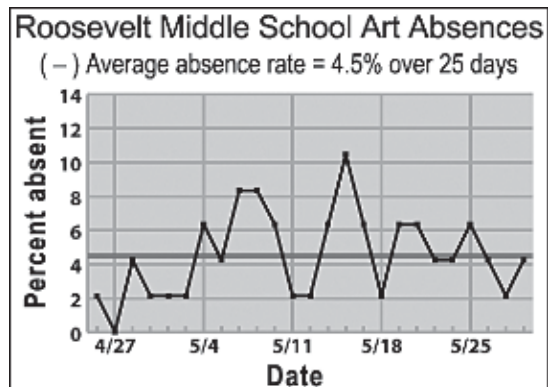
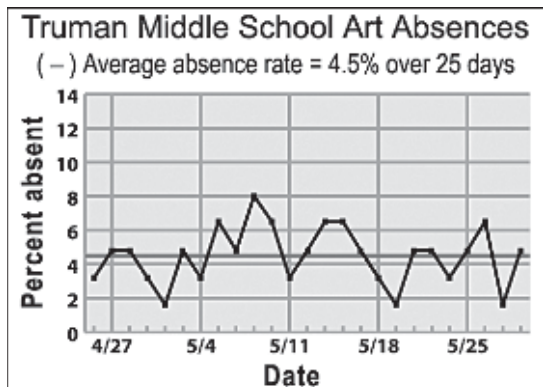
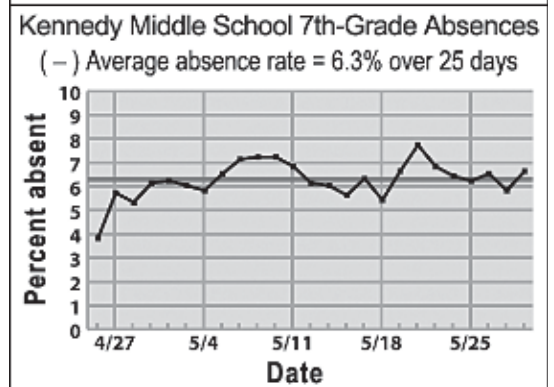
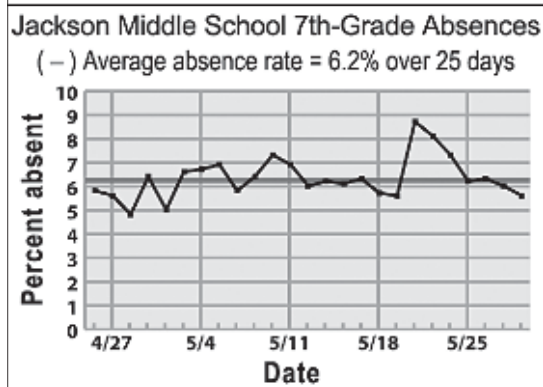
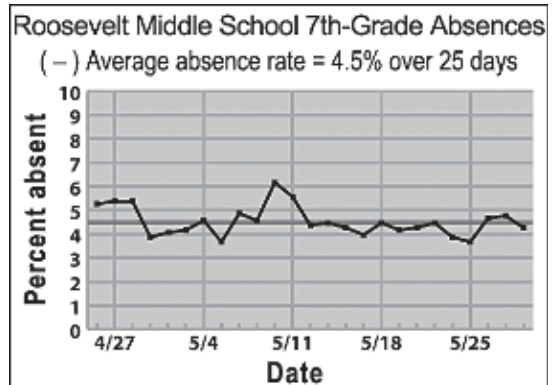
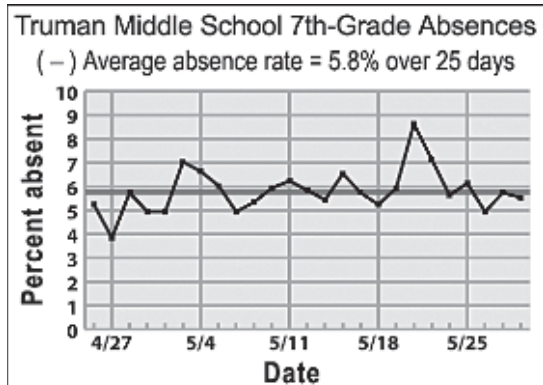
Principal Perez at Truman Middle School has alerted me to a possible health problem among her students (see accompanying letter). I need your staff to investigate the situation and determine if a health problem exists in our community. To get you started, I have arranged to give you access to the attendance data for each of our community's four middle schools.

