Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use common sense to determine whether the given event is impossible; possible, but very unlikely; or possible and likely.

1) Andrew rolled a die five times and got a six every time.   1) _____
   A) Possible and likely
   B) Possible, but very unlikely
   C) Impossible

2) Lori rolled three dice and got a total of 2.   2) _____
   A) Possible, but very unlikely
   B) Possible and likely
   C) Impossible

3) When Amina took a four-day Thanksgiving vacation in Seattle, it rained every day.   3) _____
   A) Possible, but very unlikely
   B) Impossible
   C) Possible and likely

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

4) Use the data in the table to answer the question. The x-values are amounts of saturated fat   4) _____
   (in grams) in various regular two-ounce muffins. The y-values are amounts of saturated
   fat (in grams) in various "low fat" two-ounce muffins.

   Amounts of Saturated Fat in Regular and Low-Fat Muffins

x	5.8	6.5	4.2	5.7	5.2	3.8
y	1.2	2.1	2.1	0.7	2.2	0.9

   Is each x-value matched with a corresponding y-value? That is, is each x-value associated
   with the corresponding y-value in some meaningful way? If the x- and y-values are not
   matched, does it make sense to use the difference between each x-value and the y-value
   that is in the same column?

5) The table shows the weights, in pounds, of seven subjects before and after following a   5) _____
   particular diet for two months. Assume that the x-values are the weights before the diet
   and the y-values are the weights after the diet.

Subject	A	B	C	D	E	F	G
Before	195	159	167	169	162	166	174
After	188	150	165	174	148	168	162

   Are the x-values matched with the corresponding y-values? That is, is each x-value
   associated with the corresponding y-value in some meaningful way? If the x- and
   y-values are matched, does it make sense to use the difference between each x-value and
   the y-value that is in the same column? Why or why not?

Form a conclusion about statistical significance. Do not make any formal calculations. Either use the results provided or make subjective judgments about the results.

6) Charlie's teacher claims that he does not study and just guesses on exams. On an exam with 201 true-false questions, Charlie answered 53.7% of the questions correctly. Calculations using these results show that if he were really just guessing, there would be roughly 1 chance in 7 that he would do this well. Is there statistically significant evidence against the teacher's claim that Charlie is just guessing? Why or why not?

6) _____

Provide an appropriate response.

7) An article stated that last year 807 people taking a certain medication suffered from serious side effects while this year, after the medication had been modified, only 391 suffered serious side effects. What information is missing? Why would it be important to include this information?

7) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine whether the given value is a statistic or a parameter.

8) A sample of 120 employees of a company is selected, and the average age is found to be 37 years.

8) _____
    A) Statistic   B) Parameter

9) After taking the first exam, 15 of the students dropped the class.

9) _____
    A) Parameter   B) Statistic

10) A health and fitness club surveys 40 randomly selected members and found that the average weight of those questioned is 157 lb.

10) _____
    A) Statistic   B) Parameter

Determine whether the given value is from a discrete or continuous data set.

11) The number of freshmen entering college in a certain year is 621.

11) _____
    A) Discrete   B) Continuous

12) The temperature of a cup of coffee is 67.3°F.

12) _____
    A) Discrete   B) Continuous

13) The number of limbs on a 2-year-old oak tree is 21.

13) _____
    A) Continuous   B) Discrete

14) The weight of Bill's pack as he sets off on a backpacking trip is 48.3 lb.

14) _____
    A) Discrete   B) Continuous

Determine which of the four levels of measurement (nominal, ordinal, interval, ratio) is most appropriate.

15) The temperatures of eight different plastic spheres.

15) _____
    A) Ordinal   B) Ratio   C) Nominal   D) Interval

16) The sample of spheres categorized from softest to hardest.

16) _____
    A) Ratio   B) Nominal   C) Interval   D) Ordinal

17) Salaries of college professors.

17) _____
    A) Ordinal   B) Nominal   C) Ratio   D) Interval

18) Temperatures of the ocean at various depths.
    A) Nominal   B) Ratio   C) Interval   D) Ordinal

18) _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Identify the sample and population. Also, determine whether the sample is likely to be representative of the population.

19) An employee at the local ice cream parlor asks three customers if they like chocolate ice cream.

19) _____

Use critical thinking to develop an alternative conclusion.

20) A study shows that adults who work at their desk all day weigh more than those who do not. Conclusion: Desk jobs cause people to gain weight.

20) _____

Use critical thinking to address the key issue.

21) An airline company advertises that 100% of their flights are on time after checking 5 randomly selected flights and finding that these 5 were on time.

21) _____

22) You plan to make a survey of 200 people. The plan is to talk to every 10th person coming out of the school library. Is there a problem with your plan?

