Kansas City Area Teachers of Mathematics
2011 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.

1. On a six-sided die, what is the probability of rolling a multiple of 3?
   A. 1/3 B. 1/2 C. 2/3 D. 1/6 E. None of the above

2. On the spinner in Figure 1, what is the probability of landing on a quadrilateral in **Figure 1**?

Figure 1

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

3. What is the probability of landing on a number from the set of whole numbers: {Whole #'s} on the spinner in Figure 2?

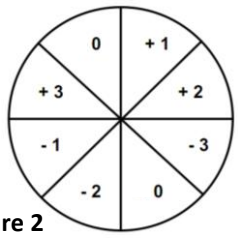


Figure 2

A. 1/2
B. 3/8
C. 1/4
D. 5/8
E. None of the above

4. What is the probability of landing on the inside square vs. the outside square in the Figure 3?

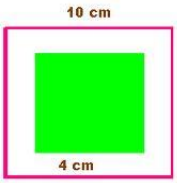
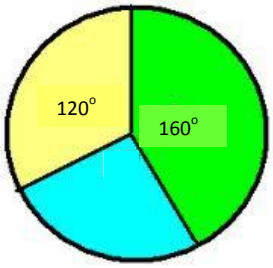


Figure 3

A. 2/5 B. 16/40
C. 4/25 D. 4/5
E. None of the above

Use Figure 4 for problems #4-5:

Figure 4



5. The spinner in **Figure 4** is based on the measure of the central angle of the sector. What is the probability of landing in the smallest sector of the circle?

   A. 0.33 B. 0.67 C. 0.22 D. 0.44 E. None of the above

6. What is the probability of landing in either of the 2 larger sectors of the circle in **Figure 4**?

   A. 7/9 B. 1/3 C. 2/9 D. 1 E. None of the above

Use a <u>standard deck of 52 cards</u> (13 of each of 4 suites: Clubs, Spades, Hearts, Diamonds) for #7 -#9.

7. What is the probability of selecting a Heart as a card? P(Heart) = ___

A. 1/3 B. 1/52 C. 1/4 D. 1/13 E. None of the above

8. What is the probability of selecting a "6"? P(6) = ___

A. 1/3 B. 1/52 C. 1/4 D. 1/13 E. None of the above

9. You select a card, then replace it and draw again. What is the probability that the card will be an ACE on both draws? P(Ace) = ___

A. 1/2 B. 1/169 C. 1/16 D. 2/13 E. None of the above

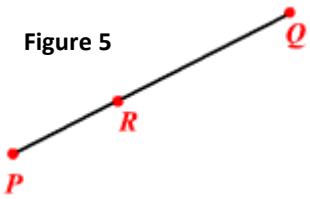


Figure 5

10. Given $\overline{PQ}$ with R between P and Q with PR = 25 and PQ = 75, what is the geometric probability of selecting a point on $\overline{RQ}$ from the whole line segment in **Figure 5**?

A. 1/3 B. 1/2 C. 3/4 D. 2/3
E. None of the above

11. Evaluate the mathematical expression of 5!
A. 5 B. 10 C. 120 D. 60 E. None of the above

12. You are on a five member committee (see Figure 6) to improve your school. Three people will be selected out of the five to attend a conference. How many different combinations of 3-people could attend the conference?
A. 5 B. 15 C. 10 D. 20 E. None of the above


Figure 6

13. Four people shake hands with everyone in the group. How many different handshakes are there?

A. 4 B. 6 C. 10 D. 3 E. None of the above

14. The probability of winning the door prize is 1/40, what are the odds of winning the door prize?
A. 1:39 B. 1:40 C. 1:41 D. 1:1 E. None of the above

15. The license plate in **Figure 7** represents the numbering and lettering system for Arizona: 3 numbers followed by 3 letters. Which expression shows how to tabulate the number of license plate the State of Arizona can make when letters and numbers can be repeated?

