Kansas City Area Teachers of Mathematics
2012 KCATM Math Competition

PROBABILITY AND STATISTICS
GRADES 7-8

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 Scantron sheet by **FILLING in the oval**.

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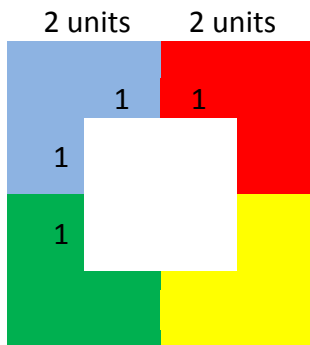
Student Name _____ Student Number _____

School _____

1. **Using trials** to establish the probability of an event is called:
   A. Theoretical probability   B. Experimental probability   C. Survey probability
   D. Estimation probability   E. None of the above

2. Use the square below to determine the **geometric probability of landing in the center white square**.
   2 units   2 units

   A. 1/5
   B. 1/4
   C. 3/8
   D. 1/3
   E. None of the above

3. What is the probability of rolling a **prime number** on a standard number cube with numbers 1-6.
   A. 1/6   B. 2/3   C. 1/2   D. 5/6

4. On the spinner below, what is the probability of landing on a **pentagon**?

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

5. What is the probability of **rolling 2 heads in a row** on a coin?
   A. 1/2   B. 1/4   C. 1/8   D. 0   E. None of the above

6. If the probability of having blue eyes in your math class is 5/28, what are the **odds** of having blue eyes in your math class?
   A. 5:33   B. 23:28   C. 5:23   D. 23:5   E. None of the above

7. If the probability of snow is 20%, what is the probability that it will **NOT** snow?
   A. 4/5   B. 1/5   C. 2/5   D. 3/5   E. None of the above

8. What is the probability of selecting a **vowel** out the letters of the alphabet? *(Do not count "y".)*
   A. 3/13   B. 5/26   C. 1/5   D. 7/26   E. None of the above

9. A tetrahedron is a triangular pyramid. If it is labeled with the numbers 1-4 on its sides, what is the probability that you will roll **a factor of 8**?
   A. 1/4   B. 1/2   C. 3/4   D. 1   E. None of the above

10. If data shows that 3% of TVs will be returned for service within the first year, how many would you expect to be returned if your store sold 535 TVs in the past year?
   A. 16   B. 23   C. 160   D. 519   E. None of the above

Use the results table for tossing 2 number cubes for problems #11-#14. Ex: (1,1) means to roll a "one" on the first number cube and a "one" 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)

11. What is the **P(odd sum)** on the two number cubes?

    A. 17/36   B. 1/2   C. 5/12   D. 5/9   E. None of the above

12. What is the **P(sum of 10)** on the two number cubes?

    A. 5/36   B. 1/9   C. 1/12   D. 1/6   E. None of the above

13. What is the **P(sum of 7)** on the two number cubes?

    A. 7/36   B. 1/6   C. 5/36   D. 11/36   E. None of the above

14. What is the **P(sum of 9)** on the two number cubes?

    A. 5/36   B. 1/6   C. 7/36   D. 1/9   E. None of the above

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15. What is the probability of landing on a number from the set of Natural numbers: **P({Natural #'s})** on the spinner?
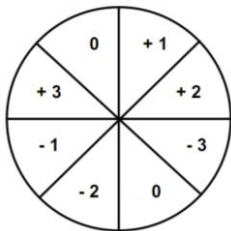
    A. 1/2
    B. 3/8
    C. 1/4
    D. 5/8
    E. None of the above

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16. **How many different combinations** of 3 letters would there be using: **C A T** ?

    A. 4   B. 5   C. 6   D. 7   E. None of the above

17. If you had choices of 5 meats, 3 cheeses, and 4 different types of bread for a sub-sandwich, how **many different sandwiches** could be made?

    A. 60   B. 35   C. 12   D. 19   E. None of the above

18. If you were running for President of your class and there were seven people running against you, what would be the probability of you winning the Presidency, **P(President of Club)**?

    A. 1/7   B. 1/8   C. 7/8   D. 6/7   E. None of the above

19. **With replacement**, if you draw a yellow marble out of a bag that has 8 yellow marbles out of 14, what would be the probability that you would **draw a yellow out twice in a row**?

    A. 2/7   B. 4/7   C. 8/7   D. 16/49   E. None of the above

**Use the stem and leaf plot for problems #20 and #21.**

Difference Between Winning and Losing Super Bowl Scores (1981-2000)

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

20. What is the probability of winning a game by less than 10 points?
   A. 1/3   B. 3/10   C. 6/21   D. 8/21   E. None of the above

21. What is the probability of winning a game by over 30 points?
   A. 7/21   B. 1/4   C. 1/5   D. 4/21   E. None of the above

Use the data from the Number of Amazing Songs released for problems #22-24.

