AP Statistics Summer Assignment 2016

Welcome to AP Statistics future statisticians! The purpose of this assignment is to make you comfortable exploring data analysis.

The summer assignment is composed of three parts.

1. Reading and Vocabulary: You will use a free online Statistical tutoring site that will give you information on variables and data displays. While reviewing the information on the site you will be completing a vocabulary list (see page 2 and 3). *Follow the steps below:*

- Go to www.stattrek.com
- Click on "AP Statistics" then "AP Tutorial"
- On the left side of the screen is a list of general topics. Under each general topic are a list of subtopics. You will read the following subtopics to complete the vocabulary list.

General Topic: Exploring Data	
Subtopics:	Variables
	Population vs Sample
	Central Tendency
	Variability
	Position
General Topic: Charts and Graphs	
Subtopics:	Charts and Graphs
	Patterns in data
	Dotplots
	Histograms
	Stemplots
	Boxplots
	Scatterplots
	Comparing data sets

2. Practice Problems: After reading all the material above you should be able to complete the questions in the remaining pages of this packet. You should do so in the spaces provided.

3. A graphing calculator is a required tool for this class. The TI-83+, or TI-84 is recommended. As you complete the Practice Problems refer to the TI Guidebook to become familiar with the list and statistical functions.

This packet should be completed by your return to school in August. You are expected to complete each part of each problem, and to construct all data displays neatly. **This assignment will be graded, and it will count as a test grade**

I will be checking email intermittently over the summer if you have any questions. kmizenko@jeffco.k12.co.us

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Part 1: Vocabulary List

Please define each of the following terms from the information on the stattrek website. Words in blue can be clicked on for more information. When asked provide a unique *example or sketch* of the word … one NOT given on the website.

1. Categorical Variables

Example:

2. Quantitative Variables

Example:

3. Discrete Variables

4. Continuous

5. Univariate Data

6. Bivariate Data

7. Population

Example:

8. Sample

Example:

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9. Median

10. Mean

Formula:

11. Outlier

12. Parameter

13. Statistics

14. Range

15. Standard Score (z-score)

Formula:

16. Center

17. Spread

18. Variance

Formula:

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19. Standard Deviation

Formula:

20.Symmetry

Sketch:

21. Unimodal

Sketch:

22. Bimodal

Sketch:

23.Skewness

Sketch Skewed left:

Sketch Skewed right:

24.Uniform

Sketch:

25.Gaps

Sketch:

26.Outliers

Sketch:

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27. Dot plots

28. Bar Chart

29. Histogram

30. Difference between bar chart and histogram

31. Stemplots

32. Boxplots

33. Quartiles

34. Range

35. Interquartile Range

36. Four Ways to Describe Data Sets

37. Types of Graphs that can used for comparing data

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Part 2: Practice Problems

CATEGORICAL OR QUANTITATIVE

Determine if the variables listed below are *quantitative* or *categorical*.

1. Time it takes to get to school
2. Number of people under 18 living in a household
3. Hair color
4. Temperature of a cup of coffee
5. Teacher salaries
6. Gender
7. Smoking
8. Height
9. Amount of oil spilled
10. Age of Oscar winners
11. Type of Depression medication
12. Jellybean flavors
13. Country of origin
14. Type of meat
15. Number of shoes owned

STATISTIC –WHAT IS THAT?

A statistic is a number calculated from data. Quantitative data has many different statistics that can be calculated. Determine the given statistics from the data below on the number of homeruns Mark McGuire hit in each season from 1982 – 2001.

70	52	22	49	3	32	58	39
39	65	42	29	9	32	9	33

Mean	
Minimum	
Maximum	
Median	
Q1	
Q3	
Range	
IQR	

Directions: Show all your work. Indicate clearly the methods you use, because you will be scored on the correctness of your methods as well as on the accuracy and completeness of your results and explanations.

1. Two large corporations, A and B, hire many new college graduates as accountants at entry-level positions. In 2009 the starting salary for an entry-level accountant position was $36,000 a year at both corporations. At each corporation, data were collected from 30 employees who were hired in 2009 as entry-level accountants and were still employed at the corporation five years later. The yearly salaries of the 60 employees in 2014 are summarized in the boxplots below.

