S.IC.B.3: Analysis of Data 2

1 Cheap and Fast gas station is conducting a consumer satisfaction survey. Which method of collecting data would most likely lead to a biased sample?
   1) interviewing every 5th customer to come into the station
   2) interviewing customers chosen at random by a computer at the checkout
   3) interviewing customers who call an 800 number posted on the customers' receipts
   4) interviewing every customer who comes into the station on a day of the week chosen at random out of a hat

2 Which statement(s) about statistical studies is true?
   I. A survey of all English classes in a high school would be a good sample to determine the number of hours students throughout the school spend studying.
   II. A survey of all ninth graders in a high school would be a good sample to determine the number of student parking spaces needed at that high school.
   III. A survey of all students in one lunch period in a high school would be a good sample to determine the number of hours adults spend on social media websites.
   IV. A survey of all Calculus students in a high school would be a good sample to determine the number of students throughout the school who don’t like math.
   1) I, only
   2) II, only
   3) I and III
   4) III and IV

3 A survey is being conducted to determine which types of television programs people watch. Which survey and location combination would likely contain the most bias?
   1) surveying 10 people who work in a sporting goods store
   2) surveying the first 25 people who enter a grocery store
   3) randomly surveying 50 people during the day in a mall
   4) randomly surveying 75 people during the day in a clothing store

4 A school newspaper will survey students about the quality of the school’s lunch program. Which method will create the least biased results?
   1) Twenty-five vegetarians are randomly surveyed.
   2) Twenty-five students are randomly chosen from each grade level.
   3) Students who dislike the school’s lunch program are chosen to complete the survey.
   4) A booth is set up in the cafeteria for the students to voluntarily complete the survey.

5 The operator of the local mall wants to find out how many of the mall's employees make purchases in the food court when they are working. She hopes to use these data to increase the rent and attract new food vendors. In total, there are 1023 employees who work at the mall. The best method to obtain a random sample of the employees would be to survey
   1) all 170 employees at each of the larger stores
   2) 50% of the 90 employees of the food court
   3) every employee
   4) every 30th employee entering each mall entrance for one week
6 Which statement regarding biased sampling is false?
1) Online sampling is biased because only the people who happen to visit the web site will take the survey.
2) A radio call-in survey is biased because only people who feel strongly about the topic will respond.
3) A survey handed to every third person leaving a library is biased because everyone leaving the library was not asked to participate.
4) Asking for experts to take a survey is biased because they may have particular knowledge of the topic.

7 A school wants to add a coed soccer program. To determine student interest in the program, a survey will be taken. In order to get an unbiased sample, which group should the school survey?
1) every third student entering the building
2) every member of the varsity football team
3) every member in Ms. Zimmer’s drama classes
4) every student having a second-period French class

8 A random sample of 100 people that would best estimate the proportion of all registered voters in a district who support improvements to the high school football field should be drawn from registered voters in the district at a
1) football game
2) supermarket
3) school fund-raiser
4) high school band concert

9 Four hundred licensed drivers participated in the math club's survey on driving habits. The table below shows the number of drivers surveyed in each age group.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Number of Drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-25</td>
<td>150</td>
</tr>
<tr>
<td>26-35</td>
<td>129</td>
</tr>
<tr>
<td>36-45</td>
<td>33</td>
</tr>
<tr>
<td>46-55</td>
<td>57</td>
</tr>
<tr>
<td>56-65</td>
<td>31</td>
</tr>
</tbody>
</table>

Which statement best describes a conclusion based on the data in the table?
1) It may be biased because no one younger than 16 was surveyed.
2) It would be fair because many different age groups were surveyed.
3) It would be fair because the survey was conducted by the math club students.
4) It may be biased because the majority of drivers surveyed were in the younger age intervals.

10 A survey is being conducted to determine which school board candidate would best serve the Yonkers community. Which group, when randomly surveyed, would likely produce the most bias?
1) 15 employees of the Yonkers school district
2) 25 people driving past Yonkers High School
3) 75 people who enter a Yonkers grocery store
4) 100 people who visit the local Yonkers shopping mall
11 A survey is being conducted to determine if a cable company should add another sports channel to their schedule. Which random survey would be the least biased?
1) surveying 30 men at a gym
2) surveying 45 people at a mall
3) surveying 50 fans at a football game
4) surveying 20 members of a high school soccer team

12 A local government is planning to increase the fee for use of a campsite. If a survey were taken, which group would be most biased in their opposition to the increase?
1) teachers
2) soccer players
3) postal workers
4) campers

13 A cell phone company is conducting a survey to determine the cell phone features that its customers use. Which survey is least biased?
1) The company conducts the survey on teenagers.
2) The company conducts the survey on all age groups.
3) The company conducts the survey on retired females.
4) The company conducts the survey on middle-aged males.

14 Erica is conducting a survey about the proposed increase in the sports budget in the Hometown School District. Which survey method would likely contain the most bias?
1) Erica asks every third person entering the Hometown Grocery Store.
2) Erica asks every third person leaving the Hometown Shopping Mall this weekend.
3) Erica asks every fifth student entering Hometown High School on Monday morning.
4) Erica asks every fifth person leaving Saturday’s Hometown High School football game.