Number Of Amazing Songs Released 2000-2009
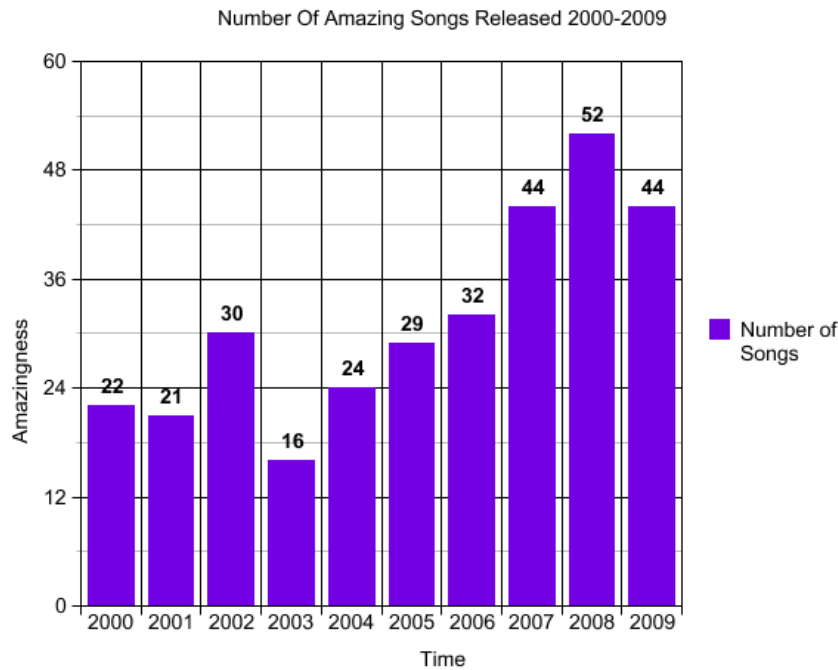
22. What is the mean of the numbers of amazing songs released each year from 2000-2009?
   A. 32   B. 31.4   C. 28.6   D. 34.9   E. None of the above

23. What is the median number of amazing songs released each year from 2000-2009?
   A. 28   B. 28.5   C. 29   D. 29.5   E. None of the above

24. What is the range of the amazing songs released each year from 2000-2009?
   A. 36   B. 52   C. 44   D. 30   E. None of the above

Use the data from Rochdale in the United Kingdom to answer problems #25-27.

Types of Travel Arrangements to School
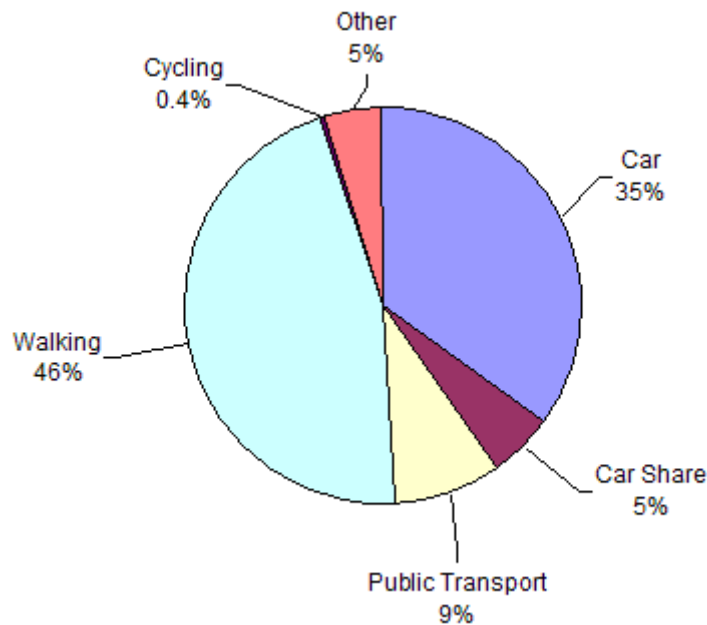
25. If there are 1,600 students in the Rochdale schools, how many students **walk** to school?
    A. 74 students   B. 736 students   C. 813 students   D. 560 students   E. None of the above

26. What would be the degree of the central angle of the students who got to school by **car** ?
    A. 150°   B. 40°   C. 144°   D. 135°   E. None of the above

27. If 1,600 students are in the Rochdale schools, which category would be represented by **6 people**?
    A. Sharing a car   B. Public Transportation   C. Other sources of transportation
    D. Riding a bicycle   E. None of the above

