Essentials of Statistics for the Behavioral Sciences 4th edition Nolan Test Bank

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Name:_____ Class:_____ Date:_____

Chapter 02: Fill-in-the-Blank

1. A(n) _____ is a data point that has not yet been transformed or analyzed.
ANSWER: raw score

2. A(n) _____ shows the pattern of data by indicating how many participants had each possible score.
ANSWER: frequency table

3. The _____ is obtained by dividing the number of participants in a group by the total number of participants and multiplying by 100.
ANSWER: percentage; percent

4. A(n) _____ table is often used to display data when those data cover a very large range of values.
ANSWER: grouped frequency

5. A(n) _____ looks like a bar graph but typically depicts interval data.
ANSWER: histogram

6. When constructing a histogram and labeling the *x*- and *y*-axis, the lowest number on each axis should ideally be _____.
ANSWER: 0, zero

7. A histogram shares a lot in common with a(n) _____, except that the latter displays frequencies as dots on a graph that are then connected with lines.
ANSWER: frequency polygon

8. A(n) _____ shares a lot in common with a frequency polygon except that the former displays frequencies as bars.
ANSWER: histogram

9. A frequency distribution that is bell-shaped, symmetrical, and unimodal is a(n) _____ distribution.
ANSWER: normal

10. A distribution that has a tail in a positive or negative direction indicates that the distribution is _____.
ANSWER: skewed

11. A frequency distribution that has a tail trailing off to the right of the distribution is _____ skewed.
ANSWER: positively

12. The distribution of incomes of professional athletes in the United States is likely to be _____ skewed.
ANSWER: positively

13. When measuring a driver's time to brake for a red light, the measure is likely to be subject to a(n) _____ effect.
ANSWER: floor

14. When a variable cannot take on values above a certain level, this is known as a(n) _____ effect.

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Chapter 02: Fill-in-the-Blank

ANSWER: ceiling

15. When a variable cannot take on values _____ a certain level, this is known as a ceiling effect.
ANSWER: above

16. When a variable cannot take on values _____ a certain level, this is known as a floor effect.
ANSWER: below

17. When a variable cannot take on values below a certain level, this is known as a(n) _____ effect.
ANSWER: floor

18. Distributions that are negatively skewed can occur when there is a(n) _____ effect.
ANSWER: ceiling

19. Distributions that are positively skewed can occur when there is a(n) _____ effect.
ANSWER: floor

20. If a professor gives an extremely easy quiz to her class, then the quiz scores might show a(n) _____ effect.
ANSWER: ceiling

21. To demonstrate the _____ effect to her Introductory Psychology class, Dr. Stewart gives the students a quiz containing questions that would challenge even her more advanced students. She expects most students to get few if any questions correct, while a few students may get lucky by guessing.
ANSWER: floor

22. To demonstrate the _____ effect to her Introductory Psychology class, Dr. Clarke would need to give her students an easy quiz.
ANSWER: ceiling

23. A frequency distribution that has a tail trailing off to the left of the distribution is _____ skewed.
ANSWER: negatively

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Name:_____ Class:_____ Date:_____

Chapter 02: Multiple Choice

1. A _____ is a data point that has not yet been transformed or analyzed.
   a. frequency table
   b. raw score
   c. frequency distribution
   d. grouped frequency distribution

ANSWER: b

2. Raw data are observations or data points that:
   a. are in their original form.
   b. have been manipulated in some way.
   c. have been plotted on a graph.
   d. are discarded because they appear in error.

ANSWER: a

3. A _____ is a visual depiction of data that shows how often each value occurred.
   a. frequency distribution
   b. frequency table
   c. grouped frequency table
   d. frequency polygon

ANSWER: b

4. Which of these is NOT displayed in a frequency table?
   a. the frequency of observations at each variable value
   b. values outside of the variable's range of observed values
   c. all observed variable values
   d. values in the range for which the frequency is zero

ANSWER: b

5. What is the correct method for calculating a percentage?
   a. Divide the total number of participants by the total number of participants in a group and then multiply by 100.
   b. Divide the total number of participants in a group by the total number of participants and then multiply by 100.
   c. Subtract the total number of participants in a group from the total number of participants and then multiply by 100.
   d. Add the total number of participants in all groups and divide by 100.

ANSWER: b

6. When constructing a frequency table, the first step is to:
   a. count the number of scores at each value and write those numbers in the frequency column.
   b. create two columns.

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Chapter 02: Multiple Choice

c. label one column *Name* and another column *Frequency*.
d. determine the highest and the lowest score.

