Name_____

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

Provide an appropriate response.

1) The table below shows the average income by age group for the residents of one town in the year 1998. The average incomes for each age group are estimates based on a sample of size 100 from each group.

Age group	Average income
18–24	$17,180
25–39	$26,661
40–54	$32,471
55–70	$25,960
Over 70	$18,241

Classify the study as either descriptive or inferential.
   A) Descriptive   B) Inferential

1) _____

Answer the question.

2) An employee at the local ice cream parlor asks three customers if they like chocolate ice cream. Identify the sample and population.
   A) Sample: all customers; population: the 3 selected customers
   B) Sample: the 3 selected customers; population: the customers who like chocolate ice cream
   C) Sample: the 3 selected customers; population: all customers
   D) Sample: the customers who like chocolate ice cream; population: all customers

2) _____

Identify the study as an observational study or a designed experiment.

3) In a clinical trial, 780 participants suffering from high blood pressure were randomly assigned to one of three groups. Over a one–month period, the first group received the experimental drug, the second group received a placebo, and the third group received no treatment. The diastolic blood pressure of each participant was measured at the beginning and at the end of the period and the change in blood pressure was recorded. The average change in blood pressure was calculated for each of the three groups and the three averages were compared.
   A) Designed experiment   B) Observational study

3) _____

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

Provide an appropriate response.

4) At one hospital in 1992, 674 women were diagnosed with breast   4) _____
cancer. Five years later, 88% of the Caucasian women and 63% of
the African American women were still alive. This observational
study shows an association between race and breast cancer
survival--that Caucasian women are more likely to survive breast
cancer than African American women. How could this study be
modified to make it a designed experiment? Comment on the
feasibility of the designed experiment that you described.

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

List all possible samples from the specified population.

5) The finalists in an essay competition are Lisa (L), Melina (M), Ben (B),   5) _____
Danny (D), Eric (E), and Joan (J). Consider these finalists to be a
population of interest. List the 20 possible samples (without replacement)
of size three from this population of six finalists.
A) L,M,B L,M,D L,M,E L,M,J L,B,D L,B,E L,B,J L,D,E L,D,J
L,E,J
M,B,D M,B,E M,B,J M,D,E M,D,J M,E,J M,L,B M,L,D M,L,J
B,D,E
B) L,M,B L,M,D L,M,E L,M,J L,B,D L,B,E L,B,J L,D,E L,D,J
L,E,J
M,B,D M,B,E M,B,J M,D,E M,D,J M,E,J B,D,E B,D,J B,E,J
D,E,J
C) L,M,B L,M,D L,M,E L,M,J L,B,D L,B,E L,B,J L,D,E L,D,J
L,E,J
L,L,M L,L,B L,L,D L,L,E L,L,J M,M,B M,M,D M,M,E M,M,J
B,B,D
D) L,M,B L,M,D L,M,E L,M,J L,B,D L,B,E L,B,J L,D,E L,D,J
L,L,M
M,B,D M,B,E M,B,J M,D,E M,D,J M,M,J B,D,E B,B,J B,E,J
D,D,J

Provide an appropriate response.

6) The finalists in an essay competition are Lisa (L), Melina (M), Ben (B), Danny (D), Eric (E), and Joan (J). Consider these finalists to be a population of interest. The possible samples (without replacement) of size three that can be obtained from this population of six finalists are as follows.

     L,M,B L,M,D L,M,E L,M,J L,B,D L,B,E
     L,B,J L,D,E L,D,J L,E,J M,B,D M,B,E
     M,B,J M,D,E M,D,J M,E,J B,D,E B,D,J
     B,E,J D,E,J

If a simple random sampling method is used to obtain a sample of three of the finalists, what are the chances of selecting Ben, Danny, and Joan?

  A) $\dfrac{1}{20}$ B) $\dfrac{1}{2}$ C) $\dfrac{3}{20}$ D) $\dfrac{1}{3}$

6) _____

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

Use the random number table in Appendix A to obtain the required list of random numbers.