(a) Write a few sentences comparing the distributions of the yearly salaries at the two corporations.

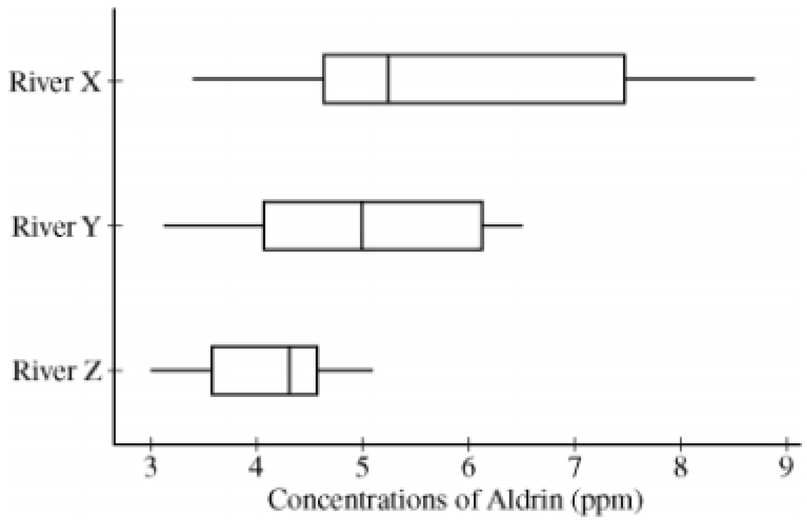
(b) Suppose both corporations offered you a job for $36,000 a year as an entry-level accountant.

(i) Based on the boxplots, give one reason why you might choose to accept the job at corporation A.

(ii) Based on the boxplots, give one reason why you might choose to accept the job at corporation B.

As a part of the United States Department of Agriculture's Super Dump cleanup efforts in the early 1990s, various sites in the country were targeted for cleanup. Three of the targeted sites—River X, River Y, and River Z—had become contaminated with pesticides because they were located near abandoned pesticide dump sites. Measurements of the concentration of aldrin (a commonly used pesticide) were taken at twenty randomly selected locations in each river near the dump sites.

The boxplots shown below display the five-number summaries for the concentrations, in parts per million (ppm) of aldrin, for the twenty locations that were sampled in each of the three rivers.



(a) Compare the distributions of the concentration of aldrin among the three rivers.

(b) The twenty concentrations of aldrin for River X are given below.

3.4	4.0	5.6	3.7	8.0	5.5	5.3	4.2	4.3	7.3
8.6	5.1	8.7	4.6	7.5	5.3	8.2	4.7	4.8	4.6

Construct a stemplot that displays the concentrations of aldrin for River X.

(c) Describe a characteristic of the distribution of aldrin concentrations in River X that can be seen in the stemplot but cannot be seen in the boxplot.