ANSWER: d

7. When constructing a frequency table, the final step is to:
a. count the number of scores at each value and write those numbers in the frequency column.
b. create two columns.
c. label one column *Name* and another column *Frequency.*
d. determine the highest and the lowest score.

ANSWER: a

8. A teacher calculated her students' test scores and found that overall they did very well. She found that out of the 23 students in the class, 19 of them got a 95 on her test. What percentage of students got a 95?
a. 82.61
b. 88.00
c. 90.61
d. 95.00

ANSWER: a

9. Imagine that 18 out of every 33 homes have a dog in the household. What percentage of homes has a dog?
a. 35.29
b. 18.00
c. 54.55
d. 45.45

ANSWER: c

10. Imagine that 180 people out of a total of 705 people surveyed reported owning a smartphone. What percentage of these individuals surveyed own a smartphone?
a. 18.94
b. 20.34
c. 25.53
d. 34.29

ANSWER: c

11. If 2 out of 3 dentists recommend a certain kind of gum, what percentage of dentists recommend that gum, rounded to the nearest whole number?
a. 23 percent
b. 33 percent
c. 40 percent
d. 67 percent

ANSWER: d

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Name:_____ Class:_____ Date:_____

Chapter 02: Multiple Choice

This table represents the fictional scores of a set of participants who rated their happiness on a scale from 1 to 7, with 1 indicating *very unhappy* and 7 indicating *very happy*.

Table: Happiness

X	Frequency
7	3
6	5
5	11
4	10
3	2
2	1
1	2

12. (Table: Happiness) The most frequently occurring score in this data set is:
    a. 3.
    b. 4.
    c. 5.
    d. 7.

ANSWER: c

13. (Table: Happiness) How many participants rated their happiness as 4 or lower?
    a. 5
    b. 9
    c. 10
    d. 15

ANSWER: d

14. (Table: Happiness) How many people participated in this study (i.e., how many people provided happiness ratings)?
    a. 26
    b. 28
    c. 34
    d. 38

ANSWER: c

15. (Table: Happiness) How many participants rated their happiness as 6 or higher?
    a. 5
    b. 8
    c. 9
    d. 14

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Chapter 02: Multiple Choice

ANSWER: b

16. (Table: Happiness) How many participants did not rate their happiness as either 4 or 5?
    a. 5
    b. 13
    c. 21
    d. 32

ANSWER: b

17. (Table: Happiness) Based on the frequency distribution, what can be said about the level of happiness in this sample of individuals?
    a. Most people are very unhappy.
    b. Most people are very happy.
    c. Most people are neither very unhappy nor very happy.
    d. No conclusion about happiness can be drawn.

ANSWER: c

18. (Table: Happiness) What percentage of participants rated their happiness as 7?
    a. 7.00
    b. 8.82
    c. 14.29
    d. 33.00

ANSWER: b

19. (Table: Happiness) What percentage of participants rated their happiness as 5?
    a. 11.00
    b. 23.53
    c. 32.35
    d. 47.83

ANSWER: c

This table represents the fictional scores of a set of participants who rated their level of depression on a scale from 0 to 10, with 0 indicating *no feelings of depression* and 10 indicating *very depressed*.

Table: Depression

Score	Frequency	Percent
10	1	2.86
9	6	17.14
8	1	2.86
7	1	2.86
6	4	11.43

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Chapter 02: Multiple Choice

5	2	5.71
4	1	2.86
3	1	2.86
2	11	31.43
1	5	?
0	2	5.71

20. (Table: Depression) How many participants rated their depression levels?
    a. 10
    b. 35
    c. 44
    d. 100

ANSWER: b

21. (Table: Depression) How many participants rated their depression as 1?
    a. 1
    b. 2
    c. 5
    d. 11

ANSWER: c

22. (Table: Depression) What percent of participants rated their depression as 1?
    a. 5.00
    b. 14.29
    c. 15.11
    d. 70.00

ANSWER: b

23. (Table: Depression) What percent of participants rated their depression as a 5?
    a. 11.43
    b. 2.00
    c. 5.71
    d. 18.00

ANSWER: c

24. (Table: Depression) How many participants reported their level of depression at 5 or above?
    a. 11
    b. 15
    c. 19
    d. 31

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Chapter 02: Multiple Choice

ANSWER: b

25. (Table: Depression) What was the most frequently reported level of depression?
    a. 0
    b. 2
    c. 11
    d. 15