Please remember to take notes about your investigation. Each day, you should write your notes on a separate *Investigative Report Form*. The headings for our new *Investigative Report Forms* are

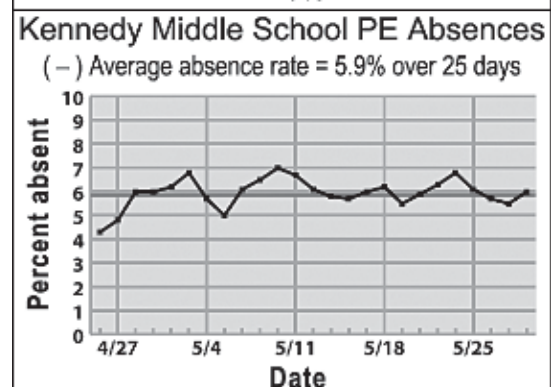
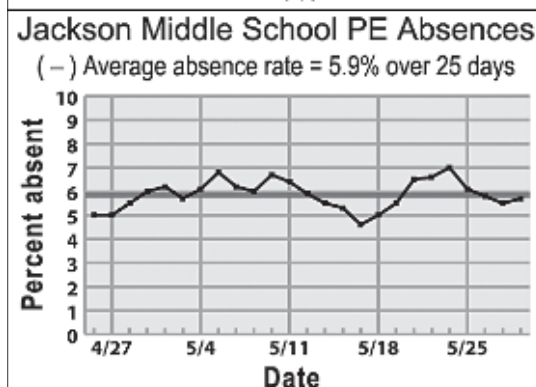
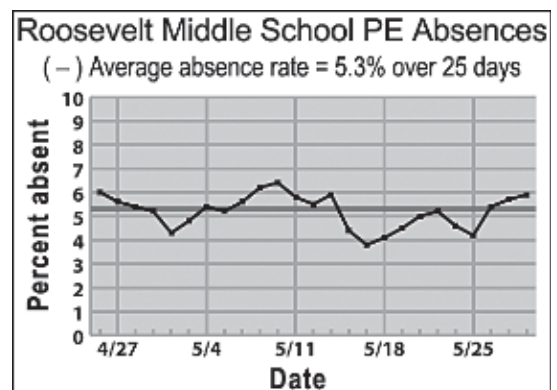
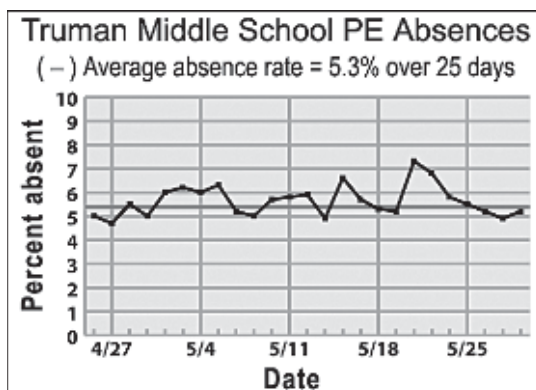
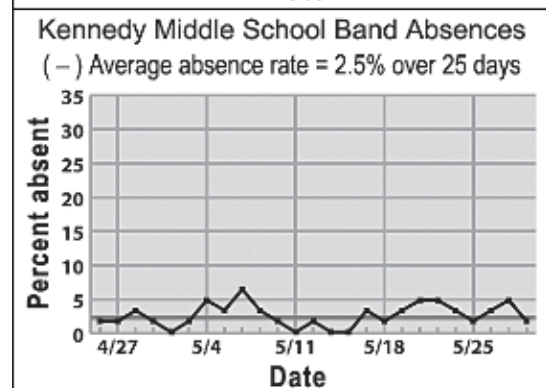
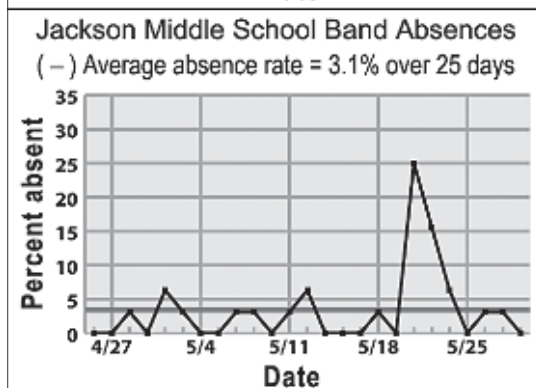
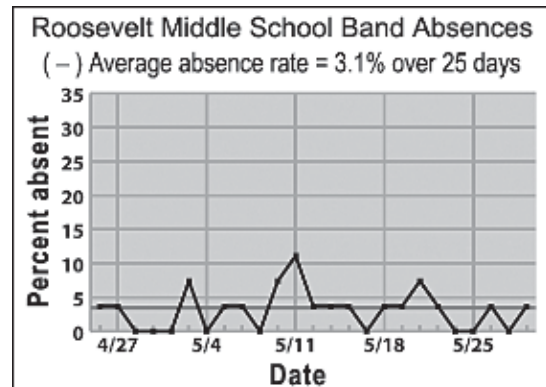
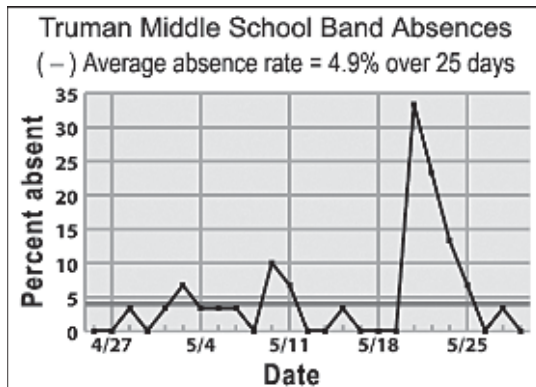
1. Testable Question
2. Evidence Collected
3. Analysis and Explanation of Evidence
4. Next Questions

