

AP Statistics Summer Work

Many topics that we will study next year in your mathematics class build on topics that you have already learned in previous classes. Since many of you have been away from these ideas for a long period of time, you might need a refresher in order to be up to speed at the beginning of the course. You are expected to know these concepts for AP Statistics. **Please work through the problems in this packet, showing all appropriate work on a separate sheet of paper. All work and answers not on a separate sheet of paper will not be graded and result in a zero. Please keep your work labeled and organized, in numerical order.** If you are unfamiliar with a term or type of problem, refer back to your notes, the examples provided or go online to various help sites for mathematics. The skills covered are part of the foundation for your course. Master of certain skills is assumed. Please read each set of directions carefully. This packet should be complete for the first day of school.

This packet will be collected on the first day of school.

Helpful websites:

www.stattrek.com

www.freemathhelp.com

<http://statistics-help-for-students.com/>

Part I: Definitions

Please define the following vocabulary in terms of statistics; you may draw visuals to help with the definitions. I'd prefer definitions typed, with visuals drawn in.

1. Alpha
2. Alternative Hypothesis
3. Back-to-Back Stemplots
4. Bar Chart
5. Bernoulli Trial
6. Bias
7. Binomial Distribution
8. Bivariate Data
9. Blinding
10. Boxplot
11. Categorical Variable
12. Census
13. Central Limit Theorem
14. Cluster
15. Cluster Sampling
16. Combination
17. Complement
18. Conditional Distribution
19. Conditional Probability
20. Confidence Interval
21. Control Group
22. Convenience Sample
23. Correlation
24. Cumulative Frequency Plot
25. Degrees of Freedom
26. Discrete Variable
27. Disjoint
28. Dotplot
29. Double Blinding
30. Expected Value
31. Experiment
32. Experimental Design
33. Frequency Table
34. Histogram
35. Hypothesis Test
36. Independent Variable
37. Influential Point
38. Interquartile Range (IQR)
39. Law of Large Numbers
40. Lurking Variable
41. Margin of Error
42. Mean
43. Median
44. Mode
45. Mutually Exclusive
46. Nonresponse Bias
47. Normal Distribution

48. Null Set
49. Observational Study
50. Outlier
51. Parallel Boxplots
52. Parameter
53. Percentile
54. Placebo
55. Population
56. Probability
57. Proportion
58. P Value
59. Qualitative Variable
60. Quantitative Variable
61. Quartile
62. Random Number Table
63. Randomization
64. Randomized Block Design
65. Range
66. Regression
67. Relative Frequency
68. Residual
69. Residual Plot
70. Response Bias
71. Sample
72. Sample Space
73. Sampling Error
74. Sampling Method
75. Sampling with Replacement
76. Sampling without Replacement
77. Scatterplot
78. Selection Bias
79. Significance Level
80. Simple Random Sampling
81. Skewness
82. Standard Deviation
83. Statistic
84. Stratified Sampling
85. Treatment
86. Type I Error
87. Type II Error
88. Undercoverage
89. Univariate Data
90. Variance
91. Voluntary Response Bias

Part II: Measure of Central Tendency

Please find the mean, median, mode and range for the follow sets of data.

- 3 3 1 4 0 4 2 5 7 4 1 2
- 5 10 9 12 8 4 5 7 5 13 11
- 0 0 8 4 15 9 1 1 6 7 10 2

Name the measure of central tendency you would report to your parents. Give your reason.

- test scores: 89 84 79 80 81 55
- friends' allowances: \$10 \$15 \$12 \$15 \$8

What is the best measure of central tendency for each type of data- mean, median, or mode? Explain.

- most popular movie in the past month
- favorite hobby
- class size in a school
- ages of members in a club

Each person has taken four tests and has one more test to take. Find the score that each person must make to change the mean or median as shown.

- Barry has scores of 93, 84, 86, and 75. He wants to raise the mean to 86.
- Liz has scores of 87, 75, 82, and 93. She wants to raise the median to 87.
- Jim has scores of 60, 73, 82, and 75. He wants to raise the mean to 75.
- Andrea has scores of 84, 73, 92, and 88. She wants to raise the median to be 86.