ANSWER: b

26. A _____ visually depicts data based on intervals rather than frequencies for specific values.
    a. grouped frequency table
    b. frequency table
    c. frequency polygon
    d. normal distribution

ANSWER: a

27. For which situation is a grouped frequency table appropriate?
    a. data set on the weights of 50 adolescents ages 12 to 18
    b. data set on the political affiliation of the students in your statistics class
    c. data set on the number of siblings of 50 adolescents ages 12 to 18
    d. data set on the letter grades of the students in your statistics class

ANSWER: a

28. A grouped frequency table is most useful when the:
    a. scores in the data set vary over a small range of discrete values.
    b. data are ordinal.
    c. data are measured on an interval scale and vary over a large range of continuous values.
    d. data are nominal.

ANSWER: c

This table shows tests scores for a cumulative final in a general education, social science course, such as an introduction to psychology course.

Table: Test Scores

Interval	Frequency
90–99	23
80–89	41
70–79	78
60–69	36
50–59	18
40–49	7

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Chapter 02: Multiple Choice

30–39	12
20–29	3

29. (Table: Test Scores) What kind of frequency distribution is this?
    a. frequency table
    b. histogram
    c. grouped frequency table
    d. frequency polygon

ANSWER: c

30. (Table: Test Scores) Based on this table, how many people passed this test if passing is 60 percent and higher?
    a. 40
    b. 166
    c. 178
    d. 218

ANSWER: c

31. (Table: Test Scores) If passing is a 60 percent and higher, what percent of the class failed this test?
    a. 15.39
    b. 18.35
    c. 19.11
    d. 81.65

ANSWER: b

32. (Table: Test Scores) If grades are further sorted into plus and minus letter grades, for example, the scores from 80–89 are sorted into groupings of B, B+, and B– based on order, how many people would you estimate received a B+?
    a. 0
    b. 13
    c. 41
    d. This cannot be determined based on the information provided.

ANSWER: d

This table depicts the scores of 83 students on an exam that was worth 65 points.

Table: Grouped Frequency Table

Exam Score	Frequency
60–62	3
57–59	9
54–56	21

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Chapter 02: Multiple Choice

51–53	18
48–50	14
45–47	10
42–44	8

33. (Table: Grouped Frequency Table) What seems to be the shape of the distribution represented in this grouped frequency table?
    a. symmetrical
    b. positively skewed
    c. rectangle
    d. negatively skewed

ANSWER: d

34. (Table: Grouped Frequency Table) Which interval has the most common exam score?
    a. 45–47
    b. 48–50
    c. 51–53
    d. 54–56

ANSWER: d

35. (Table: Grouped Frequency Table) Which interval has the least common exam score?
    a. 42–44
    b. 45–47
    c. 57–59
    d. 60–62

ANSWER: d

36. (Table: Grouped Frequency Table) How many students scored below 60?
    a. 71
    b. 74
    c. 80
    d. 83

ANSWER: c

37. Histograms are typically used to depict _____, whereas bar graphs are typically used to depict _____.
    a. scale data; nominal data
    b. nominal data; interval data
    c. means; frequencies
    d. interval data; scale data

ANSWER: a

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Chapter 02: Multiple Choice

38. Histograms typically provide frequencies for _____ data.
    a. nominal
    b. ordinal
    c. scale
    d. discrete

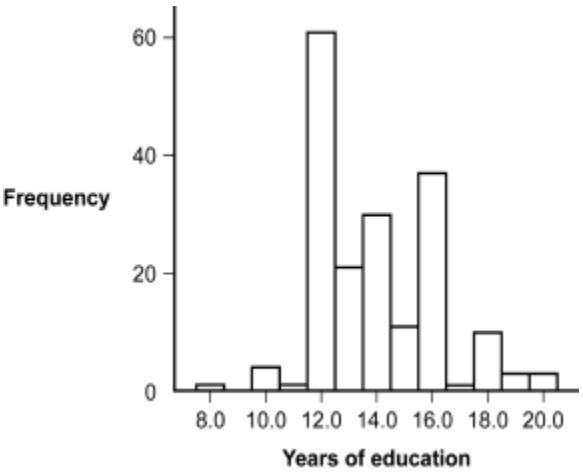
ANSWER: c

39. Bar graphs typically provide scores for _____ data.
    a. nominal
    b. ordinal
    c. interval
    d. ratio

ANSWER: a

This histogram represents the distribution of the number of years of education completed by twins who attended the 16th Annual Twins Day Festival in Twinsburg, Ohio, in August of 1991.