For your first investigation to determine if a health problem exists, you will need to ask a testable question that can be answered by analyzing school attendance data.

Attendance Data



Attendance Data



Attendance Data: Percent Absent

Date	4/24	4/27	4/28	4/29	4/30	5/1	5/4	5/5	5/6	5/7	5/8	5/11	5/12	5/13	5/14	5/15	5/18	5/19	5/20	5/21	5/22	5/25	5/26	5/27	5/28
Truman Middle School																									
7th grade (450 students)	5.2	3.8	5.7	4.9	4.9	7.0	6.6	6.0	4.9	5.3	5.9	6.2	5.8	5.4	6.5	5.7	5.2	5.9	8.6	7.1	5.6	6.1	4.9	5.7	5.5
PE classes (225 students)	5.0	4.7	5.5	5.0	6.0	6.2	6.0	6.3	5.2	5.0	5.7	5.8	5.9	4.9	6.6	5.7	5.3	5.2	7.3	6.8	5.8	5.5	5.2	4.9	5.2
Band class (30 students)	0.0	0.0	3.3	0.0	3.3	6.7	3.3	3.3	3.3	0.0	10.0	6.7	0.0	0.0	3.3	0.0	0.0	0.0	33.3	23.3	13.3	6.7	0.0	3.3	0.0
Art classes (62 students)	3.2	4.8	4.8	3.2	1.6	4.8	3.2	6.5	4.8	8.0	6.5	3.2	4.8	6.5	6.5	4.8	3.2	1.6	4.8	4.8	3.2	4.8	6.5	1.6	4.8
Roosevelt Middle School																									
7th grade (378 students)	5.2	5.3	5.3	3.8	4.0	4.1	4.5	3.6	4.8	4.5	6.1	5.5	4.3	4.4	4.2	3.9	4.4	4.1	4.2	4.4	3.8	3.6	4.6	4.7	4.2
PE classes (200 students)	6.1	5.7	5.5	5.3	4.4	4.9	5.5	5.3	5.7	6.3	6.5	5.9	5.6	6.0	4.5	3.9	4.2	4.6	5.1	5.3	4.7	4.3	5.5	5.8	6.0
Band classes (27 students)	3.7	3.7	0.0	0.0	0.0	7.4	0.0	3.7	3.7	0.0	7.4	11.1	3.7	3.7	3.7	0.0	3.7	3.7	7.4	3.7	0.0	0.0	3.7	0.0	3.7
Art classes (48 students)	2.1	0.0	4.2	2.1	2.1	2.1	6.3	4.2	8.3	8.3	6.3	2.1	2.1	6.3	10.4	6.3	2.1	6.3	6.3	4.2	4.2	6.3	4.2	2.1	4.2
Jackson Middle School																									
7th grade (505 students)	5.7	5.5	4.7	6.3	4.9	6.5	6.6	6.8	5.7	6.3	7.2	6.8	5.9	6.1	6.0	6.2	5.6	5.5	8.6	8.0	7.2	6.1	6.2	5.9	5.5
PE classes (235 students)	5.0	5.0	5.5	6.0	6.2	5.7	6.1	6.8	6.2	6.0	6.7	6.4	5.9	5.5	5.3	4.6	5.0	5.5	6.5	6.6	7.0	6.1	5.8	5.5	5.7
Band class (32 students)	0.0	0.0	3.1	0.0	6.3	3.1	0.0	0.0	3.1	3.1	0.0	3.1	6.3	0.0	0.0	0.0	3.1	0.0	25.0	15.6	6.3	0.0	3.1	3.1	0.0
Art classes (58 students)	3.4	1.7	1.7	5.7	10.3	3.4	3.4	1.7	5.7	5.7	1.7	3.4	3.4	8.6	5.7	5.7	0.0	3.4	6.9	6.9	5.7	3.4	3.4	6.9	5.7
Kennedy Middle School																									
7th grade (680 students)	3.9	5.8	5.4	6.2	6.3	6.1	5.9	6.6	7.2	7.3	7.3	6.9	6.2	6.1	5.7	6.4	5.5	6.7	7.8	6.9	6.5	6.3	6.6	5.9	6.7
PE classes (350 students)	4.3	4.8	6.0	6.0	6.2	6.8	5.7	5.0	6.1	6.5	7.0	6.7	6.1	5.8	5.7	6.0	6.2	5.5	5.9	6.3	6.8	6.1	5.7	5.5	6.0
Band classes (64 students)	1.6	1.6	3.2	1.6	0.0	1.6	4.7	3.2	6.3	3.2	1.6	0.0	1.6	0.0	0.0	0.0	1.6	3.2	4.7	4.7	3.2	1.6	3.2	4.7	1.6