The number of pages read (to the nearest multiple of 50) by the students in Mr. Sullivan's class last week are shown in the tally table.

- Find the mean, the median and the mode of the data.
- What is the outlier in this set of data?
- Does the outlier raise or lower the mean?
- Would you use the mean, median or mode to most accurately reflect the typical number of pages read by a student?

Pages	Tally
50	I
100	
150	II
200	IIIIII
250	I
300	IIIIII
350	IIIIII
400	IIIIII
450	I
500	I

For the following questions, each set of number consists of five integers such that $0 \leq N \leq 20$. Find a set of numbers that satisfies the given conditions. Calculate each measure of central tendency to verify your solution. Explain how you found each set.

- The mean, median, and mode are equal.
- The mean is greater than both the median and the mode.
- The mean is less than both the median and the mode.
- The mode is greater than the mean but less than the mode.

22. The difference between the mean and the median is greater for this set than for any other possible set.

Pages	Tally
50	I
100	
150	II
200	IIII
250	I
300	IIII
350	IIII
400	IIII
450	I
500	I

Part III: Graphing

Answer each question. Please put all graphs on graph paper. **DO NOT** use a calculator or computer to generate graphs.

1. Mrs. Ortiz's class is planning a school garden. She asked her students how many rose bushes they want in the garden. She recorded the data in a frequency table. Complete the table. Use the frequency table to make a line plot for the data. Draw a histogram of the students' data.

Number of Rose Bushes	1	2	3	4	5	6
	Tally	I	IIII	III	IIIIII	I
Frequency						

2. Raisins in a small box: 33 32 30 40 29 35 36 33 42 28 41 39 30 29 35 40 33 34 31 28

Make a frequency table for the data, and then make a histogram.

3. Construct a bar graph displaying the number of voters for all-time favorite sports figures.

All-Time Favorite Sports Figures	
Sports Figure	Number of Votes
Babe Ruth	29
Babe Didrickson Zaharias	22
Jackie Robinson	18
Billie Jean Moffitt King	17
Muhammad Ali	14
Jim Thrope	13

4. Construct a line graph for the amount of petroleum used daily in the U.S.

Daily Use of Petroleum in the U.S.
(Millions of barrels)

Year	Number
1960	1.7
1965	1.9
1970	2.2
1975	1.9
1980	1.5
1985	1.3
1990	1.1
1995	1.1
2000	1.2

What overall trend does the line graph show?

5. Construct a stem and leaf plot for the data. (Make sure to include a scale for all stem and leaf plots)

8th Grade 200-M Dash (times to the nearest 0.1s)

32.5 32.1 38.5 31.7 34.7 29.3 35.2 34.4 30.2
 35.3 34.7 31.9 36.0 32.2 36.7 32.2 31.4 34.7
 29.5 36.9 36.4 33.4 38.6 34.7 37.3

- What is the median?
- What is the mode?
- What is the range?
- How many 8th grade students finished the race in less than 35 s?

6. Construct a stem and leaf plot for this set of data. What is the greatest value?

Least value? Range?

24 36 64 42 59 61 16 63 54 39
 36 45 15 27 51

7. Brandy recorded these high temperatures for two weeks in July. Make a stem and leaf plot of her data. Find the range.

92 86 91 90 85 82 84 78
 79 83 84 89 86 87

8. Mr. Wang recorded these test scores. Make a stem and leaf plot of the data. Find the range.

66 83 58 65 66 66 82 55 57
 71 40 43 41 56 71 74 81 85
 63 62

9. Make a back to back stem and leaf plot for the following data. Find the median and mode for each set of data.

Set A: 75 82 79 80 75 76 83 74 75 86 80 71 75

Set B: 71 73 75 80 79 80 74 80 74 79 76 80 81

10. Make a back to back stem and leaf plot comparing high and low temperatures for a week in a certain city. Find the range, median and mode for each set of data.
 High Temps: 80 65 75 69 72 69 76
 Low Temps: 64 70 57 72 63 58 70
11. From your data in questions 6, 7, and 8, construct a frequency table and a histogram for each question.

Part IV: Scatter Plots and Linear Regression

DO NOT use a calculator or computer to generate graphs.