7) A company employs 5382 people and wishes to interview a random sample of 14 of them with regard to the company's health insurance policy. Construct a list of 14 random numbers between 1 and 5382 that can be used in obtaining the required simple random sample. Use the random number table and use as your starting point the digits 0691 in row 3, columns 30–33.

7) _____

Provide an appropriate response.

8) A college lecturer has devised a new method of teaching a particular mathematical concept and wishes to try out this teaching method on a representative sample of his students. There are 76 students in his class and he wishes to obtain a simple random sample of 25 of them. Describe a method which would be unlikely to yield a representative sample.

8) _____

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

9) At a college there are 120 freshmen, 90 sophomores, 110 juniors, and 80 seniors. A school administrator selects a simple random sample of 12 of the freshmen, a simple random sample of 9 of the sophomores, a simple random sample of 11 of the juniors, and a simple random sample of 8 of the seniors. She then interviews all the students selected. Identify the type of sampling used in this example.
  A) Systematic random sampling
  B) Stratified sampling
  C) Cluster sampling
  D) Simple random sampling

9) _____

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

10) The effects of global warming on the planet have received increased national attention in recent years. But how many U.S. adults would be willing to change certain personal behaviors in order to help reverse the effects of global warming? A major pollster conducted a telephone poll of 1010 U.S. adults to determine the answer to the following questions: (1) Is public transportation a viable option for you? (2) If not, do you own a hybrid vehicle or one that gets more than an overall average of 30 miles per gallon? (3) If not, would you be willing to purchase a hybrid vehicle within the five years? Respondents were also asked questions about age, sex, race, education, region, and household income to ensure that results represented a cross section of U.S. adults.
i) What kind of sampling design was used in this survey? Explain your answer.
ii) If 89% of the respondents answered the first question in the negative, what was the approximate sample size for the second question?
iii) If 75% of those responding to the second question answered "no," what was the approximate size for the third question?

10) _____

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

A designed experiment is described. Identify the specified element of the experiment.

11) In a clinical trial, 780 participants suffering from high blood pressure were randomly assigned to one of three groups. Over a one–month period, the first group received a low dosage of an experimental drug, the second group received a high dosage of the drug, and the third group received a placebo. The diastolic blood pressure of each participant was measured at the beginning and at the end of the period and the change in blood pressure was recorded. Identify the levels of the factor.
  A) The experimental drug
  B) High blood pressure, low blood pressure
  C) Placebo, low dosage, high dosage
  D) Diastolic blood pressure at the start, diastolic blood pressure at the end

11) _____

12) An education researcher was interested in examining the effect of the   12) _____
teaching method and the effect of the particular teacher on students'
scores on a reading test. In a study, there are two different teachers (Juliana
and Felix) and three different teaching methods (method A, method B, and
method C). The number of students participating in the study is 258.
Students are randomly assigned to a teaching method and teacher.
Identify the treatments.
  - A) Juliana and method A, Juliana and method B, Juliana and method
    C, Felix and method A, Felix and method B, Felix and method C
  - B) Juliana, Felix, Sonia, and Helen
  - C) Method A, method B, method C
  - D) Teaching method and teacher

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

Provide an appropriate response.

13) In a clinical trial, each participant will receive a placebo, a low   13) _____
dosage of a drug, or a high dosage of the drug. The participants
consist of 90 men and 90 women. The 90 men are randomly
divided into three groups of 30 men each. Each group of men is
randomly assigned to a different treatment (placebo, low dose, or
high dose). Likewise, the 90 women are randomly divided into
three groups of 30 women each. Each group of women is
randomly assigned to a different treatment (placebo, low dose, or
high dose). Is this a completely randomized design or a
randomized block design? Explain your answer.

14) An agricultural researcher wishes to compare the yield of four   14) _____
different varieties of wheat. 64 plots of land are available for an
experiment. On each plot of land one of the varieties of wheat will
be grown. At the end of the experiment the yield for the different
varieties will be compared. 32 of the plots are at one site (site A)
and the other 32 are at another site (site B). The soil at site A
differs significantly from the soil at site B. If the researcher wishes
to design an experiment using completely randomized design,
how could the wheat varieties be assigned to the different plots?