Art classes (95 students)	0.0	3.2	2.1	2.1	2.1	4.2	3.2	2.1	4.2	4.2	3.2	3.2	2.1	1.1	1.1	3.2	1.1	2.1	6.3	4.2	4.2	1.1	1.1	0.0	2.1

Second Memo from Director

MEMO

To: Members of the Health Department Investigative Staff

From: Director of the Community Health Department

About: Band Student Absences at Truman and Jackson Middle Schools

Thank you for your hard work. You have established that a potential health problem exists at Truman and Jackson middle schools. I have informed the principal at each school that you will continue your investigation and keep them informed of your progress.

Staff members have interviewed the parents of the absent students. The results of their interviews are summarized in the accompanying tables (one for each middle school). The tables provide a reason for each student's absence. If a student is sick, the symptoms are reported in the table. You also can read quotes from the parent interviews that are available as of today.

The principals from Truman and Jackson middle schools have sent school calendars that provide information about the activities of band-class students over the past two months.

Keep up the good work. I look forward to learning the results of your investigation.

Interview Summary

Results of Interviews with Parents of Absent Students

Truman Middle School Band Class			
Student	Reason for absence	Symptoms	Parent interview available?
T1	Sick	Stomachache, headache, fever	No
T2	Sick	Stomachache, vomiting, fever	No
T3	Sick	Stomachache, headache, vomiting	No
T4	Sick	Stomachache, diarrhea	Yes
T5	Sick	Stomachache, diarrhea, fever	No
T6	Sick	Stomachache, vomiting, diarrhea	Yes
T7	Family vacation	None	No
T8	Sick	Stomachache, headache, diarrhea	No
T9	Sick	Stomachache, diarrhea, fever	No
T10	Sick	Stomachache, vomiting, diarrhea, fever	Yes

Jackson Middle School Band Class			
Student	Reason for absence	Symptoms	Parent interview available?
J1	Broken leg	Broken leg	No
J2	Sick	Stomachache, diarrhea, vomiting, fever	Yes
J3	Sick	Stomachache, headache, diarrhea, fever	No
J4	Sick	Stomachache, diarrhea, fever	No
J5	Sick	Stomachache, headache, diarrhea	No
J6	Sick	Stomachache, vomiting, diarrhea, fever, headache	Yes
J7	Sick	Stomachache, headache	No
J8	Sick	Stomachache, headache, diarrhea	No

Quotes from Interviews

Interview with Parent of Student T4

Health worker: I understand that your daughter missed school on May 20 and 21. Can you tell me why she was absent?