15 A survey completed at a large university asked 2,000 students to estimate the average number of hours they spend studying each week. Every tenth student entering the library was surveyed. The data showed that the mean number of hours that students spend studying was 15.7 per week. Which characteristic of the survey could create a bias in the results?
1) the size of the sample
2) the size of the population
3) the method of analyzing the data
4) the method of choosing the students who were surveyed

16 The yearbook staff has designed a survey to learn student opinions on how the yearbook could be improved for this year. If they want to distribute this survey to 100 students and obtain the most reliable data, they should survey
1) every third student sent to the office
2) every third student to enter the library
3) every third student to enter the gym for the basketball game
4) every third student arriving at school in the morning

17 A survey is to be conducted in a small upstate village to determine whether or not local residents should fund construction of a skateboard park by raising taxes. Which segment of the population would provide the most unbiased responses?
1) a club of local skateboard enthusiasts
2) senior citizens living on fixed incomes
3) a group opposed to any increase in taxes
4) every tenth person 18 years of age or older walking down Main St.
18 Four surveys are described below. Which survey methodology would lead to the least biased conclusion?

1) One hundred randomly chosen heart surgeons were polled by telephone about how to get children to eat healthier foods.
2) A country and western radio station asked one hundred of its listeners to call a telephone number and answer a question about rap music.
3) From calls made to one hundred randomly generated telephone numbers, people replied to a question about television shows they watch.
4) The first one hundred people who left the World of Baseball Bookstore replied to a question about the importance of baseball to society.

19 Which survey is least likely to contain bias?

1) surveying a sample of people leaving a movie theater to determine which flavor of ice cream is the most popular
2) surveying the members of a football team to determine the most watched TV sport
3) surveying a sample of people leaving a library to determine the average number of books a person reads in a year
4) surveying a sample of people leaving a gym to determine the average number of hours a person exercises per week

20 A principal is concerned about the decline in the number of students who purchase food from the cafeteria. A survey was developed to assist the principal. The most appropriate method would be for the principal to randomly select 100 students from

1) the junior class
2) the student directory
3) the Algebra 2/Trigonometry classes
4) the students who are eating during fourth period lunch in the cafeteria

21 High school officials wanted to assess the need for a new diving board. They created a survey and distributed it to a large, diverse crowd at the State Swim Meet held at their school. Which characteristic of the survey is most likely to create a bias?

1) the number of participants
2) the height of the participants
3) the way the set of data from the survey was analyzed
4) the way the participants were selected to take the survey

22 Which method of collecting data would most likely result in an unbiased random sample?

1) selecting every third teenager leaving a movie theater to answer a survey about entertainment
2) placing a survey in a local newspaper to determine how people voted in the 2004 presidential election
3) selecting students by the last digit of their school ID number to participate in a survey about cafeteria food
4) surveying honor students taking Mathematics B to determine the average amount of time students in a school spend doing homework each night

23 Chuck's Trucking Company has decided to initiate an Employee of the Month program. To determine the recipient, they put the following sign on the back of each truck.

How's My Driving?
Call 1-555-DRIVING

The driver who receives the highest number of positive comments will win the recognition. Explain one statistical bias in this data collection method.
S.IC.B.3: Analysis of Data 2
Answer Section

1  ANS: 3  
   Self selection causes bias.  
   REF:  061703aii

2  ANS: 1  
   II. Ninth graders drive to school less often; III. Students know little about adults; IV. Calculus students love math!  
   REF:  081602aii

3  ANS: 1  
   Everyone eats, can shop in malls and wear clothes. People who work in a sporting goods store probably watch more sports television than most.  
   REF:  010923ia

4  ANS: 2  
   To determine student opinion, survey the widest range of students.  
   REF:  011313ia

5  ANS: 4  REF:  011801aii

6  ANS: 3  REF:  011404ia

7  ANS: 1  
   To determine student interest, survey the widest range of students.  
   REF:  060803ia

8  ANS: 2  REF:  011910aii

9  ANS: 4  REF:  061022ia

10 ANS: 1  
   Asking school district employees about a school board candidate produces the most bias.  
   REF:  061107ia

11 ANS: 2  
   People at a gym or football game and members of a soccer team are more biased towards sports.  
   REF:  061202ia

12 ANS: 4  REF:  061407ia

13 ANS: 2  
   To determine customer use, survey the widest range of customers.  
   REF:  061610ia

14 ANS: 4  
   Surveying persons leaving a football game about a sports budget contains the most bias.  
   REF:  080910ia
Students entering the library are more likely to spend more time studying, creating bias.

REF: fall0904a2

To determine student interest, survey the widest range of students.

REF: 061610a2

The crowd includes people who are not connected with the high school.

REF: 081603a2

(1) would result in a survey about entertainment in general skewed with too many movie-goers. (2) would result in a survey about an election skewed with too many newspaper-readers. (4) would result in a survey about study habits skewed with too many upperclassmen.

REF: 010815b

Self selection is a cause of bias because people with more free time are more likely to respond.

REF: 061828a11