15) Describe a double–blind experiment and explain why blinding is   15) _____
used. Define the term "placebo effect" as part of the answer.

1) B
2) C
3) A
4) To make the study a designed experiment, a researcher could start with a randomly chosen group of women who had been diagnosed with breast cancer in 1992. The women would then be divided into two groups: Caucasian women and African American women. The two groups of women would be required to receive the exact same cancer treatment over the next five years; then the survival rates would be recorded. This designed experiment may be infeasible because some of the women may not wish to receive the treatment provided versus a treatment that could be more appropriate to their case (radiation, chemotherapy, surgery) or any cancer treatment whatsoever. Controlling the treatment method may not be sufficient to establish whether there is a causation between race and survival rate. Other factors may affect the survival statistics, such as economic status, age, other health factors, etc.
5) B
6) A
7) 691, 3863, 3034, 978, 4584, 99, 362, 245, 1788, 4947, 471, 1562, 684, 2598
8) Answers will vary. Possible answer: The lecturer stands at the door of his classroom and tells the first 25 students to arrive to class that they are invited to a special bonus session of class to be held at some upcoming date. This is unlikely to yield a representative sample as the students who show up to class first could possibly be the ones who are more conscientious and hard–working. Or, the students may refuse to volunteer for an extra class period, so the lecturer's sample would be too small to be a representative sample.
9) B
10) i) This is a poll taken by calling randomly selected U.S. adults. Thus, the sampling design appears to be simple random sampling, although it is possible that a more complex, multi–stage design was used to ensure that various political, educational, or other types of groups were proportionately represented in the sample.
ii) The approximate sample size for the second question was 89% of 1010, or 899.
iii) The approximate sample size for the second question was 75% of 899, or 674.
11) C
12) A
13) This is a randomized block design. Explanations will vary.
14) Answers will vary. Possible answer: Randomly divide the 64 plots into four groups of 16 plots each. Randomly assign each group of plots to a different variety of wheat.
15) A double–blind experiment is one in which neither the subjects nor the researchers know who is getting the treatment. Blinding is when the subject does not know whether he or she is receiving a treatment or a placebo. Blinding is used to counteract the placebo effect in which an untreated subject believes he or she is receiving a treatment and reports an improvement in symptoms due to this belief.

Name_____

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

Provide an appropriate response.

1) The table below shows the number of new AIDS cases in the U.S. in each   1) _____
of the years 1989–1994.

Year	New AIDS cases
1989	33,643
1990	41,761
1991	43,771
1992	45,961
1993	103,463
1994	61,301

Classify the study as either descriptive or inferential.
   A) Descriptive   B) Inferential

Answer the question.

2) A magazine publisher mails a survey to every subscriber asking about   2) _____
the quality of its subscription service. The total number of subscribers
represents what?
   A) The population   B) The sample

Identify the study as an observational study or a designed experiment.

3) At one hospital in 1992, 674 women were diagnosed with breast cancer.   3) _____
Five years later, 88% of the Caucasian women and 83% of the African
American women were still alive.
   A) Designed experiment   B) Observational study

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

Provide an appropriate response.

4) Fill in the following blanks: The two major types of statistics are   4) _____
_____ statistics and _____ statistics.

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

List all possible samples from the specified population.

5) The finalists in an essay competition are Lisa (L), Melina (M), Ben (B),   5) _____
   Danny (D), Eric (E), and Joan (J). Consider these finalists to be a
   population of interest. List the 15 possible samples (without replacement)
   of size two from this population of six finalists.
      A) D,D D,E D,J E,L E,M E,B E,D E,E E,J J,L J,M J,B J,D J,E J,J
      B) L,L L,M L,B L,D L,E L,J M,M M,B
        M,D M,E M,J B,B B,D B,E B,J
      C) L,M L,B L,D L,E L,J M,B M,D
        M,E M,J B,D B,E B,J D,E D,J E,J
      D) L,L L,M L,B L,D L,E L,J M,L M,M
        M,B M,D M,E M,J B,L B,M B,B

Provide an appropriate response.