Parent: She woke up before her alarm clock went off and complained that she felt sick to her stomach. About an hour later she threw up and so I kept her home.

Health worker: I see. How is she doing now?

Parent: She is better. She missed two days of school, though, and is busy getting caught up.

Interview with Parent of Student T6

Health worker: Can you tell me why your son missed school on May 20 and 21?

Parent: Yes, he had the flu.

Health worker: Did you take him to the doctor?

Parent: No, but I'm pretty sure it was just the flu. He probably caught it from his friend who was also sick at the same time.

Health worker: Maybe. After being exposed to the flu, it generally takes three to five days for symptoms to show up.

Quotes from Interviews

Interview with Parent of Student T10

Health worker: Why was your son absent from school on May 20 and 21?

Parent: He came home from the band competition and complained that his stomach hurt. The next day he felt worse. I took his temperature and found that he had a fever, so I kept him home. I think he had food poisoning. You should check out the restaurant that they went to.

Health worker: I suppose it could be food poisoning. Symptoms of food poisoning usually appear in the next day or two after eating contaminated food.

Interview with Parent of Student J2

Health worker: Why did your son miss school on May 20 and 21?

Parent: He had a bad stomachache and diarrhea. I took his temperature and it was a little high. I was going to take him to the doctor, but he started getting better, so I canceled the appointment.

Health worker: Well, I'm glad he's doing better!

Interview with Parent of Student J6

Health worker: Can you tell me why your daughter missed school on May 20 and 21?

Parent: She woke up with a stomachache and spent the whole morning in the bathroom. Later, she developed a fever and a headache. Do you think it is anything serious?

Health worker: We're concerned that the absent students may all have the same illness. I'll be sure and let you know what our investigation turns up.

School Calendars

Truman Middle School Band Calendar

April						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
29	30	31	1	2 Parent Teacher Conferences	3 No School— Teacher Work Day	4
5	6 No School— Spring Break	7 No School— Spring Break	8 No School— Spring Break	9 No School— Spring Break	10 No School— Spring Break	11
12	13 Band practice	14	15 Band practice	16	17 Band practice	18 Band Concert
19	20 Band practice	21	22 Band practice	23	24 Band practice	25
26	27 Band practice	28	29 Band practice	30	1	2

School Calendars

Truman Middle School Band Calendar

May						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
26	27	28	29	30	1 Band practice	2 Bake Sale Fundraiser
3	4 Band practice	5 May Day Parade with bands from Jackson and Roosevelt	6 Band practice	7	8 Band practice	9
10	11 Band practice	12	13 Band practice	14	15 student planning meeting for battle of bands with Jackson	16
17	18 Band practice	19 Battle of the Bands with Jackson	20 Band practice	21	22 Band practice	23
24	25	26	27 Band practice	28	29 Band practice	30
31	1	2	3	4	5	6

School Calendars

Jackson Middle School Band Calendar

April						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
29	30	31	1	2 Parent Teacher Conferences	3 No School— Teacher Work Day	4
5	6 No School— Spring Break	7 No School— Spring Break	8 No School— Spring Break	9 No School— Spring Break	10 No School— Spring Break	11
12	13	14 Band practice	15	16 Band practice	17	18
19	20	21 Band practice	22	23 Band practice	24	25
26	27 Band Concert	28 Band practice	29	30 Band practice	1	2

School Calendars

Jackson Middle School Band Calendar

May						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
26	27	28	29	30	1	2
3	4	5 May Day Parade with bands from Truman and Roosevelt	6	7 Band practice	8	9
10	11	12 Band practice	13	14 Band practice	15 student planning meeting for battle of bands with Truman	16
17	18	19 Battle of the Bands with Truman	20	21 Field Trip to Band Concert at State College	22	23
24	25	26 Band practice	27	28 Band practice	29	30
31	1	2	3	4	5	6

Third Memo from Director

MEMO

To: Members of the Health Department Investigative Staff

From: Director of the Community Health Department

About: WATER ALERT

I need to alert you to a new situation that may or may not relate to your investigation. A neighboring community has discovered a problem that may affect us and other communities in the region. Bacteria that cause stomach illness have been detected in its water supply. The health department in that community reports a sharp increase in illnesses that have symptoms similar to food poisoning and a stomach virus (stomachache, vomiting, nausea, and diarrhea). We're taking the necessary steps to watch for problems in our community.