Figure: Years of Education



40. (Figure: Years of Education) Based on the distribution, what is the number of years of education that was completed by most twins?
    a. 12.0
    b. 13.0
    c. 14.0
    d. 16.0

ANSWER: a

41. (Figure: Years of Education) Based on the distribution, how many twins completed 13 years of education?
    a. 11

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b. 12
c. 20
d. 65

ANSWER: c

42. (Figure: Years of Education) What seems to be the shape of this distribution?
a. negatively skewed
b. positively skewed
c. rectangle
d. symmetrical

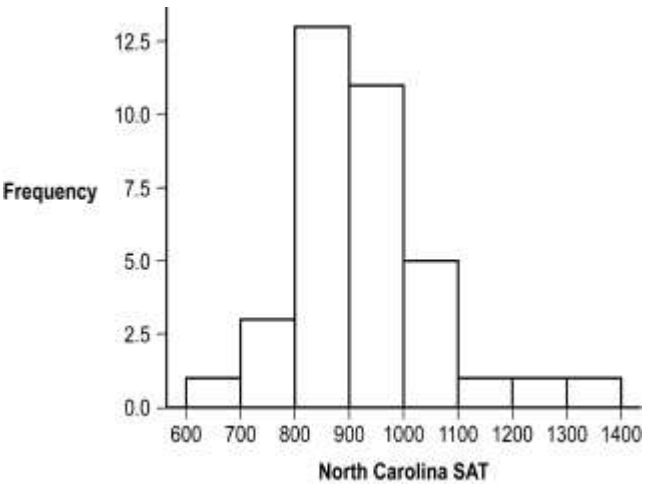
ANSWER: b

This table and figure depict the average SAT scores for entering freshmen in the year 1995 at 36 North Carolina colleges.

Table: North Carolina SAT

825	922	870	1121
990	1230	1302	926
1054	845	826	956
840	923	818	867
600	1030	831	935
890	879	1005	842
780	757	1002	774
915	921	1071	921
915	848	915	813

Figure: Histogram of SAT



43. (Figure: Histogram of SAT) Based on the frequency distribution, approximately how many participants scored 1000 or above?

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Chapter 02: Multiple Choice

a. 3
b. 5
c. 8
d. 19

ANSWER: c

44. (Figure: Histogram of SAT) Based on the frequency distribution, what was the interval with the most common score?
a. 700–799
b. 800–899
c. 900–999
d. 1000–1099

ANSWER: b

45. (Figure: Histogram of SAT) What seems to be the shape of the distribution represented in this histogram?
a. symmetrical
b. positively skewed
c. rectangle
d. negatively skewed

ANSWER: b

46. In a frequency polygon, the *x*-axis represents the:
a. midpoint for every interval.
b. frequencies.
c. raw scores.
d. total number of participants.

ANSWER: a

47. In a frequency polygon, the *y*-axis represents the:
a. midpoint for every interval.
b. frequencies.
c. raw scores.
d. total number of participants.

ANSWER: b

48. A frequency polygon is similar to a histogram EXCEPT that:
a. a frequency polygon can be drawn for a greater range of data values.
b. the polygon is typically used for ordinal rather than interval data.
c. lines are used to connect the midpoint of each interval.
d. in the polygon, frequencies appear on the *x*-axis.

ANSWER: c

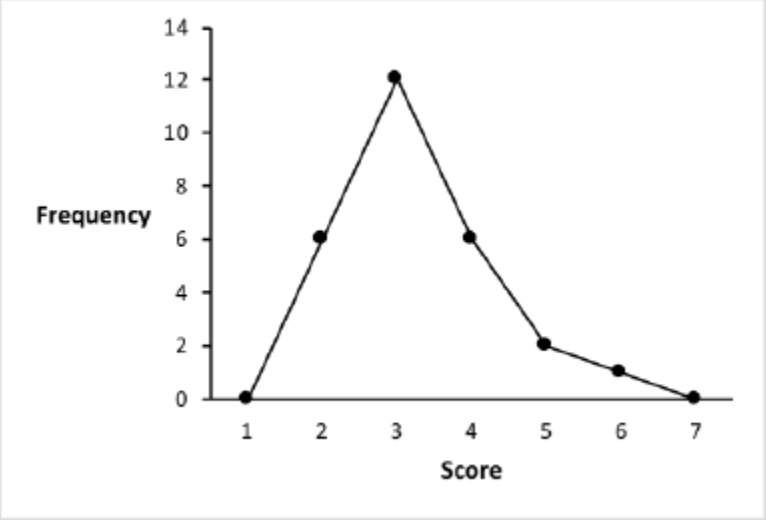
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Chapter 02: Multiple Choice

This polygon represents a fictional distribution of scores.

