1. In order to determine if smoking causes cancer, researchers surveyed a large sample of adults. For each adult they recorded whether the person had smoked regularly at any period in his or her life and whether the person had cancer. They then compared the proportion of cancer cases in those who had smoked regularly at some time with the proportion of cases in those who had never smoked regularly at any point. The researchers found there was a higher proportion of cancer cases among those who had smoked regularly than among those who had never smoked regularly. This is
A) an observational study                   B) an experiment, but not a double-blind experiment
C) a double-blind experiment               D) a block design

3. In order to investigate whether women are more likely than men to prefer Democratic candidates, a political scientist selects a large sample of registered voters, both men and women. She asks every voter whether they voted for the Republican or the Democratic candidate in the last election. This is
A) an observational study                   B) a multistage sample
C) a double-blind experiment               D) a block design

4. Can pleasant aromas help a student learn better? Two researchers believed that the presence of a floral scent could improve a person’s learning ability in certain situations. They had 22 people work through a pencil-and-paper maze six times, three times while wearing a floral-scented mask and three times wearing an unscented mask. The three trials for each mask closely followed one another. Testers measured the length of time it took subjects to complete each of the six trials. They reported that, on average, subjects wearing the floral-scented mask completed the maze more quickly than those wearing the unscented mask, although the difference was not statistically significant. This study is
A) a convenience sample                   B) an observational study, not an experiment
C) an experiment, but not a double-blind experiment               D) a double-blind experiment

Choose a simple random sample of size three from the following employees of a small company.

Use the numerical labels attached to the names above and the list of random digits below. Read the list of random digits from left to right, starting at the beginning of the list.
11793 20495 05907 11384 44982 20751 27498 12009 45287 71753 98236 66419 8453

9. Referring to the information above, the simple random sample is
A) 117                   B) Bechhofer, then Bechhofer again, then Taylor
C) Bechhofer, Taylor, Weiss               D) Kesten, Kiefer, Taylor

10. Referring to the information above, which of the following statements is true?
A) If we used another list of random digits to select the sample, we would get the same result that we obtained with the list used here.
B) If we used another list of random digits to select the sample, we would get a completely different sample than that obtained with the list used here.
C) If we used another list of random digits to select the sample, we would get at most one name in common with the sample obtained here.
D) If we used another list of random digits to select the sample, it would be just as likely that the sample that we obtained here would be selected as any other set of three names.

15. In order to assess the opinion of students at the University of Minnesota on campus snow removal, a reporter for the student newspaper interviews the first 12 students he meets who are willing to express their opinion. In this case, the sample is
A) all those students favoring prompt snow removal                   B) all students at universities receiving substantial snow
C) the 12 students interviewed                                    D) all students at the University of Minnesota
17. In order to select a sample of undergraduate students in the United States, I select a simple random sample of four states. From each of these states, I select a simple random sample of two colleges or universities. Finally, from each of these eight colleges or universities, I select a simple random sample of 20 undergraduates. My final sample consists of 160 undergraduates. This is an example of
A) simple random sampling  B) stratified random sampling
C) multistage sampling  D) convenience sampling

18. A simple random sample of 1200 adult Americans is selected, and each person is asked the following question:
In light of the huge national deficit, should the government at this time spend additional money to establish a national system of health insurance? Only 39% of those responding answered yes. This survey
A) is reasonably accurate since it used a large, simple random sample
B) probably overstates the percentage of people that favor a system of national health insurance
C) probably understates the percentage of people that favor a system of national health insurance
D) is very inaccurate, but neither understates nor overstates the percentage of people that favor a system of national health insurance. Since simple random sampling was used, it is unbiased

19. A marketing research firm wishes to determine if the adult men in Laramie, Wyoming, would be interested in a new upscale men's clothing store. From a list of all residential addresses in Laramie, the firm selects a simple random sample of 100 and mails a brief questionnaire to each. The sample in this survey is
A) all adult men in Laramie, Wyoming  B) all residential addresses in Laramie, Wyoming
C) the members of the marketing firm that actually conducted the survey  D) the 100 addresses to which the survey was mailed