Figure 6

A. 26 x 26 x 26 x 10 x 10 x 10
B. 3 x 26 + 3 x 10
C. 3(26 + 26 + 26) x 3(10 + 10 + 10)
D. 26 x 25 x 24 x 10 x 9 x 8
E. None of the above

Use **Figure 8** as the KEY to Box Plots to assist with answering questions #16-#20. Figure 9 show shows the data on the box plot for test grades in two different algebra classes on the first test.

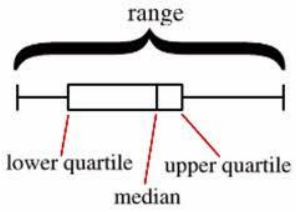


Figure 8

Percent Grades for TEST 1

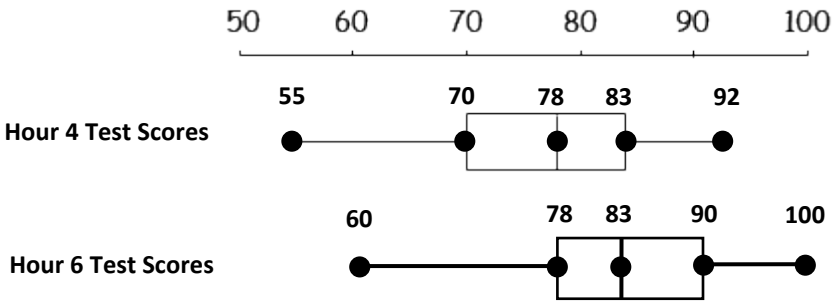


Figure 9

16. What is the range of test scores in Hour 4?
    A. 35% B. 45% C. 40% D. 37% E. None of the aove

17. What is the difference in the medians comparing Hour 6 to Hour 4?
    A. 1% B. 7% C. 5% D. 12% E. None of the above

18. The Inter-Quartile Range (IQR) is found by looking at the middle box of data which represents the middle 50% of the data. ***Calculate the IQR by: Upper Quartile – Lower Quartile***. What is the IQR for Hour 6?
    A. 18% B. 12% C. 13% D. 10% E. None of the above

19. What percent of the students earned an A in Hour 6 if the following scale is used as the minimum score in each grade category: F = below 60%, D = 60%, C = 70%, B = 80%, A = 90%.
    A. 25% B. 15% C. 10% D. 50% E. None of the above

20. Which of the following statements is **NOT** a true analysis of the data in the Box Plot of the test data?
    A. Overall, Hour 6 students performed better than Hour 4 on this test.
    B. The difference in the ranges between Hour 4 and Hour 6 is 3%.
    C. One fourth of the students in Hour 4 earned a 70% or less on the test.
    D. Half the students in Hour 6 scored an 83% or better.
    E. None of the above (All statements are true.)

---

21. Oscar measured the following lengths of trim boards that he has available in class at Mill Creek Center.
    8’, 8’, 12’, 16’, 18’ 12’, 12’ 18’
    What is the mean, median, **and** mode of the data?

    A. 16’, 18’, 12’ B. 13’, 12’, 12’ C. 12’, 12’, 12’ D. 13’, 17’, 12’ E. None of the above

Use the following sets of numbers: A = {…-4, -2, 0, 2, 4, …} and B = {…-3, -1,1, 3, …} for problems #21-#22.

22. What is the probability of choosing an even number from set A?
A. 50% B. 25% C. 100% D. 0% E. None of the above

23. What is the probability of choosing a positive odd integer from set B?
A. 0% B. 25% C. 50% D. 100% E. None of the above

Use 2 standard dice (1-6 on each) for problems #24-26 (see Figure 10).

Figure 10

24. What is the probability of getting a sum of twelve on the two dice?
A. 1/36 B. 1/6 C. 1/12 D. 1/18 E. None of the above

25. What is the probability of getting a three on either die?
A. 1/36 B. 1/6 C. 2/3 D. 1/3 E. None of the above

26. What is the probability of getting an even number on both dice?
A. 1/36 B. 1/4 C. 1/3 D. 1/6 E. None of the above

Figure 11

Use the bag of marbles in Figure 11 consisting of 4 blue, 3 red, and 5 green for problems #27-#28.