Figure: Frequency Polygon



49. (Figure: Frequency Polygon) Based on the distribution, how many participants scored 3?
    a. 5
    b. 11.5
    c. 12
    d. 18

ANSWER: c

50. (Figure: Frequency Polygon) Based on the frequency distribution, how many participants scored between 1 and 3?
    a. 2
    b. 3
    c. 6
    d. 18

ANSWER: d

51. (Figure: Frequency Polygon) Based on the frequency distribution, how many participants scored a 6?
    a. 0
    b. 1
    c. 6
    d. 18

ANSWER: b

52. (Figure: Frequency Polygon) Based on the frequency distribution, how many participants scored a 4 or above?
    a. 4

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b. 6
c. 8
d. 9

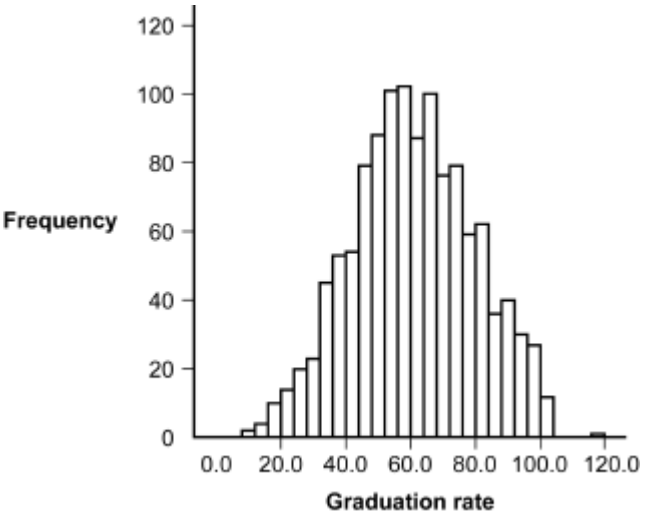
ANSWER: d

53. (Figure: Frequency Polygon) What seems to be the shape of the distribution represented in this frequency polygon?
a. symmetrical
b. positively skewed
c. rectangle
d. negatively skewed

ANSWER: b

This histogram represents the frequency of graduation rates for all U.S. colleges (data collected by *U.S. News & World Report*, 1995).

Figure: Graduation Rates



54. (Figure: Graduation Rates) The shape of the distribution of graduation rates appears to be:
a. normal.
b. rectangular.
c. positively skewed.
d. negatively skewed.

ANSWER: a

55. A normal distribution is also known as a _____ distribution.
a. nonsymmetrical
b. symmetrical
c. skewed

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d. negative

ANSWER: b

56. A bell-shaped curve is similar to all EXCEPT which type of distribution?
a. symmetric
b. normal
c. unimodal
d. positively skewed

ANSWER: d

57. When one tail of the distribution is pulled away from the center, it is known as a(n) _____ distribution.
a. normal
b. nominal
c. skewed
d. interval

ANSWER: c

58. The technical term for a distribution that is lopsided, off-center, or otherwise nonsymmetrical is _____.
a. skewed
b. normal
c. bell-shaped
d. floor-shaped

ANSWER: a

59. Katrina observes and records the number of people who purchase breakfast at a hospital cafeteria. The cafeteria is open from 7:00 A.M. to 11:00 A.M. and employees typically eat breakfast at 9:00 A.M. What type of distribution should Katrina expect to see in her data?
a. normal distribution
b. positively skewed distribution
c. negatively skewed distribution
d. nonsymmetric distribution

ANSWER: a

60. Professor Kellogg calculates the grades on the first exam for her statistics class. She finds that students did really well, with most students scoring 98 or higher. What type of distribution is Professor Kellogg MOST likely to have?
a. normal
b. positively skewed
c. nominal
d. negatively skewed

ANSWER: d

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Chapter 02: Multiple Choice

61. In a _____, the tail of the distribution extends to the right.
    a. negatively skewed distribution
    b. positively skewed distribution
    c. ceiling effect
    d. normal distribution

ANSWER: b

62. In a _____, the tail of the distribution extends to the left.
    a. negatively skewed distribution
    b. positively skewed distribution
    c. normal distribution
    d. floor effect

ANSWER: a

63. A positive skew may have a tail that indicates extreme scores _____ the center of the distribution.
    a. around
    b. below
    c. above
    d. on either side of

ANSWER: c

64. A negative skew may have a tail that indicates extreme scores _____ the center of the distribution.
    a. around
    b. below
    c. above
    d. on either side of

ANSWER: b

65. Positively skewed distributions often result from:
    a. a ceiling effect.
    b. a floor effect.
    c. unimodal curves.
    d. a symmetrical distribution.