6) The finalists in an essay competition are Lisa (L), Melina (M), Ben (B),   6) _____
   Danny (D), Eric (E), and Joan (J). Consider these finalists to be a
   population of interest. The possible samples (without replacement) of
   size two that can be obtained from this population of six finalists are as
   follows.

      L,M L,B L,D L,E L,J M,B M,D
      M,E M,J B,D B,E B,J D,E D,J E,J

   If a simple random sampling method is used to obtain a sample of two of
   the finalists, what are the chances of selecting Lisa and Danny?

      A) $\dfrac{1}{6}$ B) $\dfrac{1}{15}$ C) $\dfrac{1}{3}$ D) $\dfrac{2}{15}$

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

Use the random number table in Appendix A to obtain the required list of random numbers.

7) A market researcher is conducting a telephone poll. She has a list   7) _____
   of 581 registered voters and wishes to interview a random
   sample of 12 of them. Construct a list of 12 random numbers
   between 1 and 581 that can be used in obtaining the required
   simple random sample. Use the random number table and use as
   your starting point the digits 432 in row 13, columns 10–12.

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

Provide an appropriate response.

8) True or false? In simple random sampling, each possible sample is   8) _____
   equally likely to be the one obtained.
      A) True   B) False

9) From a group of 496 students, every 49th student starting with the 3rd   9) _____
   student is selected. Identify the type of sampling used in this example.
   A) Systematic random sampling
   B) Stratified sampling
   C) Cluster sampling
   D) Simple random sampling

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

10) Define the terms "stratified sampling", "systematic sampling" and   10) _____
    "cluster sampling". Give examples for each.

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

A designed experiment is described. Identify the specified element of the experiment.

11) In a clinical trial, 780 participants suffering from high blood pressure   11) _____
    were randomly assigned to one of three groups. Over a one–month
    period, the first group received a low dosage of an experimental drug, the
    second group received a high dosage of the drug, and the third group
    received a placebo. The diastolic blood pressure of each participant was
    measured at the beginning and at the end of the period and the change in
    blood pressure was recorded. Identify the experimental units (subjects).
    A) The three different groups
    B) The diastolic blood pressures of the participants
    C) The treatment (i.e., placebo, low dosage of drug, or high dosage of
       drug)
    D) The participants in the experiment

12) An education researcher was interested in examining the effect of the   12) _____
    teaching method and the effect of the particular teacher on students'
    scores on a reading test. In a study, there are four different teachers
    (Juliana, Felix, Sonia, and Helen) and three different teaching methods
    (method A, method B, and method C). The number of students
    participating in the study is 258. Students are randomly assigned to a
    teaching method and teacher. Identify the response variable.
    A) Method A, method B, method C
    B) Score on reading test
    C) Teaching method
    D) Teacher

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

Provide an appropriate response.

13) Explain the difference between an observational study and a   13) _____
    designed experiment.

14) Give an example of a designed experiment. In your experiment, identify the experimental units, the response variable, the factor(s), the levels of each factor, and the treatments.

14) _____

15) An agricultural researcher wishes to compare the yield of four different varieties of wheat. 64 plots of land are available for an experiment. On each plot of land one of the varieties of wheat will be grown. At the end of the experiment the yield for the different varieties will be compared. 32 of the plots are at one site (site A) and the other 32 are at another site (site B). The soil at site A differs significantly from the soil at site B. The researcher wishes to design an experiment. In this example, why might a randomized block design, with blocking by soil type, be preferable to a completely randomized design?

15) _____

1) A
2) A
3) B
4) descriptive and inferential
5) C
6) B
7) 432, 452, 534, 16, 343, 242, 428, 378, 163, 182, 293, 422
8) A
9) A
10) Stratified sampling subdivides the population into at least two different subpopulations (strata) and then draws a simple random sample from each stratum.

