Kansas City Area Teachers of Mathematics
2014 KCATM Math Competition

STATISTICS and PROBABILITY
GRADE 8

INSTRUCTIONS

- **Do not open this booklet** until instructed to do so.

- Time limit: **20 minutes**

- You **may use calculators** on this test.

- Mark your answer on the answer sheet by **FILLING in the oval**.

- You **may not use rulers, protractors, or other measurement devices** on this test.

Student Name _____ Student Number _____

School _____

101. Establishing the probability of an event without using trials is called:

   A. Theoretical probability   B. Experimental probability   C. Survey probability
   D. Estimation probability   E. None of these

102. The ratio of the number of times an event occurs to the total number of trials is:

   A. Theoretical probability   B. Experimental probability   C. Survey probability
   D. Estimation probability   E. None of these

**Use the spinner diagram below for problems 103.-104.**

103. Use the spinner diagram below to determine the probability of orange; **P(Orange),** assuming the central angles for each section are equal.

      A. P = 0.4   B. P = 0.5   C. P = 0.2   D. P = 0.25   E. None of these

104. Use the spinner diagram below to determine the probability of orange or yellow; P(Orange or Yellow), assuming the areas of the colored sections are equal.

      A. P = 0.2   B. P = 0.4   C. P = 0.6   D. P = 2   E. None of these

105. Use the square below to determine the **geometric probability of landing in the shaded area** around the white square, assuming that it lands somewhere inside the larger square with dimension of 2 units.
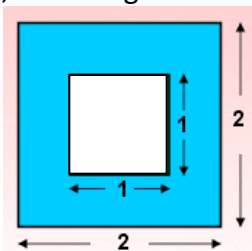
      A. 1/2
      B. 3/4
      C. 5/4
      D. 1/4
      E. None of the above

106. What is the probability of rolling an **even number less than 5** on a standard number cube with numbers 1-6?

   A. 1/3   B. 1/2   C. 1/6   D. 2/3   E. None of these

107. What is the probability of rolling a **prime number** on a pair of standard number cubes with numbers 1-6?

   A. 1/6   B. 2/3   C. 1/3   D. 1/2   E. None of these

108. What is the probability of **flipping 3 tails in a row** on a coin?
    A. 1/2   B. 1/4   C. 1/8   D. 1/16   E. None of these

109. If the probability of having auburn hair in your math class is 7 out of 29, what are the **odds** of auburn hair in your math class?
    A. 7:29   B. 22:29   C. 7:22   D. 22:7   E. None of these

110.   If the probability of an Artic Vortex arriving in your area is 40%, what is the probability that it will **NOT** arrive?
    A. 2/5   B. 3/5   C. 4/5   D. 1/5   E. None of these

111. What is the probability of selecting a **vowel** out the letters of the alphabet?
    A. 3/13   B. 5/26   C. 7/26   D. 21/26   E. None of these

112. If a dodecahedron has its faces and base labeled with the numbers 1 – 12, what is the probability that you will roll **a factor of 6**?
    A. 1/3   B. 1/4   C. 1/2   D. 1/6   E. None of these

113. If there is a 3% return on mini iPads, how many would you expect to be returned if 120,000 were sold?

    A. 6000   B. 4800   C. 3600   D. 2400   E. None of these

Use the results table for tossing 2 number cubes for problems #114-#117. Ex: (3,4) means to roll a "three" on the first number cube and a "four" on the second number cube. P(E) = Probability of the Event

(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	(1,6)
(2,1)	(2,2)	(2,3)	(2,4)	(2,5)	(2,6)
(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)
(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)
(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	(5,6)
(6,1)	(6,2)	(6,3)	(6,4)	(6,5)	(6,6)

114. What is the **P(1) on the sum of** the two number cubes?
    A. 1/36   B. 1/18   C. 1/12   D. 1/9   E. None of these