By the way, I'm pleased to hear of the progress you are making with your investigation. As requested by your team supervisor, our staff has collected information about the activities that students participated in during the Battle of the Bands event. This information is available in a table and displayed as a series of maps.

Keep up the hard work. I look forward to learning the results of your investigations.

Activity Tables

Activities in which Students Participated

Truman Middle School^{a, b}

Student	Biff's French Restaurant	Cheep Chicken Hut	Volleyball	Soccer	Swimming
T1		X			X
T2	X			X	
T3		X			X
T4		X			X
T5		X			X
T6		X			X
T8		X			X
T9		X			X
T10	X				X
T11	X				X
T12		X			X
T13	X		X		
T14	X			X	
T15		X			X
T16		X		X	
T17	X				X
T18	X		X		
T19	X		X		
T20	X			X	
T21	X			X	
T22	X		X		
T23		X		X	
T24	X			X	
T25		X		X	
T26	X		X		
T27	X			X	
T28		X			X
T29	X		X		
T30		X			X

^aStudent T7 was on vacation and did not attend the Battle of the Bands event.

^bThe shaded area indicates students who did not become sick.

Activity Tables

Activities in which Students Participated

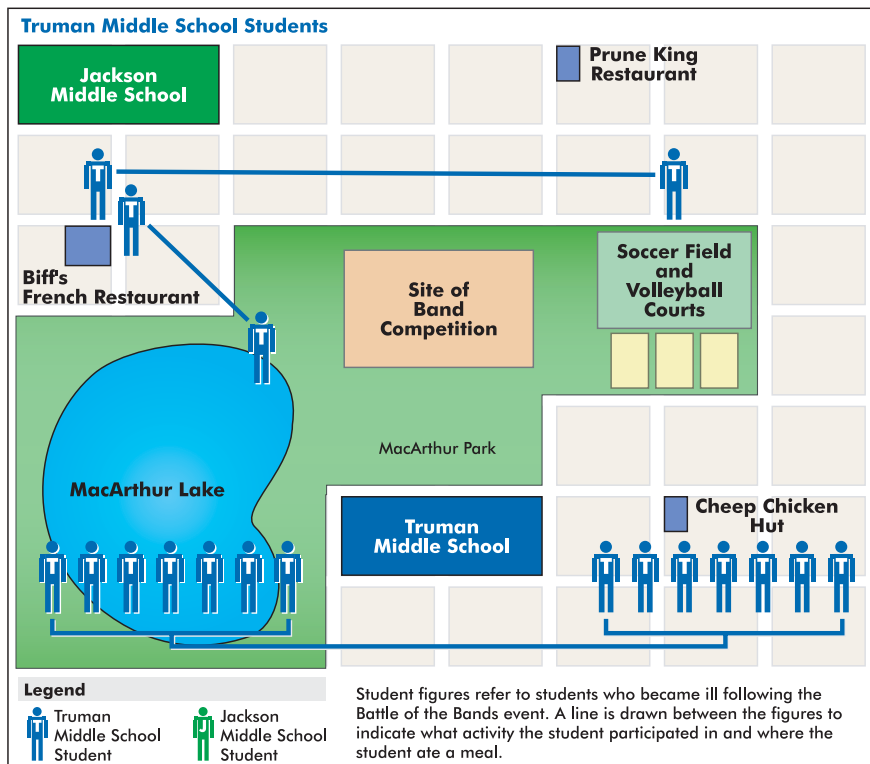
Jackson Middle School^{a, b}

Student	Cheep Chicken Hut	Prune King Restaurant	Volleyball	Soccer	Swimming
J2	X				X
J3	X			X	
J4		X			X
J5	X		X		
J6	X				X
J7	X				X
J8	X				X
J9		X	X		
J10		X	X		
J11		X		X	
J12	X				X
J13		X			X
J14		X	X		
J15		X		X	
J16	X				X
J17		X		X	
J18	X			X	
J19		X	X		
J20		X			X
J21		X	X		
J22		X		X	
J23		X		X	
J24	X		X		
J25	X				X
J26		X		X	
J27		X		X	
J28		X	X		
J29		X		X	
J30	X			X	
J31		X			X
J32	X				X

^a Student J1 has a broken leg and did not attend the Battle of the Bands event.