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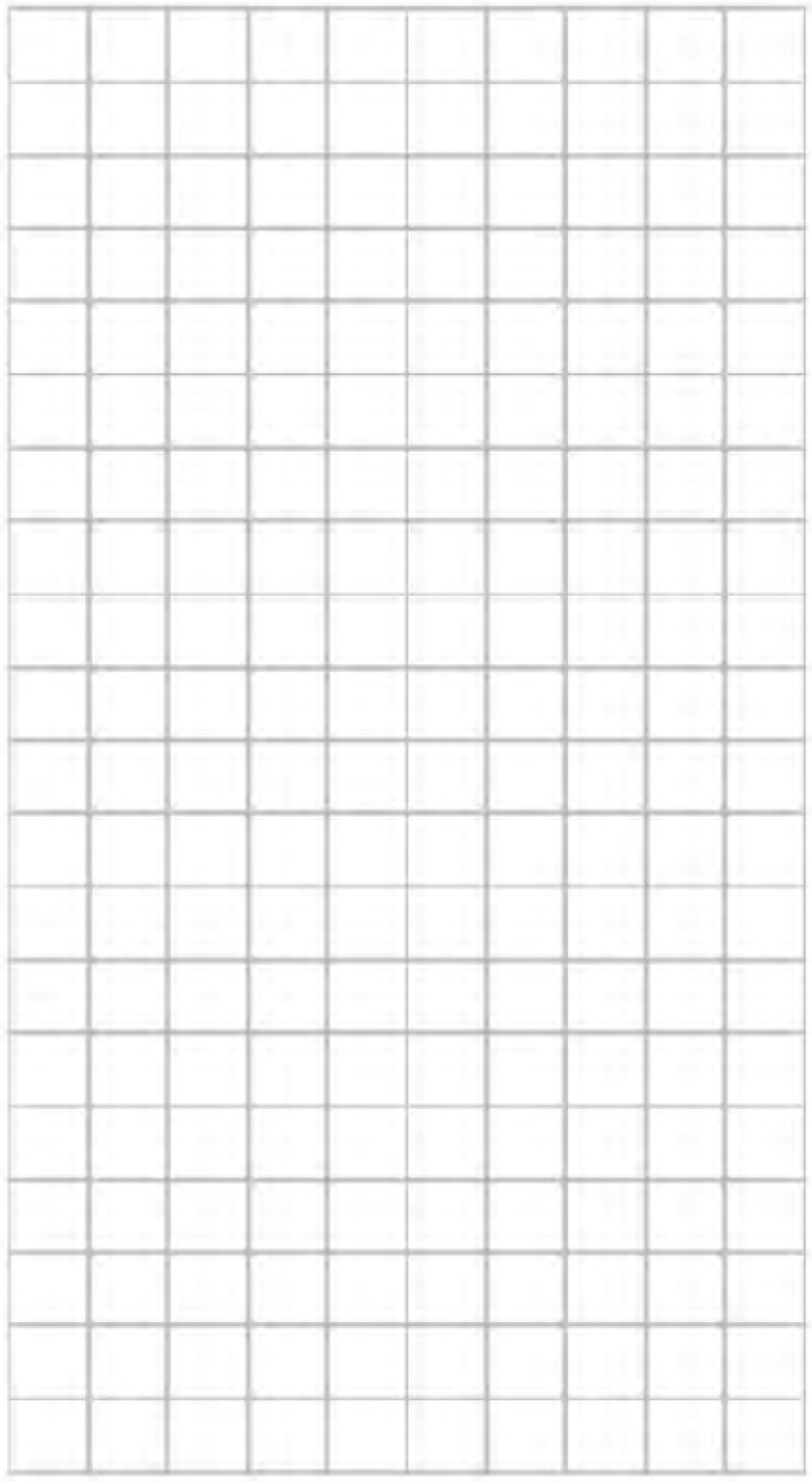
IT'S A TWISTA

The data below gives the number of hurricanes that happened each year from 1944 through 2000 as reported by *Science* magazine.

3	2	1	4	3	7	2	3	3	2	5	2	2	4	2	2	6	0	2	5	1	3	1	0
3	2	1	0	1	2	3	2	1	2	2	2	3	1	1	1	3	0	1	3	2	1	2	1
1	0	5	6	1	3	5	3															

a. Make a dotplot to display these data. Make sure you include appropriate labels, title, and scale. The graph paper should help ensure you space your markings (you may use x's or dots) consistently.



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SHOPPING SPREE!

A marketing consultant observed 50 consecutive shoppers at a supermarket. One variable of interest was how much each shopper spent in the store. Here are the data (round to the nearest dollar), arranged in increasing order:

3	9	9	11	13	14	15	16	17	17
18	18	19	20	20	20	21	22	23	24
25	25	26	26	28	28	28	28	32	35
36	39	39	41	43	44	45	45	47	49
50	53	55	59	61	70	83	86	86	93

a. Make a stemplot using tens of dollars as the stem and dollars as the leaves. Make sure you include appropriate labels, title and key.

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WHERE DO OLDER FOLKS LIVE?