115. What is the **P(sum > 7)** on the two number cubes?
    A. 7/12   B. 1/6   C. 5/6   D. 5/12   E. None of these

116. What is the **P(sum of 9)** on the two number cubes?
    A. 5/36   B. 1/6   C. 1/9   D. 1/6   E. None of these

117. What is the **P(sum < 6)** on the two number cubes?
    A. 5/18   B. 5/6   C. 5/31   D. 1/6   E. None of these

118. What is the probability of landing on a number from the set of Integers: **P({Integer}) = P(Z)**
       on the spinner?
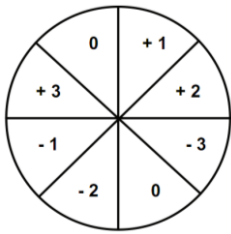
                     A. 1/4
                     B. 3/8
                     C. 1/2
                     D. 1
                     E.   None of the above

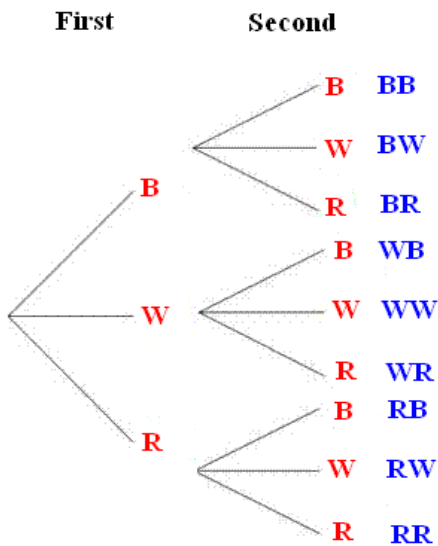119. **How many different combinations** of 4 letters would there be using: **A B C D**?

   A. 10   B. 12   C. 16   D. 24   E. None of these

120. If you had choices of white, rye, wheat breads; beef, salami, chicken, turkey meats; and yellow, spicy brown, horseradish mustards or mayo; Swiss, American, or no cheese; how **many different sandwiches** could be made?

   A. 14   B. 144   C. 72   D. 96   E. None of these

121. Use the tree diagram below to determine the probability of a WR outcome.

         First   **Second**

                           B BB

                         W BW   A.   4/9

             B   R BR   B.   2/9

                         B WB   C.   1/9

              W   W WW   D.   1/3

                         R WR   E.   None of the above

                         B RB

             R   W RW

                         R RR

122. **If you draw a gumball out of a bag that has 7 uniquely colored gumballs (including a green), what would be the probability that you would **a green gumball**?

   A. 1/7   B. 1/6   C. 6/7   D. 2/7   E. None of these

123. **With replacement**, if you draw a green gumball out of a bag that has 4 green gumballs out of 9, what would be the probability that you would **draw a green out twice in a row**?

   A. 8/9   B. 64/81   C. 8/81   D. 16/81   E. None of these

Use the stem and leaf plot for problems #124 and #125.

