Heights, in inches, for the 200 graduating seniors from Washington High School are summarized in the frequency table below.

Height	Frequency
Height < 60 inches	22
60 inches ≤ height < 66 inches	84
66 inches ≤ height < 72 inches	62
72 inches ≤ height < 78 inches	24
Height ≥ 78 inches	8

Which of the following statements about the median height is true?

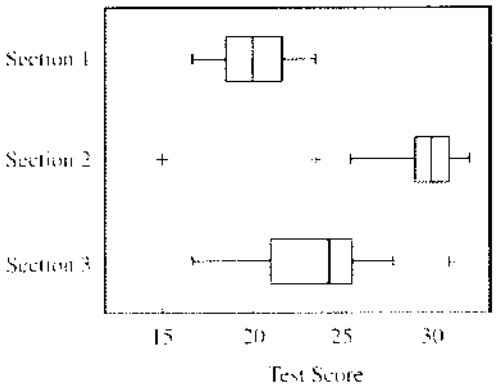
(A) It is greater than or equal to 78 inches.

(B) It is greater than or equal to 72 inches but less than 78 inches.

(C) It is greater than or equal to 66 inches but less than 72 inches.

(D) It is greater than or equal to 60 inches but less than 66 inches.

(E) It is less than 60 inches.



Professor James gave the same test to his three sections of statistics students. On the 35-question test, the highest score was 32 and the lowest was 15. Based on the information displayed in the boxplots above, which of the following statements is true?

(A) Section 1 has the smallest interquartile range.

(B) The lowest score in section 2 is higher than the highest score in either of the other sections.

(C) Section 2 has the smallest range of scores.

(D) The top 25% of scores in section 2 are lower than the highest score in section 3.

(E) At least 50% of the scores in section 3 are higher than all of the scores in section 1.

A well-designed experiment should have which of the following characteristics?

I. Subjects assigned randomly to treatments

II. A control group or at least two treatment groups

III. Replication

(A) I only

(B) I and II only

(C) I and III only

(D) II and III only

(E) I, II, and III

The distribution of colors of candies in a bag is as follows.

Color	Brown	Red	Yellow	Green	Orange
Proportion	0.3	0.2	0.2	0.2	0.1

If two candies are randomly drawn from the bag with replacement, what is the probability that they are the same color?

(A) 0.09
(B) 0.22
(C) 0.25
(D) 0.75
(E) 0.78

Approximately 52 percent of all recent births were boys. In a simple random sample of 100 recent births, 49 were boys and 51 were girls. The most likely explanation for the difference between the observed results and the expected results in this case is

(A) bias
(B) variability due to sampling
(C) nonsampling error
(D) a sampling frame that is incomplete
(E) confounding

Each person in a random sample of adults was asked how many DVDs he or she owned. Summary statistics are given below.

Variable	N	Mean	Median	TrMean	StDev	SE Mean
DVDs	117	129.4	50.0	76.5	323.6	29.2

Variable	Minimum	Maximum	Q1	Q3
DVDs	0.0	3000.0	30.0	95.0

Which of the following statements is true?

(A) Seventy-five percent of the adults in the sample own more than 95 DVDs.

(B) Fifty percent of the adults in the sample own between 0 and 129.4 DVDs.

(C) The distribution of the number of DVDs owned appears to be approximately symmetric.

(D) The interquartile range of the number of DVDs owned is 65.

(E) The distribution of the number of DVDs owned contains outliers on both the low side and the high side.

A survey was administered to parents of high school students in a certain state to see if the parents thought the students' academic needs were being met. To select the sample, the parents were divided into two groups—one group of parents who live in cities with populations of more than 100,000 and the other group of parents who live in cities with populations less than or equal to 100,000. A random sample of 100 parents from each group was taken. Which of the following statements about the sample of 200 parents is true?

(A) It is a convenience sample because the sample of parents was easily obtained.

(B) It is a stratified random sample because parents were randomly selected from each group.

(C) It is a random cluster sample because parents were randomly selected from each group.

(D) It is a random cluster sample because groups of high schools were randomly selected.

(E) It is a systematic sample because the parents were systematically divided into two groups.

A carnival game allows the player a choice of simultaneously rolling two, four, six, eight, or ten fair dice. Each die has six faces numbered 1 through 6, respectively. After the player rolls the dice, the numbers that appear on the faces that land up are recorded. The player wins if the greatest number recorded is 1 or 2. How many dice should the player choose to roll to maximize the chance of winning?

(A) Two
(B) Four
(C) Six
(D) Eight
(E) Ten

A school is having a contest in which students guess the number of candies in a jar. The student whose guess is closest to the correct number of candies in the jar wins a prize. The number of candies guessed by male and female students is shown in the back-to-back stemplot below.

Male		Female
	6	4
2	7	5 8
1	8	0 9
0	9	0 0 5
0 0	10	0 0 1 4
5 5 3 0	11	0 0 5 7 8 8
5 5 5 4 2 1 0	12	0 1 1 2
8 6 5 0 0 0	13	
9 5 0	14	

Key: 6|4 = 64

Which of the following statements is true about the distributions of guesses?

(A) The distribution of guesses for male students is skewed to the left, and the distribution of guesses for female students is skewed to the right.

(B) The distribution of guesses for male students is skewed to the right, and the distribution of guesses for female students is skewed to the left.