Systematic sampling divides the population size by the sample size and rounds the result down to the nearest whole number, m. Then, using a random–number table to obtain a number k between 1 and m, selects for the sample those members numbered k, k + m, k + 2m, and so on.

In cluster sampling, the population is divided into sections, then sections are randomly selected, and then all members of the randomly selected sections are surveyed. Examples will vary.
11) D
12) B
13) Answers will vary. Possible answer: In an observational study, there is no manipulation of the variables and the researchers simply observe characteristics and take measurements. In a designed experiment, the researchers manipulate variables by imposing treatments and controls before observing characteristics and taking measurements.
14) Answers will vary.
15) Answers will vary. Possible answer: by blocking, the researcher can isolate and remove the variation in yield which is due to different soil types. It will then be easier to detect the differences in yield among the four varieties of wheat, if such differences exist.

Name_____

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

Provide an appropriate response.

1) The table below shows the total number of births in the U.S. and the birth rate per 1,000 population in each of the years 1990–1994.

Year	Births	Birth Rate
1990	4,158,512	16.7
1991	4,110,907	16.3
1992	4,065,014	15.9
1993	4,000,240	15.5
1994	3,979,000	15.3

Classify the study as either descriptive or inferential.
   A) Descriptive   B) Inferential

1) _____

Answer the question.

2) A magazine publisher mails a survey to every subscriber asking about the timeliness of its subscription service. The publisher finds that only 4% of the subscribers responded. This 4% represents what?
   A) The population   B) The sample

2) _____

Identify the study as an observational study or a designed experiment.

3) An educational researcher used school records to determine that, in one school district, 84% of children living in two–parent homes graduated high school while 75% of children living in single–parent homes graduated high school.
   A) Designed experiment   B) Observational study

3) _____

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

Provide an appropriate response.

4) Define observational study and designed experiment.

4) _____

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

List all possible samples from the specified population.

5) The members of a board of directors have the following roles: president (P), vice president (V), secretary (S), treasury (T), and fundraiser (F). Consider these board members to be a population of interest. List the 10 possible samples (without replacement) of size two from this population of five board members.

    5) _____

  A) P,P P,V P,S P,T P,F V,V V,S V,T V,F S,S
  B) S,T S,F T,P T,V T,S T,F F,P F,V F,S F,T
  C) P,V P,S P,T P,F V,P V,S V,T V,F S,P S,V
  D) P,V P,S P,T P,F V,S V,T V,F S,T S,F T,F

Provide an appropriate response.

6) The members of a board of directors have the following roles: president (P), vice president (V), secretary (S), treasury (T), and fundraiser (F). Consider these board members to be a population of interest. The possible samples (without replacement) of size two that can be obtained from these five board members are as follows.

    6) _____

P,V P,S P,T P,F V,S V,T V,F S,T S,F T,F

If a simple random sampling method is used to obtain a sample of two of the board members, what are the chances of selecting the secretary and the treasurer?

  A) $\dfrac{1}{10}$ B) $\dfrac{2}{5}$ C) $\dfrac{1}{5}$ D) $\dfrac{1}{20}$

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

Use the random number table in Appendix A to obtain the required list of random numbers.

7) A medical researcher is conducting clinical trials. Of the 60 people participating in the trial, 20 will receive a placebo, 20 will receive the experimental drug, and 20 will constitute the control group. The 20 people who will receive the drug will be selected at random. Construct a list of 20 random numbers between 1 and 60 which can be used in obtaining the required simple random sample. Use the random number table and use as your starting point the digits 54 in row 15, columns 20–21.

    7) _____

Provide an appropriate response.

8) A store manager wishes to determine whether his customers would be prepared to pay a little extra for organic produce. He uses a random number table to choose 50 random numbers between 1 and 200. He stands outside the store on a Monday morning between 9:00 a.m. and 12:00 noon and interviews the people corresponding to the random numbers. For example random number 82 would correspond to the 82nd person to arrive. Do you think that the sample obtained in this way will be representative of all the store's customers?