Differences in Game Scores for the 2013-14 Season

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0 | 1   4   5   6   7   7
1 | 0   0   3   4   5   7   7   9
2 | 2   3   9
3 | 2   5   6
4 | 5
```

Key: 1| 0 means 10 points

124. What is the probability of winning a game by less than 14 points?
   A. 2/7   B. 9/12   C. 10/21   D. 3/7   E. None of these

125. What is the probability of winning a game by over 24 points?
   A. 2/7   B. 5/21   C. 0   D. 4/21   E. None of these

Use the data from the "Favorite Types of Movie" for #126-128.
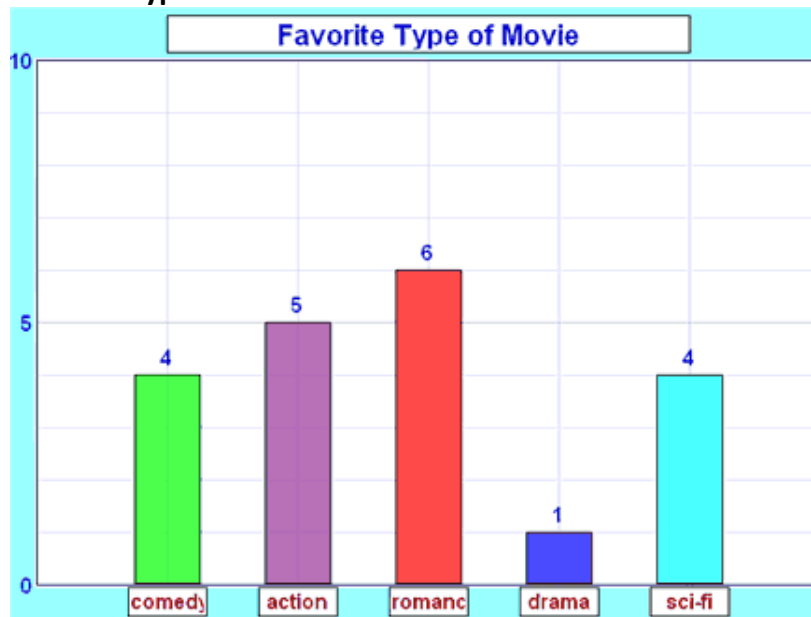
126. What is the mean of the frequencies of the favorite type of movies shown?
   A. 6   B. 1   C. 5   D. 4   E. None of these

127. What is the range of the frequencies of the favorite type of movies shown?
   A. 6   B. 1   C. 5   D. 4   E. None of these

128. If the number of Drama movies changed to 7, which value would not change?
   A. median   B. mode   C. mean   D. range   E. None of these

**Use the spinners for problems #129-130.**
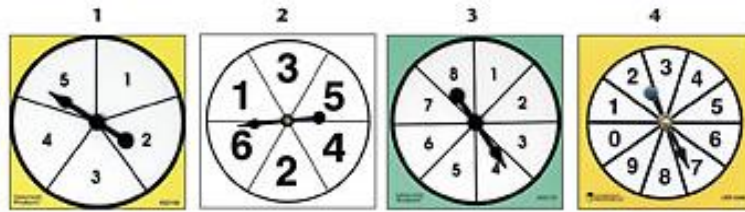
129. If you have the 4 spinners above, **which <u>one</u> would give you the least probability** of landing on an **odd number**?

   A. Spinner #1   B. Spinner #2   C. Spinner #3   D. Spinner #4   E. None of these

130. If you have the 4 spinners below, which one would give you the best probability of landing on a **prime number**?

   A. Spinner #1   B. Spinner #2   C. Spinner #3   D. Spinner #4   E. None of these
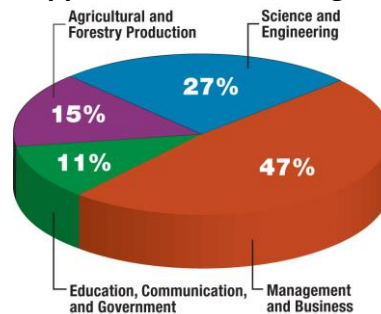
131.   Assuming that a dart was thrown and it hits the target, what is the probability of landing in the white region of the target, if each consecutive ring has the radius that is 2" larger than the previous ring as shown?
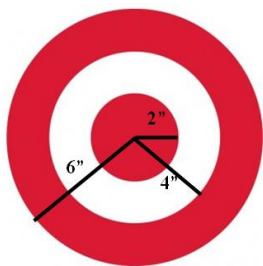
   A.   1/3   B. 1/5   C. 3/5   D. 4/9

   E. None of the above

Use the data from Employment Opportunities for College Graduates, 2010 for #132-134.

Employment Opportunities for College Graduates, 2010

132. How much larger was the employment opportunity for Science and Engineering than Agricultual and Forrestry Production?