22. A news release for a diet products company reports: “There's good news for the 65 million Americans currently on a diet.” Its study showed that people who lose weight can keep it off. The sample was 20 graduates of the company's program who endorse it in commercials. The results of the sample are probably
A) biased, overstating the effectiveness of the diet  B) biased, understating the effectiveness of the diet
C) unbiased since these are nationally recognized individuals  D) unbiased, but they could be more accurate. A larger sample size should be used

23. A marketing research firm wishes to determine if the adult men in Laramie, Wyoming, would be interested in a new upscale men's clothing store. From a list of all residential addresses in Laramie, the firm selects a simple random sample of 100 and mails a brief questionnaire to each. The chance that all 100 homes in a particular neighborhood in Laramie end up being the sample of residential addresses selected is
A) the same as for any other set of 100 residential addresses  B) exactly 0. Simple random samples will spread out the addresses selected
C) reasonably large due to the “cluster” effect  D) 100 divided by the size of the population of Laramie

24. A recent poll conducted by the student newspaper asked, “Who do you believe will win the Ohio State Undergraduate Student Government elections?” In order to vote, one had to access the student newspaper's Web site and record one's vote at the student newspaper's Web page. The results of the poll were summarized in a graphic similar to the one below.

Based on this information,
A) the results of the survey are unreliable since convenience sampling was used
B) the results of the survey are likely to be unreliable since the sample size was very small
C) both of the above
D) Patel and Patel have such a large majority that, even though there are flaws in the poll, they are still almost certain to win
25. The number of undergraduates at Johns Hopkins University is approximately 2000, while the number at Ohio State University is approximately 40,000. At both schools a simple random sample of about 3% of the undergraduates is taken. We conclude that
A) the sample from Johns Hopkins is more accurate than the sample from Ohio State
B) the sample from Johns Hopkins is less accurate than the sample from Ohio State
C) the sample from Johns Hopkins has the same accuracy as the sample from Ohio State
D) it is impossible to make any statements about the accuracies of the two samples since the students surveyed were different

28. You are testing a new medication for relief of depression. You are going to give the new medication to subjects suffering from depression and see if their symptoms have lessened after a month. You have eight subjects available. Half of the subjects are to be given the new medication and the other half a placebo. The names of the eight subjects are given below.
Using the list of random digits 81507 27102 56027 55892 33063 41842 81868 71035 09001 43367 49497
starting at the beginning of this list and using single-digit labels, you assign the first four subjects selected to receive the new medication, while the remainder receive the placebo. The subjects assigned to the placebo are
A) Blumenthal, Costello, Duvall, and Fan  B) Blumenthal, House, Pavlicova, and Tang

29. Sickle-cell disease is a painful disorder of the red blood cells that affects mostly blacks in the United States. To investigate whether the drug hydroxyurea can reduce the pain associated with sickle-cell disease, a study by the National Institute of Health gave the drug to 150 sickle-cell sufferers and a placebo to another 150. The researchers then counted the number of episodes of pain reported by each subject. The response is
A) the drug hydroxyurea  B) the number of episodes of pain
C) the presence of sickle-cell disease  D) the number of red blood cells

Twelve people who suffer from chronic fatigue syndrome volunteer to take part in an experiment to see if shark fin extract will increase one's energy level. 8 of the volunteers are men and 4 are women. Half of the volunteers are to be given shark fin extract twice a day and the other half a placebo twice a day. We wish to make sure that 4 men and 2 women are assigned to each of the treatments, so we decide to use a block design with the men forming one block and the women the other.

30. Referring to the information above, a block design is appropriate in this experiment if
A) we believe men and women will respond differently to treatments
B) gender equity is an important legal consideration in this study
C) we want the conclusions to apply equally to men and women  D) all of the above

31. Referring to the information above, suppose one of the researchers is responsible for determining if a subject displays an increase in energy level. In this case, we should probably
A) use two placebos  B) use stratified sampling to assign subjects to treatments
C) use fewer subjects but observe them more frequently  D) conduct the study as a double-blind experiment

A group of college students believes that herbal tea has remarkable restorative powers. To test their theory they make weekly visits to a local nursing home, visiting with residents, talking with them, and serving them herbal tea. After several months, many of the residents are more cheerful and healthy.