ANSWER: b

66. Negatively skewed distributions often result from:
    a. a ceiling effect.
    b. a floor effect.
    c. unimodal curves.
    d. a symmetrical distribution.

ANSWER: a

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Chapter 02: Multiple Choice

67. Johanna is trying to measure the vertical leap of athletes on the women's basketball team at her university. Unfortunately, the ruler she is using is only 15 inches long and many women can jump much higher than the length of her ruler. If she records all women who jump higher than 15 inches as jumping 15 inches, this will likely create a _____.

a. normal distribution
b. floor effect
c. ceiling effect
d. positive skew

ANSWER: c

68. A researcher wanted to find the tallest person in a group of 20 women. Although he found that the tallest woman in the group measured 6 feet tall, his measurement was compromised by the fact that his scale reached only 6 feet. This example BEST illustrates which concept?

a. the floor effect
b. a skewed distribution
c. the ceiling effect
d. a negative skew

ANSWER: c

69. Professor Kellogg calculates the grades on the first exam for her statistics class. She finds that students did really well, with most students scoring 98 or higher. What type of effect, which often corresponds to a negatively skewed distribution, is MOST likely to be influencing the shape of the distribution of scores?

a. floor effect
b. ceiling effect
c. raw score effect
d. interval score effect

ANSWER: b

70. Coach Kelly records all first and second place finishes for athletes on the track team. Most athletes don't ever finish in first or second place. As a result, the distribution of finishes is constrained in a manner known as a(n) _____ effect.

a. floor
b. ceiling
c. raw score
d. interval score

ANSWER: a

71. The class average on Professor Bhatt's midterm for statistics was a 68. Because this score was unexpectedly low, she has decided to award every student an additional 5 points. Adding these 5 points will _____ the distribution of scores.

a. help to normalize the shape of
b. negatively skew

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Chapter 02: Multiple Choice

c. have no effect on the shape of
d. positively skew

ANSWER: c

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Name:_____ Class:_____ Date:_____

Chapter 02: True/False

1. Raw scores are data that have been modified from their original form.
   a. True
   b. False

ANSWER: False

2. Raw scores are data that have not been modified from their original form.
   a. True
   b. False

ANSWER: True

3. It is advisable to use a grouped frequency table when depicting the frequency of interval data that vary over a large range of numbers in table format.
   a. True
   b. False

ANSWER: True

This table represents the fictional scores of a set of participants who rated their happiness on a scale from 1 to 7, with 1 indicating *very unhappy* and 7 indicating *very happy*.

Table: Happiness

X	Frequency
7	3
6	5
5	11
4	10
3	2
2	1
1	2

4. (Table: Happiness) Out of 34 participants who rated their happiness, 19 rated their happiness as a 5 or higher.
   a. True
   b. False

ANSWER: True

5. (Table: Happiness) The most common rating of happiness was 5.
   a. True
   b. False

ANSWER: True

6. (Table: Happiness) Out of 34 participants who rated their happiness, 15 rated their happiness as a 4 or higher.
   a. True

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Chapter 02: True/False

b. False

ANSWER: False

7. When creating a grouped frequency table, most researchers recommend using between 5 and 10 intervals.
   a. True
   b. False

ANSWER: True

8. A histogram places frequency on the *y*-axis and variable values on the *x*-axis.
   a. True
   b. False

ANSWER: True

9. A histogram is typically used to depict nominal data.
   a. True
   b. False

ANSWER: False

10. A histogram is typically used to depict scale data.
    a. True
    b. False

ANSWER: True

11. In a frequency polygon, the *x*-axis represents frequencies.
    a. True
    b. False

ANSWER: False

12. In a frequency polygon, the *y*-axis represents frequencies.
    a. True
    b. False

ANSWER: True

13. In a frequency polygon, the *x*-axis represents values or midpoints of intervals.
    a. True
    b. False

ANSWER: True

14. In a frequency polygon, the *y*-axis represents values or midpoints of intervals.
    a. True
    b. False

ANSWER: False

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Chapter 02: True/False

15. The line drawn in a frequency polygon should float above the *x*-axis, never touching the axis.
    a. True
    b. False
ANSWER: False