1. Dana surveyed her friends about how much TV they watch and their average test scores. Her results are shown in the table. Create a scatter plot for the data (make sure to label your axes).

TV Hours/Day	Avg. Test Scores
1	98
1	86
2	90
2	82
2	85
3	79
3	73
3	75
4	62
5	68

- a. Is the trend in the data negative or positive? Explain.
 b. Describe the relationship Dana likely found between test scores and TV time.
2. Make a scatter plot showing the number of homeowners on one axis and vacation homeowners on the other axis. If there is a trend, draw the line.

Year	Homeowners	Vac. Homeowners
1997-98	2,050	973
1996-97	1,987	967
1995-96	1,948	1,041
1994-95	1,897	1,043
1993-94	1,862	1,125
1992-93	1,832	1,123

3. Draw the data in a scatter plot. If there is a trend line, draw the line.

Time Spent Studying (Mins)	Number of Words Spelled Correctly
40	20
35	18
32	16
30	16
20	15
15	15
10	10
10	8

Tell whether a scatter plot made for each set of data would show a positive trend, a negative trend, or no trend.

4. Amount of education and annual salary
5. weight and speed in a foot race
6. test score and shoe size

Tell whether each pair of quantities is positively correlated, negatively correlated, or not related.

7. Traffic volume and commuting time
8. average outside temperature and amount of fuel used to heat a house
9. hat size and average of math test scores

10. Use the data below to draw a scatter plot and a trend line.

- a. Use your graph to estimate the height of a person who weighs about 90lbs.
 - b. Use your graph to estimate the weight of a students 51in tall
 - c. Is there a relationship between height and weight? Explain.
- Weight (lb): 78 63 67 52 81 92 60 34 83 47 73 98 45 31 95 71 76 41
 Height (in): 56 52 55 47 58 60 50 39 58 45 54 61 45 36 60 54 56 41

Part V: Probability

1. How many license plates are possible if four letters are to be followed by two digits?
2. How many license plates are possible if two letters are to be followed by four digits?
3. A dress pattern offers two styles of skirts, three styles of sleeves, and four different collars. How many different types of dresses are available from one pattern?
4. In a class of 250 eighth graders, 14 are running for president, 12 are funning for vice president, 9are running for treasurer. How many different results are possible for the class election?
5. A home alarm system has a 3-digit code that can be used to deactivate the system. If the homeowner forgets the code, how many different codes might the homeowner have to try?

6. A 4-letter password is required to enter a computer file. How many passwords are possible if no letter is repeated and nonsense words are allowed.

Evaluate each.

7. $6!$ 8. $12!$ 9. $9!$ 10. $\frac{8!}{5!}$
11. $\frac{12!}{3!}$ 12. ${}_9P_5$ 13. ${}_8P_2$ 14. ${}_{10}P_8$
15. ${}_5P_5$ 16. ${}_{15}P_6$
17. In how many ways can the letters of the word WORK be arranged?
18. In how many ways can you arrange seven friends in a row for a photo?
19. ${}_9C_1$ 20. ${}_8C_4$ 21. ${}_{11}C_4$ 22. ${}_{12}C_6$
23. Ten students from a class have volunteers to be on a committee to organize a dance. In how many ways can six be chosen for the committee?
24. At a party there are 12 people present. The host requests that each person present shake hands exactly once with every other person. How many handshakes are necessary?

Suppose you have a box that contains 12 slips of paper. Each slip of paper is equally likely to be drawn. There are 6 slips of paper with the word red on it, 3 for yellow, 3 for blue. Find the probability of each event.

25. P(red) 26. P(blue) 27. P(yellow) 28. P(red) + P(blue)
29. P(red) + P(yellow) 30. P(red or blue) 31. P(not red)
32. P(blue or yellow)

A card is drawn from a well-shuffled deck of playing cards. What is the probability of the following?

33. The card is a nine?
34. The card is a six?
35. The card is a two?

Suppose you draw 1 card from a standard deck of 52 cards. Find each probability.

36. P(jack)
37. P(red 10)
38. P(club)
39. P(not a red card)
40. P(face card)
41. P(7 of hearts)
42. P(not a diamond)
43. P(not the ace of spades)