35. The explanatory variable in this experiment is the
A) emotional state of the residents  B) herbal tea  C) fact that this is a local nursing home  D) college students

36. The confounding variable in this experiment is the
A) emotional state of the residents  B) herbal tea  C) fact that this is a local nursing home  D) visits of college students

39. An amateur gardener decides to change varieties of tomatoes for this year to see if the yield is improved. He put in 6 plants the previous year and 6 plants this year using the same part of the garden. The average yield per plant was 11.3 pounds per plant in the previous year and 14.5 pounds per plant using the new variety. This is an example of
A) an experiment  B) an observational study, not an experiment
C) the elimination of all confounding variables by design, since the gardener used the same part of the garden in both years  D) a multistage design, since two years were involved
40. A study to determine whether or not a football filled with helium traveled farther when kicked than one filled with air found that, while the football filled with helium went, on average, farther than the one filled with air, the difference was not statistically significant. The response
A) is the gas, air or helium, with which the football is filled        B) does not exist without statistical significance
C) is the number of kickers D) is the distance the football traveled

One hundred volunteers who suffer from severe depression are available for a study. Fifty are selected at random and are given a new drug that is thought to be particularly effective in treating severe depression. The other 50 are given an existing drug for treating severe depression. A psychiatrist evaluates the symptoms of all volunteers after four weeks in order to determine if there has been substantial improvement in the severity of the depression.

44. The factor in the study above is
A) which treatment the volunteers receive    B) the use of randomization and the fact that this was a comparative study
C) the extent to which the depression was reduced       D) the use of a psychiatrist to evaluate the severity of depression

45. The study described above would be double-blind if
A) neither drug had any identifying marks on it
B) all volunteers were not allowed to see the psychiatrist nor the psychiatrist allowed to see the volunteers during the session during which the psychiatrist evaluated the severity of the depression
C) neither the volunteers nor the psychiatrist knew which treatment any person had received D) all of the above

46. Referring to the study described above, suppose volunteers were first divided into men and women, and then half of the men were randomly assigned to the new drug and half of the women were assigned to the new drug. The remaining volunteers received the other drug. This would be an example of
A) Replication                                    B) confounding. The effects of gender will be mixed up with the effects of the drugs
C) a block design                                  D) a matched-pairs design

48. A researcher conducts a study to investigate the effect of exercise and diet on mood. The factors in this study are
A) whether randomization and placebos were used           B) whether the experiment was double-blind
C) the number of subjects                                 D) exercise and diet

New varieties of corn with altered amino acid patterns may have higher nutritive value than standard corn, which is low in the amino acid lysine. An experiment compares two new varieties, called opaque-2 and floury-2, with normal corn. Corn-soybean meal diets using each type of corn are prepared at three different protein levels, 12%, 16%, and 20%, giving nine diets in all. Researchers assign 10 one-day-old male chicks to each diet and record their weight gains after 21 days. The weight gain of the chicks is a measure of the nutritive value of their diet.

49. Referring to the information above, the experimental units in this experiment are
A) variety and protein level        B) the weight gains       C) the 90 one-day-old male chicks     D) opaque-2 and floury-2

50. Referring to the information above, the factors are
A) variety and protein level        B) the three levels of protein
C) the 90 one-day-old male chicks    D) opaque-2 and floury-2 varieties of corn

54. To simulate a basketball player who makes 75% of his free throws, we use the digits 1, 2, and 3 to correspond to making the free throw and the digit 4 to correspond to missing the free throw. Assume successive shots are independent and we obtain the following sequence of 10 random digits: 19223 95034
Using these digits, the relative frequency of missing a free throw is
A) 1/10                                B) 5/10
C) 1/6                                 D) 5/6

55. To simulate a single roll of a die, we can use the correspondence 1, 2, 3, 4, 5, and 6 in the table of random numbers. For two consecutive rolls we can use the correspondence
A) 11, 22, 33, 44, 55, 66          B) 11, 12, 13, 14, 15, 16, 21, . . . 26, . . . 61, 62, . . . 66, for 36 possible outcomes
C) both (a) and (b)               D) neither (a) nor (b)

Answer Key