16. Normal distributions are symmetric and inherently have no skew.
    a. True
    b. False
ANSWER: True

17. Normal distributions are nonsymmetric and inherently have no skew.
    a. True
    b. False
ANSWER: False

18. Floor effects can lead to positive skew in a distribution.
    a. True
    b. False
ANSWER: True

19. In a negatively skewed distribution, the tail extends to the left.
    a. True
    b. False
ANSWER: True

20. People who report "married" as their relationship status are assumed to have no less than one marriage. The fact that the number of marriages cannot vary below one represents a ceiling effect.
    a. True
    b. False
ANSWER: False

21. Some sports have what is called a "mercy rule," that is, once the difference in scores between two teams gets to a certain level, the game is ended. In soccer, the mercy rule might end a game when one team has 10 more goals than the other team. This limit on how big the difference between points can be is an example of a ceiling effect.
    a. True
    b. False
ANSWER: True

22. Floor effects can lead to negative skew in a distribution.
    a. True
    b. False

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Chapter 02: True/False

ANSWER: False

23. To demonstrate the ceiling effect to her Introductory Psychology class, Dr. Morris would need to give her students an easy quiz.
    a. True
    b. False

ANSWER: True

24. To demonstrate the floor effect to her Introductory Psychology class, Dr. Morris would need to give her students an easy quiz.
    a. True
    b. False

ANSWER: False

25. Ceiling effects can lead to positive skew in a distribution.
    a. True
    b. False

ANSWER: False

26. Ceiling effects can lead to negative skew in a distribution.
    a. True
    b. False

ANSWER: True

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Name:_____ Class:_____ Date:_____

Chapter 02: Critical Thinking

This table depicts the average SAT scores for entering freshmen in the year 1995 at 36 North Carolina colleges.

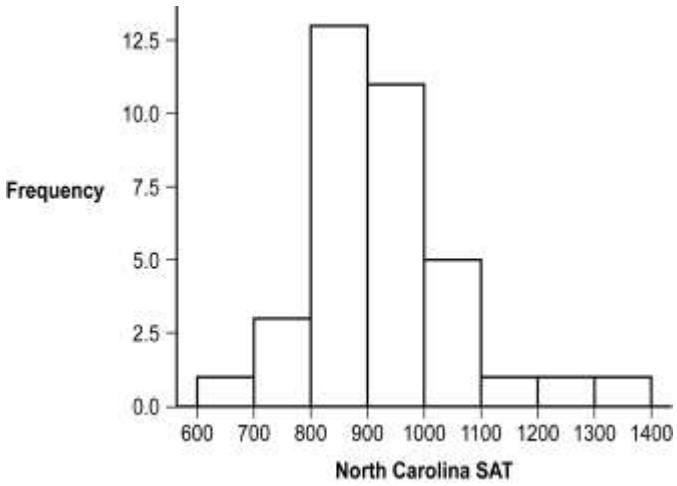
Table: North Carolina SAT

825	922	870	1121
990	1230	1302	926
1054	845	826	956
840	923	818	867
600	1030	831	935
890	879	1005	842
780	757	1002	774
915	921	1071	921
915	848	915	813

1. (Table: North Carolina SAT) Use the data set to create a histogram. Based on the histogram, describe the skew of the data.

ANSWER: Suggested Answer:
(Figure: Histogram of SAT Data) A sample histogram, which was generated in SPSS, is depicted here. This distribution is positively skewed.

Figure: Histogram of SAT Data



2. (Table: North Carolina SAT) Use the data provided to create a grouped frequency table for the North Carolina SAT scores.

ANSWER: Suggested Answer:
(Table: Grouped Frequency SAT Data) The following table depicts one possible grouped frequency table that can be constructed from the data provided.

Table: Grouped Frequency SAT Data

SAT	Frequency

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1212–1313	2
1110–1211	1
1008–1109	3
906–1007	13
804–905	13
702–803	3
600–701	1

Table: Frequency Table

X	Frequency
7	1
6	4
5	1
4	15
3	2
2	1
1	21

3. (Table: Frequency Table) Use the information in the table to determine the percentages for each score. What information do you need in order to calculate the percentages?

ANSWER: Suggested Answer:
(Table: Frequency Table Answer) Before calculating the percentages for each score, we must first obtain the total number of participants. We obtain this number by adding up all of frequencies, which comes to 45. Now we can obtain the percentages for each score by dividing the total number for each group (*X*) by the total number of participants (45) and multiplying by 100.