(C) The distributions of guesses for male and female students are both skewed to the right.

(D) The distributions of guesses for male and female students are both skewed to the left.

(E) The distributions of guesses for male and female students are both symmetric.

A box contains 10 tags, numbered 1 through 10, with a different number on each tag. A second box contains 8 tags, numbered 20 through 27, with a different number on each tag. One tag is drawn at random from each box. What is the expected value of the sum of the numbers on the two selected tags?

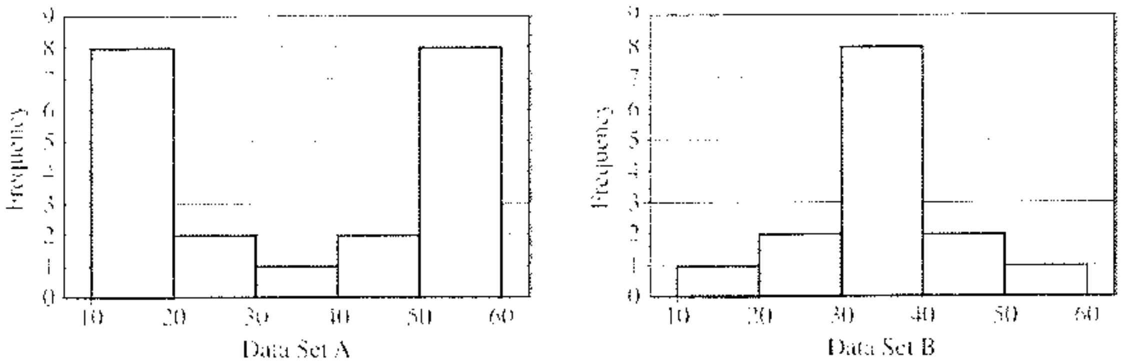
(A) 13.5

(B) 14.5

(C) 15.0

(D) 27.0

(E) 29.0



Which of the following statements must be true about the data sets A and B displayed in the histograms above?

(A) The mean of data set A is equal to the mean of data set B.

(B) The median of data set A is equal to the median of data set B.

(C) The range of data set A is equal to the range of data set B.

(D) The standard deviation of data set A is less than the standard deviation of data set B.

(E) The standard deviation of data set A is greater than the standard deviation of data set B.

Let X be a random variable whose values are the number of dots that appear on the uppermost face when a fair die is rolled. The possible values of X are 1, 2, 3, 4, 5, and 6. The mean of X is $\frac{7}{2}$ and the variance of X is $\frac{35}{12}$. Let Y be the random variable whose value is the difference (first minus second) between the number of dots that appear on the uppermost face for the first and second rolls of a fair die that is rolled twice. What is the standard deviation of Y?

(A) $\sqrt{\frac{35}{12}}$

(B) $\sqrt{\frac{35}{12}} - \sqrt{\frac{35}{12}}$

(C) $\sqrt{\frac{35}{12} - \frac{35}{12}}$

(D) $\sqrt{\frac{35}{12} + \frac{35}{12}}$

(E) $\frac{35}{12} + \frac{35}{12}$

In a large set of data that are approximately normally distributed,

r is the value in the data set that has a z-score of -1.00,
s is the value of the first quartile, and
t is the value of the 20th percentile.

Which of the following is the correct order from least to greatest for the values of r, s, and t?

(A) r, s, t

(B) r, t, s

(C) s, t, r

(D) t, r, s

(E) t, s, r

(14) A distribution of scores is approximately normal with a mean of 78 and a standard deviation of 8.6. Which of the following equations can be used to find the score x above which 33 percent of the scores fall?

(A) $0.11 = \dfrac{x - 78}{18.61}$

(B) $0.67 = \dfrac{x - 78}{18.61}$

(C) $0.33 = \dfrac{x - 78}{8.6}$

(D) $0.44 = \dfrac{x - 78}{8.6}$

(E) $0.67 = \dfrac{x - 78}{8.6}$

(15) A sample of 942 homeowners are classified, in the two-way frequency table below, by the number of credit cards they have and the number of years they have owned their current homes.

	Number of Years Owning Current Home			
Number of Credit Cards	Less than One Year	One Year to Three Years	More than Three Years	Total
One	265	53	16	334
Two	84	19	4	107
Three	201	68	20	289
Four or more	134	58	20	212
Total	684	198	60	942

Of the homeowners in the sample who have four or more credit cards, what proportion have owned their current homes for <u>at least</u> one year?

(A) $\dfrac{78}{212}$

(B) $\dfrac{78}{258}$

(C) $\dfrac{78}{942}$

(D) $\dfrac{212}{942}$

(E) $\dfrac{258}{942}$

(16) Which of the following distinguishes an observational study from a randomized experiment?

(A) In an observational study volunteers are always used, whereas in a randomized experiment a random sample is always taken from the population.

(B) In an observational study a random sample is always taken from the population, whereas in a randomized experiment volunteers are always used.

(C) In an observational study treatments are not randomly assigned, whereas in a randomized experiment treatments are randomly assigned.

(D) In an observational study a control group is never used, whereas in a randomized experiment a control group is always used.

(E) An observational study can be double-blind, whereas a randomized experiment can only be single-blind because the experimenter determines who is randomly assigned to each treatment.