28. Use the data on the **Number of Typos** found in a book to determine the trend of the data by finding the **most reasonable equation for the best-fit line** from the equations listed below.
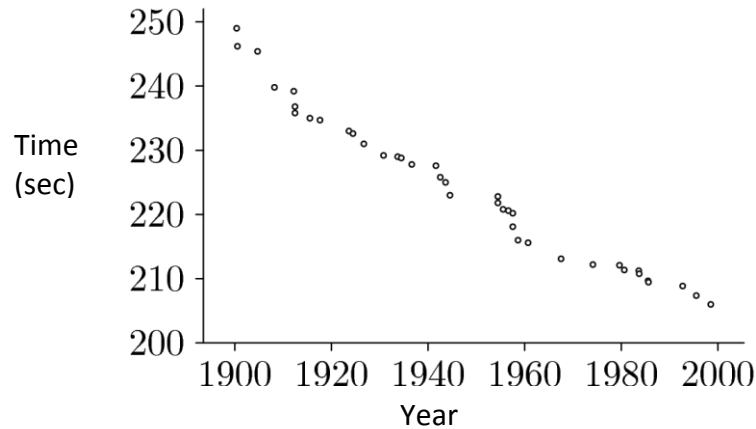
Typos In Book
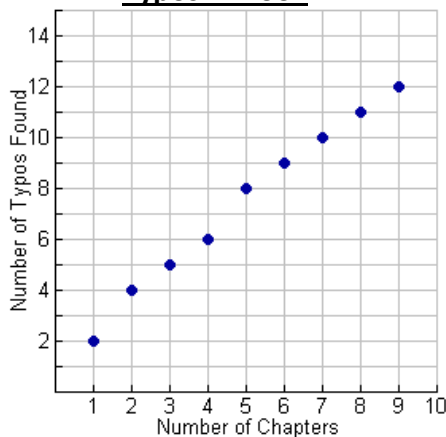
A. $T = -1(c) + 2$
B. $T = 1(c) + 1.5$
C. $T = 3(c) + 2$
D. $T = -2(c) + 3$
E. $T = 0.5x$

29. Use the data on recorded times for the 1500 meter race to discuss **correlation** of data.

TIMES for 1500m Race for Years 1900-2000

A. The data shows a strong positive correlation between the year and the record times.
B. The data shows a weak positive correlation between the year and the record times.
C. The data shows a weak negative correlation between the year and the record times.
D. The data shows a strong negative correlation between the year and the record times.
E. None of the above

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30. If the mean of ages of the 24 students in your classroom is 13.7 years old, **how is the mean affected** when you include the teacher's age of 60 in your data?
A. The mean rose to 15.6 years old.
B. The mean rose to 16.2 years old.
C. The mean rose to 14.8 years old.
D. The mean rose to 17.1 years old.
E. None of the above

Use the Blood Pressure Box Plots separated by age to answer problems #31 and #32.

**AGE and BLOOD PRESSURE Values**
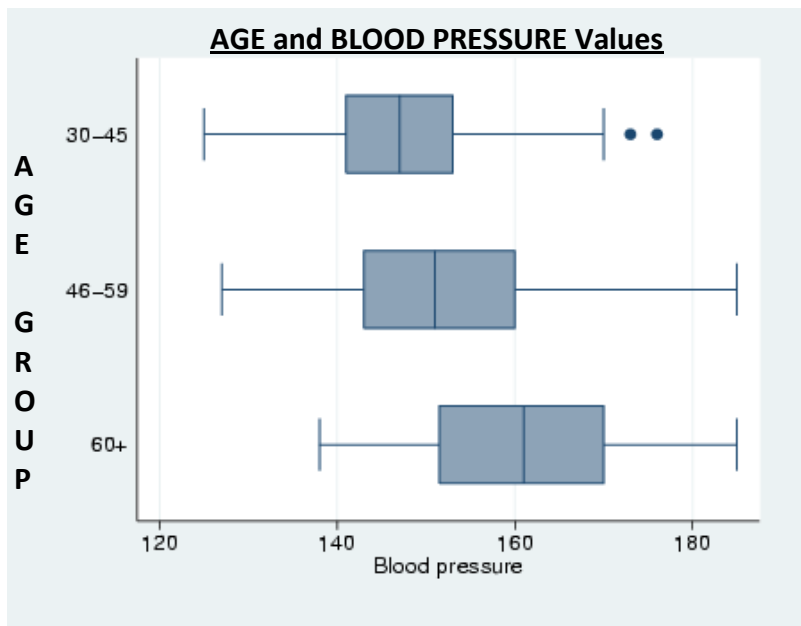
31. Which age group had the largest range of data?
    A. 30-45   B. 46-59
    C. Over 60   D. Both 30-45 and over 60
    E. None of the above

32. Which conclusion could you **NOT** make comparing the data?
A. The older you get, the middle 50% (interquartile range) of the data on blood pressure shows that blood pressure rises.
B. The interquartile range shows less variability in the age group of 30-45 years old.
C. The median values rose in the age groups.
D. As people age, the maximum values of blood pressure goes up for each age group.
E. None of the above

Use the data in the histogram on student MBA scores to answer problems #33 and #34.