Table: Frequency Table Answer

X	Frequency	Percentage
7	1	2.22
6	4	8.89
5	1	2.22
4	15	33.33
3	2	4.44
2	1	2.22
1	21	46.67

This table depicts the scores of 83 students on an exam that was worth 65 points.

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Chapter 02: Critical Thinking

Table: Grouped Frequency Table

Exam Score	Frequency
60–62	3
57–59	9
54–56	21
51–53	18
48–50	14
45–47	10
42–44	8

4. (Table: Grouped Frequency Table) Describe the skew of this distribution.

ANSWER: Suggested Answer:
The distribution is negatively skewed. The data rise very quickly at the higher scores and trail off to the lower values.

5. (Table: Grouped Frequency Table) How many students received a score of 49?

ANSWER: Suggested Answer:
Given that this is a grouped frequency table, it is not possible to know exactly how many people received a score of 49. We do know, however, that 14 students received a score between 48 and 50.

This table depicts the annual salary for a sample of 10 Chicago Cubs players during the 2005 baseball season in millions of dollars.

Table: Chicago Cubs Salaries

Player	Salary (in $US millions)
1	3.11
2	0.32
3	1.20
4	2.30
5	4.50
6	2.00
7	1.00
8	0.34
9	8.25
10	3.76

6. (Table: Chicago Cub Salaries) Is it possible to calculate the percentages for the 10 Chicago Cubs players listed in the table without a frequency column? If so, calculate the percentages. If not, explain.

ANSWER: Suggested Answer:

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Chapter 02: Critical Thinking

It is possible to calculate the frequencies because the frequencies are already described as a total of 10 participants, with each participant belonging to his own group. Since each player is a single group, the corresponding frequency is 1. Since we have the total number of participants per "group" as well as the total number of participants overall, 10, it is possible to calculate the percentages for each player by dividing 1 (number in group) by 10 (total number) and multiplying by 100. The result would be a percentage of 10 for each player.

The figures in this table are the salaries for each of the 30 Colorado Rockies baseball players during the 2005 baseball season. Numbers are in thousands of dollars.

Table: Colorado Rockies Players' Salaries

320	328	316
317	324	326
316	650	950
317	317	950
316	12,600	318
2350	366	316
317	2400	316
326	2200	317
319	6575	12,500
317	321	550

7. (Table: Colorado Rockies Players' Salaries) Describe the skew of the distribution of salaries and explain what is causing it.

ANSWER: Suggested Answer:
The distribution of salaries is positively skewed. The salaries tend to cluster in the low- to mid-$300,000s, with a collection of higher salaries, including $900,000 up to $12,600,000. These salaries create the trailing off of data at the high end, which is part of a positive skew.

8. (Table: Electricity Cost) Describe the shape of the distribution of electricity costs in the South Atlantic States? Is it normal or skewed? Explain your answer.

ANSWER: Suggested Answer:
The distribution of electricity costs in the South Atlantic States is negatively skewed because higher scores are clustering on the right-hand side of the distribution, pulling the tail to the left-hand side of the distribution.

9. How do extreme observations affect the shape of a distribution?

ANSWER: Suggested Answer:
Extreme observations can affect the shape of a distribution by pulling the distribution in either direction. This can result in a positively or negatively skewed distribution depending upon the nature of the extreme observation.

10. If we were to look at the distribution of salaries for all National League baseball players, what shape would we expect the distribution to have? Would it be normal, negatively skewed, or positively skewed? Why?

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Chapter 02: Critical Thinking

ANSWER: Suggested Answer:
It is likely that the distribution would be positively skewed. There are a few very highly paid players whose data would pull the tail of the distribution out to the right. Also, a floor effect on the players' salaries would be likely, with no players making less than a certain amount.

11. Describe an example of data where you might observe a ceiling effect and a second example where you might observe a floor effect. Explain how these effects will alter the shape of the distribution in terms of skew.

ANSWER: Suggested Answer:
One example where a ceiling effect might be observed would be exam scores on an easy exam. Even though many students would be expected to score well, a few will still do very poorly, resulting in a negative skew. A second example demonstrating a floor effect might be the number of first- or second-place finishes by nations in the World Cup. Most nations have never advanced to the World Cup finals while several nations have won the World Cup many times. This would result in a distribution that is positively skewed since you cannot have advanced to the World Cup finals less than zero times.

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