   A. 12°   B. 20°   C. 60°   D. 80°   E. None of these

133. What would be the degree of the central angle for Science and Engineering? Round to whole degree.

   A. 92°   B. 98°   C. 97°   D. 90°   E. None of these

134. If the total Employment Opportunities represents 4 million jobs, how many were in Education, Communication, and Government?

   A. 440,000   B. 400,000   C. 4,400,000   D. 380,000   E. None of these

135. Use the graph below to select the **most reasonable** equation for the best-fit line *(from the equations listed below)*. Consider the horizontal line to be the x-axis, and the vertical line to be the y-axis.
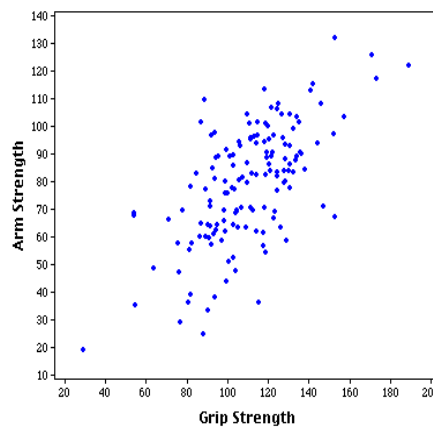   Note: T = Test Score and h = number of hours you study.

Hours of study vs. Test scores
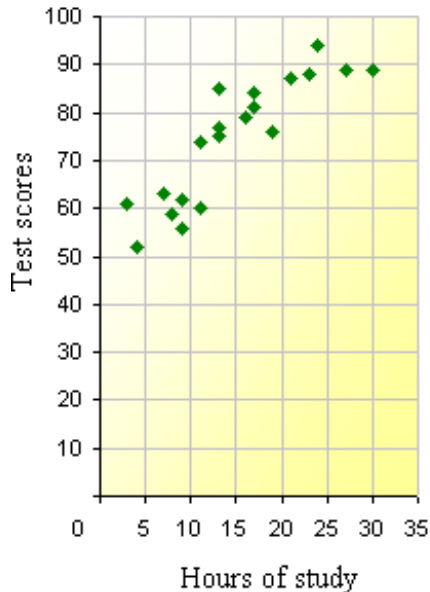
A. T = 1.4(h) + 55

B. T = 4(h) + 60

C. T = 0.6(h) + 70

D. T = - 1.4(h) + 60

E. T = -0.6h + 55

136. Use the data on Arm Strength v. Grip Strength to discuss **correlation** of data.

A.   The data shows a strong positive correlation between the Arm Strength and Grip Strength.
B. The data shows a weak positive correlation between the Arm Strength and Grip Strength.
C. The data shows a very weak negative correlation between the Arm Strength and Grip Strength.
D. The data shows a strong negative correlation between the Arm Strength and Grip Strength.
E. None of the above

Use the _sample_ license plates to answer problems #137 and #138.

| A	B	C	D
3 letters followed by 3 numbers; all can repeat	7 numbers all can repeat	6 letters and/or 6 numbers all can repeat	4 numbers and 3 letters in any order; all can repeat

137. If you follow the rule below the plates, which plate would have the **least** possible number of
     different combinations of license plates?
     A. Oklahoma   B. Texas   C. New Jersey   D. Diplomat   E. Oklahoma or New Jersey

138. How would the number of possibilities change **IF Texas** uses a combination of **either letters or numbers**
     for the **first two places** on their license plates?
     A. The number multiplied by 676.   B. The number multiplied by 6.76