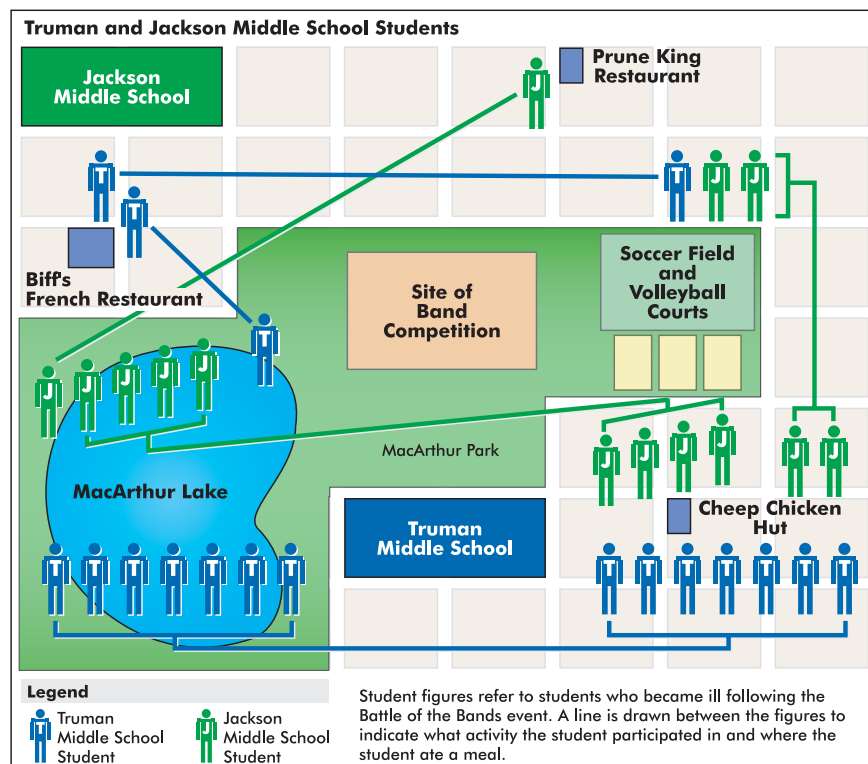
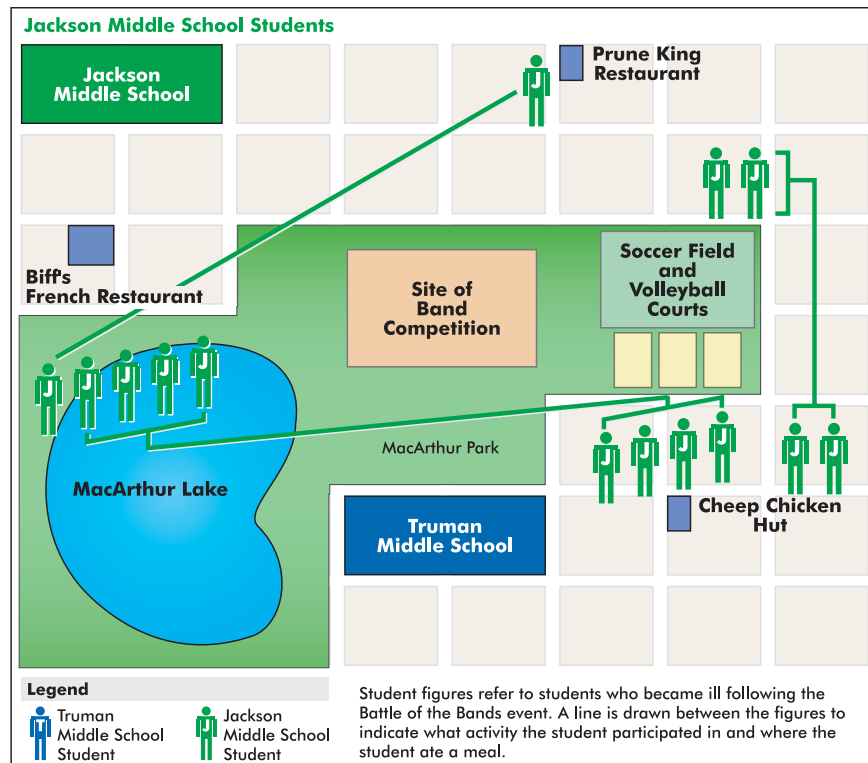
^b The shaded area indicates students who did not become sick.