22) _____

23) A researcher published this survey result: "74% of people would be willing to spend 10 percent more for energy from a non-polluting source". The survey question was announced on a national radio show and 1,200 listeners responded by calling in. What is wrong with this survey?

23) _____

24) A company accused of downsizing workers defended itself with the following statement: "Yes, we were forced to lay off 20% of our workforce last year, but this year we increased our workforce by 20%, and we therefore now have the same number of employees as before the layoff." What is the flaw in this argument?

24) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Perform the requested conversions. Round decimals to the nearest thousandth and percents to the nearest tenth of a percent, if necessary.

25) Convert the fraction $\frac{4}{9}$ to an equivalent decimal and percentage.

25) _____

    A) 0.444, 44.4%   B) 0.564, 56.4%   C) 0.444, 4.44%   D) 0.564, 564%

26) Convert 0.6 to an equivalent fraction and percentage.

26) _____

    A) $\frac{2}{5}$, 6%   B) $\frac{3}{5}$, 60%   C) $\frac{2}{5}$, 60%   D) $\frac{3}{5}$, 6%

27) Convert 0.296 to an equivalent fraction and percent.

27) _____

    A) $\frac{36}{125}$, 29.6%   B) $\frac{37}{125}$, 29.6%   C) $\frac{36}{125}$, 2.96%   D) $\frac{37}{125}$, 2.96%

28) Convert 2.5 to an equivalent fraction and percent.

28) _____

    A) $2\frac{1}{2}$, 25%   B) 2, 25%   C) 2, 250%   D) $2\frac{1}{2}$, 250%

Solve the problem.

29) A gardener has 78 clients, 10% of whom are businesses. Find the number of business clients. 29) _____

    A) 8 clients   B) 10 clients   C) 76 clients   D) 70 clients

30) Alex and Juana went on a 116-mile canoe trip with their class. On the first day they traveled 29 30) _____
miles. What percent of the total distance did they canoe?

    A) 0.25%   B) 400%   C) 25%   D) 4%

31) On a test, 86% of the questions are answered correctly. If 215 questions are correct, how many 31) _____
questions are on the test?

    A) 250   B) 86   C) 43   D) 40

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

32) A bus company claims that in the past year it has reduced the number of late departures 32) _____
of buses by 100%. What is wrong with this statement?

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine whether the given description corresponds to an observational study or an experiment.

33) A marketing firm does a survey to find out how many people use a product. Of the one hundred 33) _____
people contacted, fifteen said they use the product.

    A) Observational study   B) Experiment

34) A clinic gives a drug to a group of ten patients and a placebo to another group of ten patients to 34) _____
find out if the drug has an effect on the patients' illness.

    A) Observational study   B) Experiment

35) A political pollster reports that his candidate has a 10% lead in the polls with 10% undecided. 35) _____

    A) Observational study   B) Experiment

36) A doctor performs several diagnostic tests to determine the reason for a patient's illness. 36) _____

    A) Observational study   B) Experiment

Identify which of these types of sampling is used: random, stratified, systematic, cluster, convenience.

37) 49, 34, and 48 students are selected from the Sophomore, Junior, and Senior classes with 496, 348, 37) _____
and 481 students respectively.

    A) Cluster
    B) Random
    C) Systematic
    D) Stratified
    E) Convenience

38) A sample consists of every 49th student from a group of 496 students. 38) _____

    A) Convenience
    B) Random
    C) Stratified
    D) Cluster
    E) Systematic

39) A pollster uses a computer to generate 500 random numbers, then interviews the voters corresponding to those numbers.   39) _____
   A) Random
   B) Cluster
   C) Convenience
   D) Stratified
   E) Systematic

40) An education researcher randomly selects 48 middle schools and interviews all the teachers at each school.   40) _____
   A) Systematic
   B) Random
   C) Convenience
   D) Stratified
   E) Cluster

41) A researcher interviews 19 work colleagues who work in his building.   41) _____
   A) Stratified
   B) Convenience
   C) Systematic
   D) Cluster
   E) Random

Provide an appropriate response.

42) An education expert is researching teaching methods and wishes to interview teachers from a particular school district. She randomly selects ten schools from the district and interviews all of the teachers at the selected schools. Does this sampling plan result in a random sample? Simple random sample? Explain.   42) _____
   A) No; no. The sample is not random because teachers in small schools are more likely to be selected than teachers in larger schools. It is not a simple random sample because some samples are not possible, such as a sample that includes teachers from schools that were not selected.
   B) Yes; yes. The sample is random because all teachers have the same chance of being selected. It is a simple random sample because all samples have the same chance of being selected.
   C) Yes; no. The sample is random because all teachers have the same chance of being selected. It is not a simple random sample because some samples are not possible, such as a sample that includes teachers from schools that were not selected.
   D) No; yes. The sample is not random because teachers in small schools are more likely to be selected than teachers in larger schools. It is a simple random sample because all samples have the same chance of being selected.