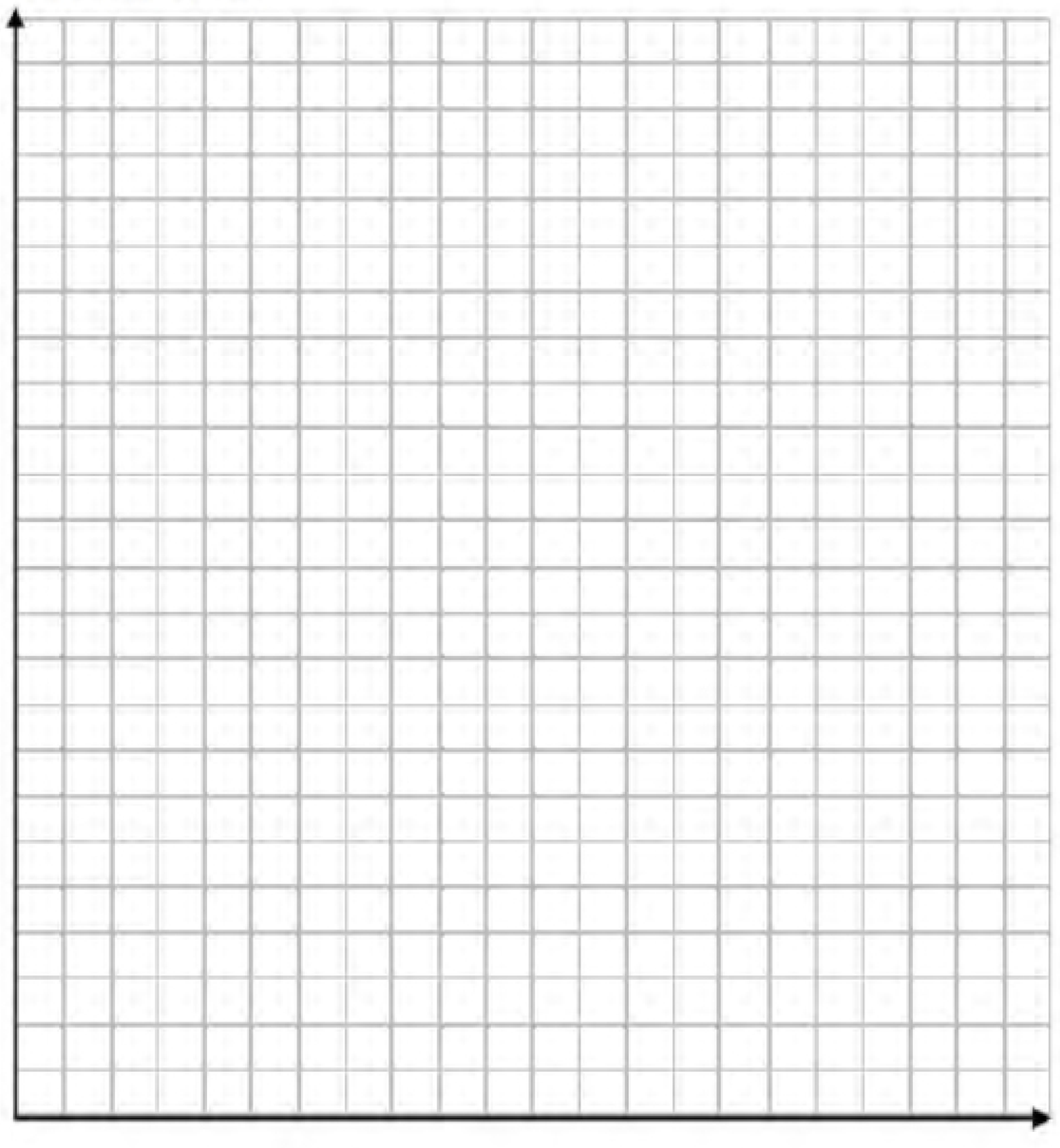
This table gives the percentage of residents aged 65 or older in each of the 50 states.