8) _____

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

9) An education researcher randomly selects 38 schools from one school district and interviews all the teachers at each of the 38 schools. Identify the type of sampling used in this example.
   A) Stratified sampling
   B) Systematic random sampling
   C) Cluster sampling
   D) Simple random sampling

9) _____

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

10) Describe the advantages and disadvantages of cluster sampling as compared with simple random sampling.

10) _____

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

A designed experiment is described. Identify the specified element of the experiment.

11) In a clinical trial, 780 participants suffering from high blood pressure were randomly assigned to one of three groups. Over a one–month period, the first group received a low dosage of an experimental drug, the second group received a high dosage of the drug, and the third group received a placebo. The diastolic blood pressure of each participant was measured at the beginning and at the end of the period and the change in blood pressure was recorded. Identify the factor.
   A) The participants in the experiment
   B) The experimental drug
   C) The dosage of the drug
   D) Diastolic blood pressure

11) _____

12) An education researcher was interested in examining the effect of the teaching method and the effect of the particular teacher on students' scores on a reading test. In a study, there are four different teachers (Juliana, Felix, Sonia, and Helen) and three different teaching methods (method A, method B, and method C). The number of students participating in the study is 258. Students are randomly assigned to a teaching method and teacher. Identify the levels of the factor "teaching method".

12) _____

    A) Teaching method and teacher
    B) Method A, method B, method C
    C) Score on reading test
    D) Juliana, Felix, Sonia, and Helen

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

Provide an appropriate response.

13) An education researcher wishes to assess the effectiveness of three different methods for teaching young children to read. The 380 children participating in the study are divided into three groups. The study runs for six months. The children in the first group are taught using method A, the children in the second group are taught using method B, and the children in the third group are taught using method C. At the end of the six months, the reading ability of the children in the different groups is assessed. Why might randomization be used when dividing the children into three groups?

13) _____

14) In a designed experiment, explain the difference between the treatments and the factors.

14) _____

15) In a clinical trial, each participant will receive a placebo, a low dosage of a drug, or a high dosage of the drug. The participants consist of 90 men and 90 women. The 90 men are randomly divided into three groups of 30 men each. Each group of men is randomly assigned to a different treatment (placebo, low dose, or high dose). Likewise, the 90 women are randomly divided into three groups of 30 women each. Each group of women is randomly assigned to a different treatment (placebo, low dose, or high dose). Is this a completely randomized design or a randomized block design? Explain your answer.

15) _____

1) A
2) B
3) B
4) In an observational study, researchers simply observe and measure specific characteristics as in a sample survey. In a designed experiment researchers apply some treatment and controls and then proceed to observe its effects on the subjects and take measurements.
5) D
6) A
7) 54, 2, 3, 41, 24, 19, 8, 30, 4, 6, 36, 15, 14, 40, 1, 5, 39, 42, 58, 10
8) No; explanations will vary. Possible answer: the sample was obtained from among people shopping on a Monday morning. That group is likely to include a relatively large number of people who do no have full time jobs and a relatively large number of parents. This group may tend to have different views than the entire population of customers. People with young children, for example, may be more concerned than most about the health effects of produce grown with pesticides.
9) C
10) Answers will vary. Possible answer: Cluster sampling can save time when members of the population are widely scattered geographically. The disadvantage is that members of a cluster may be more homogeneous than the members of the population as a whole and may not mirror the entire population.
11) B
12) B
13) Answers will vary. Possible answer: randomization is used in order to minimize the effects of possible confounding factors such as aptitude for reading of the children in the different groups. Randomizing helps to ensure that in each group there is a mixture of reading aptitudes. Differences in reading ability between the three groups at the end of the study can then more readily be attributed to the teaching method.
14) Answers will vary. Possible answer: the factors are the variables whose effect on the response variable is of interest. The treatments are the various experimental conditions. In a single-factor experiment, the treatments are the levels of the factor. In a multi-factor experiment, each treatment is a combination of levels of the factors.
15) This is a randomized block design. Explanations will vary.