Frequency of Scores on MBA Exam
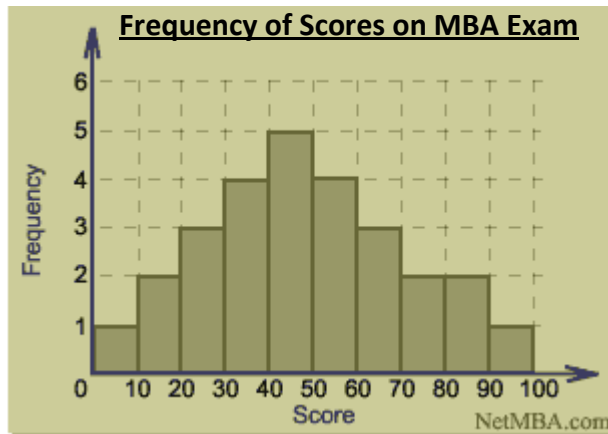
33. How many people are in the data set?
    A. 23   B. 27   C. 28   D. 30   E. None of the above

34. Which conclusion can NOT be make from this data?
    A. More people scored between 40 and 50 than any other range.
    B. Fewer people scored low or high compared to the middle scores.
    C. The people with a score of 50 or more passed.
    D. The range of the data is approximately 90.
    E. None of the above

35. Use the tree diagram below to determine the probability of a red followed by a blue outcome.

| 1st draw | 2nd draw | Outcomes |

A. 4/9

B. 2/9

C. 1/9

D. 1/3
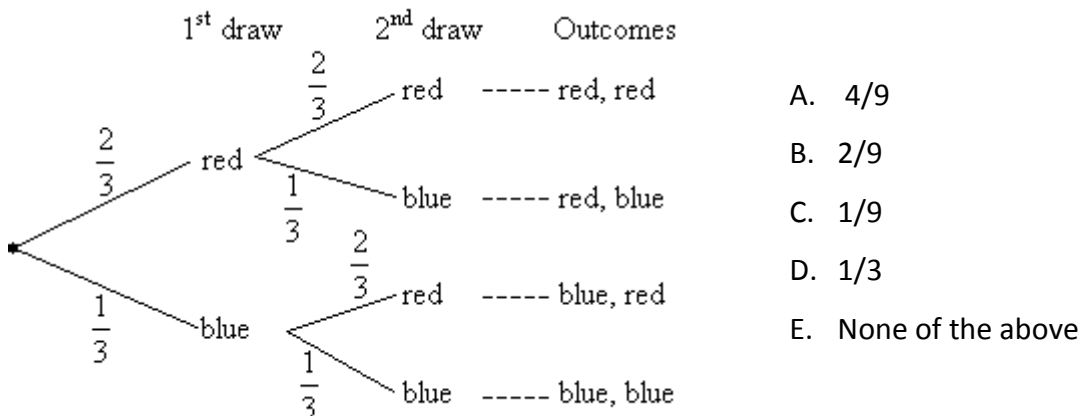
E. None of the above

36. If you have the 4 spinners below, which one would give you a better probability of landing on an odd number?
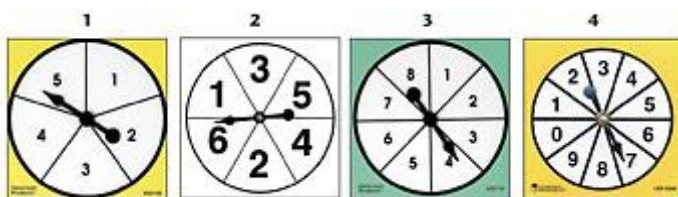
A. Spinner # I
B. Spinner # 2
C. Spinner # 3
D. Spinner # 4
E. None of the above

Use the <u>sample</u> license plates to answer problems #37 and #38.

| A	B	C	D
3 letters, 4 numbers can repeat	7 numbers can repeat	3 letters, 3 numbers can repeat	3 numbers, letter, number, letter – can repeat

37. If you follow the rule below the plates, which state would have the least possible number of **different combinations of license plates**?