Activity Maps



For each student, a line is drawn between two figures to indicate what activity the student participated in and where the student ate a meal on May 19.

Activity Maps



For each student, a line is drawn between two figures to indicate what activity the student participated in and where the student ate a meal on May 19.

Analyzing Evidence

Name: _____

Date: _____

For the evidence listed below, write down the information you learned from it and explain how it helped, or did not help, you answer a testable question.

1. Memos from the director of the community health department
2. Attendance data for seventh-grade students at four middle schools
3. Summaries of interviews from parents of absent students
4. Transcripts from interviews with parents of absent students
5. School calendars
6. Student activity tables
7. Activity maps

Memo from Director

MEMO

To: Members of the Health Department Investigative Staff

From: Director of the Community Health Department

About: Disease Outbreak

The director of our Disease Awareness unit has alerted me to a disease outbreak at one of our elementary schools. Her staff have completed an initial investigation into the outbreak and sent data to us for analysis.

I need you to review the data they have sent and prepare a brief report. You will complete a form based on our *Investigative Report Form*.

Data from Investigation

Community Health Department

Case Number 0439-a
Disease Outbreak at Lincoln Elementary School



Results from Initial Investigation

I. School absences

The school has 520 students. The illness occurred over a two-month period. At the peak of the outbreak, 66 students (12.6 percent) were absent from school. Two years ago, a similar percentage of students were absent from what turned out to be the flu.

II. Disease symptoms

I interviewed the doctor who treated the ill students. He concluded that 66 students had chicken pox, based on having the characteristic rash and at least two other symptoms. The following table shows how many of these students displayed symptoms of chicken pox.

Symptom of chicken pox	Number of students with symptom
Mild fever	66
Runny nose	60
Slight cough	56
Rash	66
Blisters	17
Headache	55
Sore throat	54

III. Laboratory tests

Samples taken from two of the ill students were sent away for lab analysis. One of the two samples was found to contain the chicken pox virus.

Data from Investigation

Community Health Department

Case Number 0439-b
Disease Outbreak at Lincoln Elementary School



Results from Initial Investigation

I. Infection rates of vaccinated compared with unvaccinated students

Parents were interviewed to see if the children had been vaccinated. They were also asked if the children had already had and recovered from chicken pox. Children cannot get the disease a second time. Over 90 percent of parents reported having had chicken pox as children.

	Number of Students	
Student breakdown	Vaccinated	Unvaccinated
Total	470	50
With chicken pox now	51	15
Who had chicken pox before	25	30

II. Severity of the disease

Two doctors examined the sick children and classified each case as mild, moderate, or severe.

	Number of Students	
Student breakdown	Vaccinated	Unvaccinated
With mild disease	43	3
With moderate disease	7	9
With severe disease	1	3

III. Time of vaccination

Parents of children who were vaccinated were asked if their child was vaccinated within the past four years. Children who were vaccinated over four years ago were five times as likely to get chicken pox as were children vaccinated within the past four years.



Report Form

Investigator name: _____

Date: _____

I have reviewed case number 0439-a / 0439-b (circle one).

I have identified the following testable question or questions:

The questions are based on the following evidence:

My analysis of the evidence and my conclusions are as follows:

I have identified the following questions that could be asked as next steps in the investigation:



Evaluation Form

Investigator name: _____

Date: _____

I have evaluated the report by team member _____, who studied case number 0439-a / 0439-b (circle one). My evaluation is presented below.

1. Was a testable question (or questions) identified?

2. Was the evidence collected appropriate for answering the questions?

3. Was there other evidence that should have been used by the investigator?

4. Were proposed explanations supported by the evidence collected?

5. Were there other explanations that should have been considered?