43) A researcher obtains an alphabetical list of the 2560 students at a college. She uses a random
    number generator to obtain 50 numbers between 1 and 2560. She chooses the 50 students
    corresponding to those numbers. Does this sampling plan result in a random sample? Simple
    random sample? Explain.

43) _____

    A) No; yes. The sample is not random because not all students have the same chance of being
       selected. It is a simple random sample because all samples of 50 students have the same
       chance of being selected.
    B) Yes; yes. The sample is random because all students have the same chance of being selected.
       It is a simple random sample because all samples of 50 students have the same chance of
       being selected.
    C) No; no. The sample is not random because not all students have the same chance of being
       selected. It is not a simple random sample because some samples are not possible, such as a
       sample containing the the first 50 students on the list.
    D) Yes; no. The sample is random because all students have the same chance of being selected.
       It is not a simple random sample because some samples are not possible, such as a sample
       containing the first 50 students on the list.

Identify the type of observational study (cross-sectional, retrospective, prospective).

44) A statistical analyst obtains data about ankle injuries by examining a hospital's records from the
    past 3 years.

44) _____

    A) Cross-sectional   B) Prospective   C) Retrospective   D) None of these

45) A researcher plans to obtain data by following those in cancer remission since January of 2005.

45) _____

    A) Prospective   B) Cross-sectional   C) Retrospective   D) None of these

46) A town obtains current employment data by polling 10,000 of its citizens this month.

46) _____

    A) Prospective   B) Cross-sectional   C) Retrospective   D) None of these

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

47) In a clinical trial for a new headache medication, participants are randomly assigned to a
    treatment group or a placebo group. They do not know whether they are receiving the
    medication or a placebo. However the doctors administering the medication and
    evaluating the results do know which participants are receiving the medication. This
    experiment is blind but not double blind. Explain what this means and why the absence of
    double blinding could cause a problem.

47) _____

1) B
2) C
3) C
4) The x-values are not matched with the y-values, so it does not make sense to use the differences between each x-value and the y-value that is in the same column.
5) The x-values are matched with the corresponding y-values. It makes sense to use the difference between each x-value and the y-value that is in the same column. Both represent weights measured in pounds and both are associated with the same person. The x-value is the weight of a person before the diet and the y-value in the same column is the weight of the same person after the diet. The difference represents the amount of weight lost (or gained) by that person.
6) No; The exam result of 53.7% is not substantially greater than 50%. Even if Charlie were just guessing, he could easily do this well just by chance.
7) There is no context to the data. The article should include the number of people taking the medication last year and this. More important than the number suffering serious side effects is the percentage of those taking the medication that suffer side effects. Although fewer people suffered side effects this year, it is possible (if fewer people are taking the medication this year) that the percentage suffering side effects has actually increased.
8) A
9) A
10) A
11) A
12) B
13) B
14) B
15) D
16) D
17) C
18) C
19) Sample: the 3 selected customers; population: all customers; not representative
20) Desk job workers are confined to their chairs for most of their work day. Other jobs require standing or walking around which burns calories. It is probably the lack of exercise that causes higher weights, not the desk job itself. Avoid causality altogether by saying lack of walking and exercise is associated with higher weights.
21) The sample was too small.
22) People who don't go to the library are excluded.
23) This is a voluntary response sample. The survey is based on voluntary, self-selected responses and therefore has serious potential for bias.
24) Answers will vary. Possible answer: This is a misleading use of percentages, as 20% of the reduced workforce is smaller than 20% of the original workforce. The company therefore did not hire as many new workers as it originally laid off. The size of the current workforce is therefore smaller than the size of the workforce before the layoffs.
25) A
26) B
27) B
28) D
29) A
30) C
31) A
32) A reduction of 100% would mean that the company had reduced the number of late departures to zero which is not plausible.
33) A
34) B
35) A

36) B
37) D
38) E
39) A
40) E
41) B
42) C
43) B
44) C
45) A
46) B
47) This experiment is blind because participants do not know whether they are receiving the treatment or a placebo. This will allows investigators to determine whether the treatment effect is significantly different from the placebo effect. However, the experiment is not double blind because the doctors administering the medication and evaluating the results know which participants are receiving the medication. The doctors may not be impartial and their evaluation and analysis of results could be influenced by their knowledge of which participants are receiving the treatment.