27. What is the probability that you will draw a red marble from the bag?
A. 1/4 B. 1/3 C. 5/12 D. 3/4 E. None of the above

28. What is the probability that you will not draw a blue from the bag?
A. 1/4 B. 1/3 C. 2/3 D. 7/12 E. None of the above

---

29. Use the outcomes of the probability tree in **Figure 11** to determine the probability of "Blue, Blue".

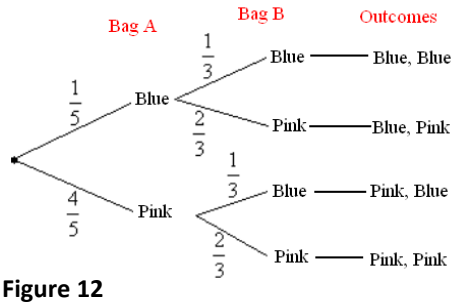


Figure 12

A. 1/15
B. 2/15
C. 4/15
D. 8/15
E. None of the above

Use the spinners below in Figure 13 for problems #30-33.

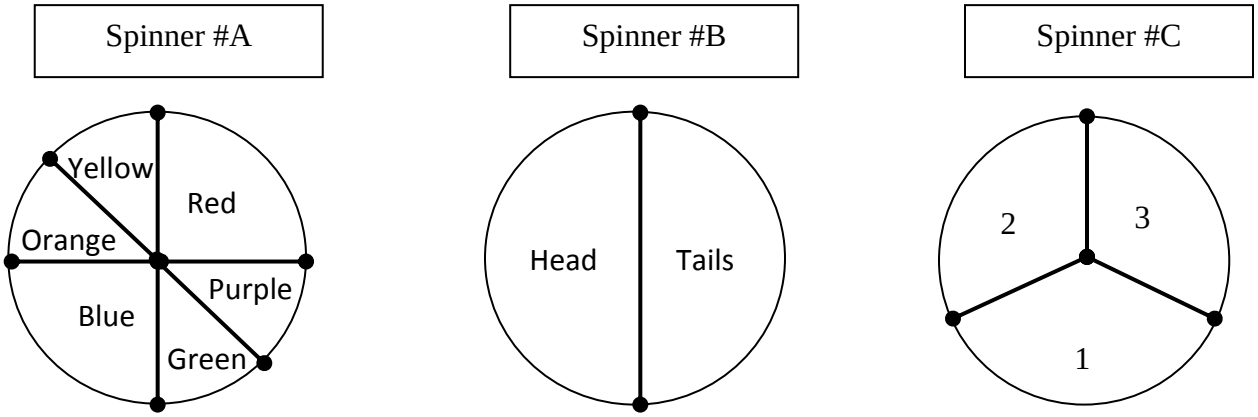


Figure 13

30. If you spin C, what is the probability you will land on a prime number?
A. 0 B. 2/3 C. 1/3 D. 1 E. None of the above

31. If you spin A, what is the probability that you will get Red, Blue, Purple **or** Green?
A. 1/4 B. 1/2 C. 2/3 D. 3/4 E. None of the above

32. If you spin B and C at the same time, what is the probability that you will get a Heads **and** a 2?
A. 5/6 B. 2/3 C. 1/3 D. 2/5 E. None of the above

33. After spinning Spinner B 250 times, about how many times would you get a Tails?
A. 100 B. 200 C. 175 D. 125 E. None of the above

---

34. If there are 2,100 students at Olathe East in the 2010-2011 school year, and 10% are coming to the WPA dance tonight in the gym, how many are **NOT** coming to the dance?
A. 210 B. 1890 C. 420 D. 1200 E. None of the above

35. With the economy declining, the price of homes has also declined. What is the median price of the last six homes sold in a community where the data is described below?
Home sales: $89,000; $124,500; $92,000; $150,000; $98,000; $92,000;