State	Percent	State	Percent	State	Percent
Alabama	13.1	Louisiana	11.5	Ohio	13.4
Alaska	5.5	Maine	14.1	Oklahoma	13.4
Arizona	13.2	Maryland	11.5	Oregon	13.2
Arkansas	14.3	Massachusetts	14.0	Pennsylvania	15.9
California	11.1	Michigan	12.5	Rhode Island	15.6
Colorado	10.1	Minnesota	12.3	South Carolina	12.2
Connecticut	14.3	Mississippi	12.2	South Dakota	14.3
Delaware	13.0	Missouri	13.7	Tennessee	12.5
Florida	18.3	Montana	13.3	Texas	10.1
Georgia	9.9	Nebraska	13.8	Utah	8.8
Hawaii	13.3	Nevada	11.5	Vermont	12.3
Idaho	11.3	New Hampshire	12.0	Virginia	11.3
Illinois	12.4	New Jersey	13.6	Washington	11.5
Indiana	12.5	New Mexico	11.4	West Virginia	15.2
Iowa	15.1	New York	13.3	Wisconsin	13.2
Kansas	13.5	North Carolina	12.5	Wyoming	11.5
Kentucky	12.5	North Dakota	14.4		

Histograms are a way to display groups of quantitative data into bins (the bars). These bins have the same width and scale and are touching because the number line is continuous. To make a histogram you must first decide on an appropriate bin width and count how many observations are in each bin. The bins for percentage of residents aged 65 or older have been started below for you.

a. Finish the chart of Bin widths and then create a histogram using those bins on the grid below. Make sure you include appropriate labels, title and scale.

Bin Widths	Frequency
4 to < 6	1
6 to < 8	
8 to < 10	



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SSHA SCORES
Here are the scores on the Survey of Study Habits and Attitudes (SSHA) for 18 first-year college women:

154 109 137 115 152 140 154 178 101 103 126 126 137 165 165
129 200 148

and for 20 first-year college men:

108 140 114 91 180 115 126 92 169 146 109 132 75 88 113
151 70 115 187 104

a. Put the data values in order for each gender. Compute numeral summaries for each gender.

Women			Men	
Mean			Mean	
Minimum			Minimum	
Q1			Q1	
Median			Median	
Q3			Q3	
Maximum			Maximum	
Range			Range	
IQR			IQR	

b. Using the minimum, Q1, Median, Q3, and Maximum from each gender, make parallel boxplots to compare the distributions.

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ALGEBRA PAGE!
The prerequisite for AP Statistics is Algebra II. You will not find very much equation solving in this course, but some quick review of Algebra I and Algebra II content will be helpful.

To answer the following refer to the readings on www.stattrek.com "Survey Sampling Methods".

The 7 types of sampling designs are:

A. voluntary response	B. convenience	C. simple random	D. stratified
E. cluster	F. multistage	G. systematic	

1. The Maryland division of Weight Watchers is doing research to determine how many people on the Weight Watchers diet cheat at least once a week. They decide that anonymous surveys will give them an accurate representation but do not have time to get responses from ALL the Maryland Weight Watchers people.
Read the scenarios below and determine which of the 7 sampling methods best describes it.

_____ I. Randomly select 10 members from each of the WW centers in the Maryland division.
_____ II. Use an alphabetical listing of all Maryland division members. Randomly choose a starting person on the list. Then select every 20th person thereafter.
_____ III. Randomly select 2 or 3 branches of the Maryland division and survey every member of that center.
_____ IV. Send out the survey to every member of the Maryland division. Place drop boxes in each WW center. Anyone who returns a survey will be in the sample.
_____ V. The Maryland regional office is in Baltimore so they survey members at the WW center in Baltimore.
_____ VI. From a numbered list of all Maryland division members use a computer to randomly select 100 numbers and survey all members with those corresponding numbers.

2. What is the population of interest in the WW situation?

Here is a formula that is used often in AP Statistics: $z = \frac{x - \bar{x}}{s}$. ***Use your algebra skills…***

1. If z = 2.5, x = 102 and $\bar{x}$ = 100, what is s? Show your work.

2. If z = -3.35, x = 60, and s = 4, what is $\bar{x}$? Show your work.

3. Solve this equation for n: $.03 = 1.96\left(\frac{2.4}{\sqrt{n}}\right)$

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It is expected that you have a thorough understanding of linear functions and scatterplots.

1. The USDA reported that in 1990 each person in the United States consumed an average of 133 pounds of natural sweeteners. They also claim this amount has decreased by about 0.6 pounds each year.

   a. If 1990 could be considered "year 0", which of the above numbers represents the slope and which represents the y-intercept?

   b. What is the equation of the line of best fit using the slope and y-intercept above?

   c. Predict the average consumption of sweeteners per person for the year 2005.