     C. The number multiplied by 1296   D. The number multiplied by 12.96.   E. None of these

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Use the Speed of Light Experiment Data for problems #139 and #140.
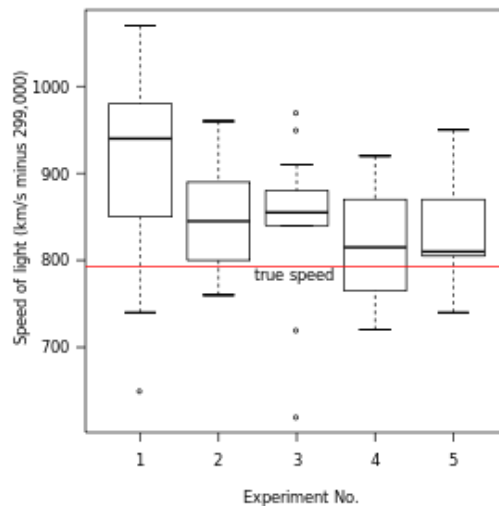
139. Which of these experiments had the largest range of data?
     A. Exp. No. 1   B. Exp. No. 2   C. Exp. No. 3   D Exp. No. 4   E. Exp. No. 5

140. Which conclusion could you **NOT** make comparing the data?

     A. Experiment No. 3 has the smallest Inter-Quartile Range (IQR).
     B. All experiments have outliers.
     C. The median values for all experiments are within 150 km/s of each other.
     D. The medians of all the experiments over-valued the speed of light.
     E. None of the above

Shade the correct answer!
Example: A   ●   C   D   E

Name_____

School _____

101.	A	B	C	D	E		121.	A	B	C	D	E
102.	A	B	C	D	E		122.	A	B	C	D	E
103.	A	B	C	D	E		123.	A	B	C	D	E
104.	A	B	C	D	E		124.	A	B	C	D	E
105.	A	B	C	D	E		125.	A	B	C	D	E
106.	A	B	C	D	E		126.	A	B	C	D	E
107.	A	B	C	D	E		127.	A	B	C	D	E
108.	A	B	C	D	E		128.	A	B	C	D	E
109.	A	B	C	D	E		129.	A	B	C	D	E
110.	A	B	C	D	E		130.	A	B	C	D	E
111.	A	B	C	D	E		131.	A	B	C	D	E
112.	A	B	C	D	E		132.	A	B	C	D	E
113.	A	B	C	D	E		133.	A	B	C	D	E
114.	A	B	C	D	E		134.	A	B	C	D	E
115.	A	B	C	D	E		135.	A	B	C	D	E
116.	A	B	C	D	E		136.	A	B	C	D	E
117.	A	B	C	D	E		137.	A	B	C	D	E
118.	A	B	C	D	E		138.	A	B	C	D	E
119.	A	B	C	D	E		139.	A	B	C	D	E
120.	A	B	C	D	E		140.	A	B	C	D	E

Shade the correct answer!   Name_____

Example: A ● C D E

School _____

ANSWER KEY

101.	●	B	C	D	E	121.	A	B	●	D	E
102.	A	●	C	D	E	122.	●	B	C	D	E
103.	A	B	●	D	E	123.	A	B	C	●	E
104.	A	●	C	D	E	124.	A	B	C	●	E
105.	A	●	C	D	E	125.	A	●	C	D	E
106.	A	B	C	●	E	126.	A	B	C	●	E
107.	A	B	C	●	E	127.	A	B	●	D	E
108.	A	B	●	D	E	128.	A	●	C	D	E
109.	A	B	●	D	E	129.	A	B	C	D	●
110.	A	●	C	D	E	130.	●	B	C	D	E
111.	A	●	C	D	E	131.	●	B	C	D	E
112.	●	B	C	D	E	132.	●	B	C	D	E
113.	A	B	●	D	E	133.	A	B	●	D	E
114.	A	B	C	D	●	134.	●	B	C	D	E
115.	A	B	C	●	E	135.	●	B	C	D	E
116.	A	B	●	D	E	136.	A	●	C	D	E
117.	●	B	C	D	E	137.	●	B	C	D	E
118.	A	B	C	●	E	138.	A	●	C	D	E
119.	A	B	C	●	E	139.	●	B	C	D	E
120.	A	●	C	D	E	140.	A	●	C	D	E