  A. Unknown state –specialized nursing plate   B. Illinois

  C. Oklahoma   D. Connecticut   E. None of the above

38. How would the number of possibilities change **IF Connecticut** uses a combination of **<u>either</u> letters or numbers for the <u>last three places</u>** on their license plates?

  A. The number grew from 6,760,000 to 46,656,000.

  B. The number grew from 17,576,000 to 46,656,000.

  C. The number grew from 10,000,000 to 46,656,000.

  D. The number grew from decreased from 175,760,000 to 46,656,000.

  E. None of the above

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39. Given the graph below, what is the geometric probability of selecting the shaded region?
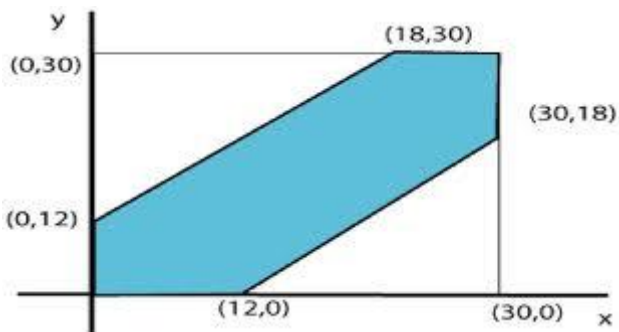
  A. 38%

  B. 54%

  C. 50%

  D. 64%

  E. None of the above

40. 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. *(See labels.)*
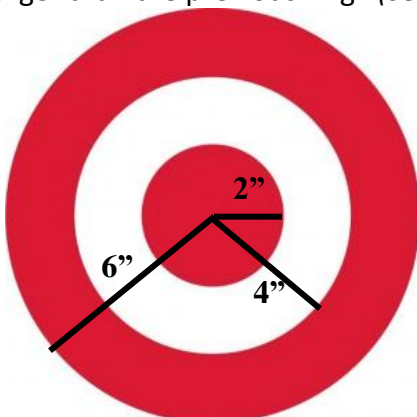
  A.   1/4

  B. 1/5

  C. 2/5

  D. 1/3

  E. None of the above

Shade the correct answer!   Name_____

Example: A   ●   C   D   E

School _____

1.	A	B	C	D	E	21.	A	B	C	D	E
2.	A	B	C	D	E	22.	A	B	C	D	E
3.	A	B	C	D	E	23.	A	B	C	D	E
4.	A	B	C	D	E	24.	A	B	C	D	E
5.	A	B	C	D	E	25.	A	B	C	D	E
6.	A	B	C	D	E	26.	A	B	C	D	E
7.	A	B	C	D	E	27.	A	B	C	D	E
8.	A	B	C	D	E	28.	A	B	C	D	E
9.	A	B	C	D	E	29.	A	B	C	D	E
10.	A	B	C	D	E	30.	A	B	C	D	E
11.	A	B	C	D	E	31.	A	B	C	D	E
12.	A	B	C	D	E	32.	A	B	C	D	E
13.	A	B	C	D	E	33.	A	B	C	D	E
14.	A	B	C	D	E	34.	A	B	C	D	E
15.	A	B	C	D	E	35.	A	B	C	D	E
16.	A	B	C	D	E	36.	A	B	C	D	E
17.	A	B	C	D	E	37.	A	B	C	D	E
18.	A	B	C	D	E	38.	A	B	C	D	E
19.	A	B	C	D	E	39.	A	B	C	D	E
20.	A	B	C	D	E	40.	A	B	C	D	E

Shade the correct answer!   Name_____

Example: A ● C D E

                              School _____

1.	A	●	C	D	E	21.	A	B	C	●	E

1.   A ● C D E   21. A B C ● E

2.   A ● C D E   22. A ● C D E

3.   A B ● D E   23. A B C ● E

4.   A B C D ●   24. ● B C D E

5.   A ● C D E   25. A ● C D E

6.   A B ● D E   26. A B ● D E

7.   ● B C D E   27. A B C ● E

8.   A ● C D E   28. A ● C D E

9.   A B ● D E   29. A B C ● E

10. ● B C D E   30. ● B C D E

11. A ● C D E   31. A ● C D E

12. A B ● D E   32. A B C ● E

13. A ● C D E   33. A ● C D E

14. A B C ● E   34. A B ● D E

15. A ● C D E   35. A ● C D E

16. A B ● D E   36. ● B C D E

17. ● B C D E   37. ● B C D E

18. A ● C D E   38. ● B C D E

19. A B C ● E   39. A B C ● E

20. A B ● D E   40. A B C ● E