2. The following equation can be used to predict the average height of boys anywhere between birth and 15 years old: $y = 2.79x + 25.64$, where x is the age (in years) and y is the height (in inches).

   a. What does the slope represent in this problem? Interpret it in the context of this problem/situation.

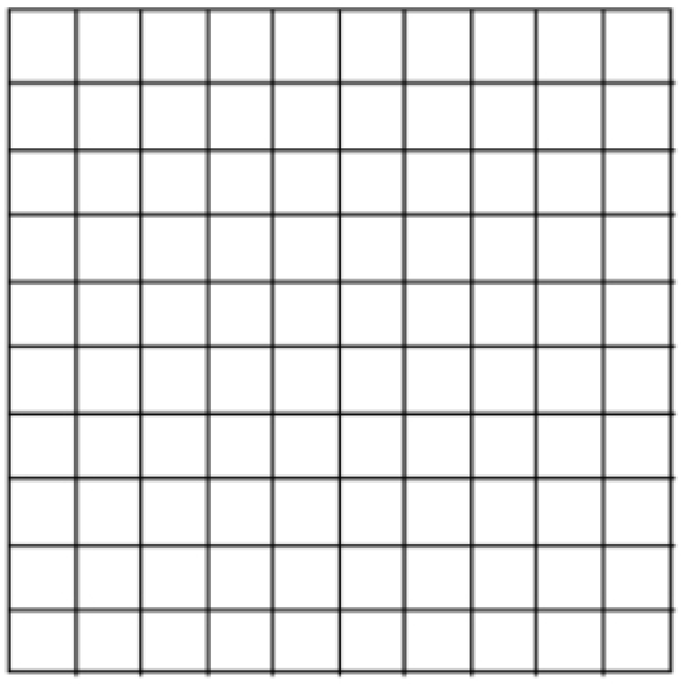
   b. What does the y-intercept represent in this problem? Interpret it in context.

3. Hilary wonders if people of similar heights tend to date each other. She measures herself, her dormitory roommate, and the women in the adjoining rooms; then she measures the next man each woman dates. Here are the data (heights in inches):

Women:	66	64	66	65	70	65
Men:	72	68	70	68	74	69

A. Construct a scatterplot of the data.

B. Describe the association between the heights of the women and the men they date.



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You are expected to have a basic understanding of simple probability. If you find these problems "less than intuitive", there are numerous sites available online that provide basic probability explanations.

1. A special lottery is to be held to select the student who will live in the only deluxe room in a dormitory. There are 100 seniors, 150 juniors, and 200 sophomores who applied. Each senior's name is placed in the lottery 3 times; each junior's name, 2 times; and each sophomore's name, 1 time. What is the probability that a senior's name will be chosen?

A. $\frac{1}{8}$ B. $\frac{2}{9}$ C. $\frac{2}{7}$ D. $\frac{3}{8}$ E. $\frac{1}{2}$

2. Which of the following has a probability closest to 0.5?

A. The sun will rise tomorrow.
B. It will rain tomorrow.
C. You will see a dog with only three legs when you leave the room.
D. A fair die will come up with a score of 6 four times in a row.
E. There will be a plane crash somewhere in the world within the next five minutes.

3. If a coin is tossed twice, what is the probability that on the first toss the coin lands heads and on the second toss the coin lands tails? (Hint: What are the possible outcomes when you toss a coin twice?)

A. 1/6
B. 1/3
C. ¼
D. ½
E. 1

4. If a coin is tossed twice what is the probability that it will land either heads both times or tails both times?

A. 1/8
B. 1/6
C. 1/4
D. 1/2
E. 1

5. Calculate the following probabilities and arrange them in order from least to greatest.

I. The probability that a fair die will produce an even number. _____

II. A random digit from 1 to 9 (inclusive) is chosen, with all digits being equally likely. The probability that when it's squared the answer will contain the digit 1. _____

III. The probability that a letter chosen from the alphabet will be a vowel. _____

IV. A random number between 1 and 20 (inclusive) is chosen. The probability that its square root will not be an integer. _____

ORDER: _____, _____, _____, _____