A. $95,000 B. $107,583 C. $92,000 D. $111,250 E. None of the above

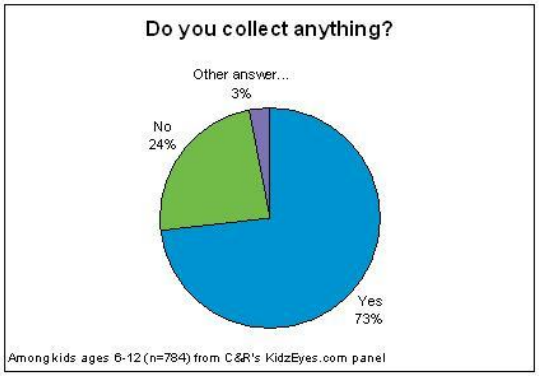


Figure 14

36. Use the data graph in Figure 14 to help you determine how many students ages 6-12 collect something if there were 784 students polled.

A. 212 students
B. 188 students
C. 24 students
D. 572 students
E. None of the above

Use the data from the bar graph in Figure 15 to determine the answers to #37-#38.

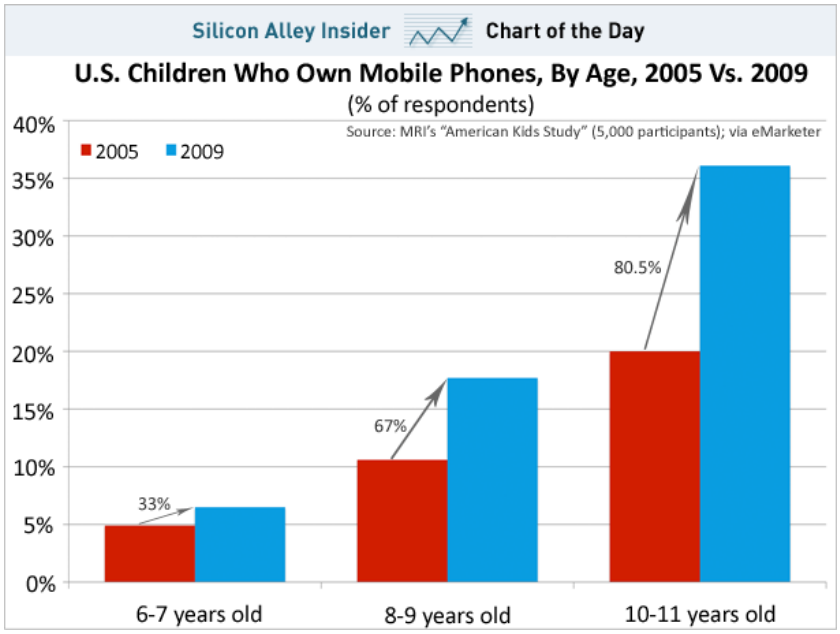


Figure 15

37. Approximately what percent of children ages 10-12 owned a cell (mobile) phone in 2009?

A. 80.5% B. 18%
C. 36% D. 20%
E. None of the above

38. If there were 400 children out of 5000 who owned a phone at age 8-9 in 2005, and the number grew by 67% in 2009, how many children in that age group owned cell phones in 2009?

A. 228 B. 650
C. 668 D. 704
E. None of the above

Use the graph on Bike Weight vs. Jump Height in **Figure 16** to determine the answers to problems #39-#40.

Figure 16

39. Which of the following statements is true about the data displayed?

A. As the weight of the bike goes up, the height of a bike's jump goes down.
B. As the weight of the bike goes up, the height of a bike's jump goes up.
C. The height achieved with a bike that is 20 pounds is 10 feet.
D. If a bike weighs 24 pounds, then the bike does not make a jump.
E. None of the above

40. What is the rate of change of the jump in "feet per pound" if Pt.1 is identified as (19 pounds, 10.35 ft.) and Pt. 2 is (23.5 pounds, 9.75 ft.)?

A. 1.59 feet per pound B. -0.13 feet per pound
B. -7.5 feet per pound C. -0.70 feet per pound
E. None of the above