Louisiana Mu Alpha Theta

affiliated with
Mu Alpha Theta
National High School and Junior College
Honorary Mathematics Club

50th State Convention
March 25-27, 2010
Baton Rouge, Louisiana

Alpha – Adv. Math Y

TEST RULES

1. Do not begin test until you are told to do so.
2. You must supply your own #2 pencil.
3. Only ACT approved calculators are allowed on all tests.
4. Print your name and school in the name blank, your code in the date blank, and the area test in the subject blank on your Scantron answer sheet
5. Standard procedure for machine graded papers must be followed. Use only a #2 pencil, marking the appropriate spaces carefully.
6. In case of a tie, winners will be determined according to the order in which the answer sheet was turned into the moderator.
7. Do all scratch work on your test.

2010 Advanced Math Y Area Test

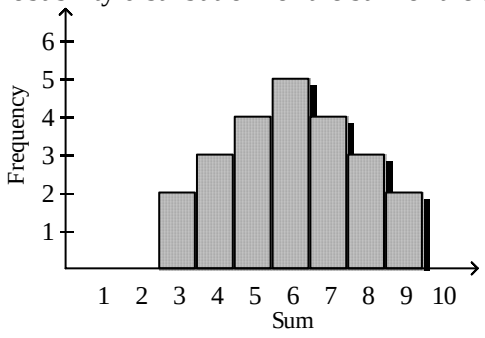
Multiple Choice

Identify the choice that best completes the statement or answers the question.

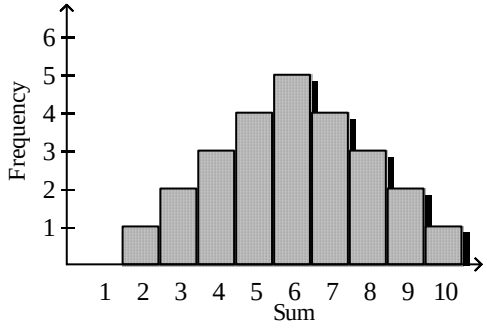
NOTA → None of the above

1. Suppose you spin two spinners. Each has 5 equally likely outcomes, the numbers 1 through 5. Which graph shows the probability distribution for the sum of the two spinners?

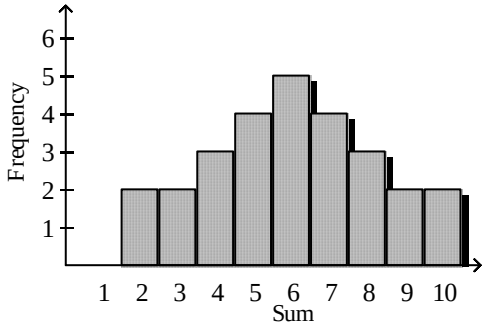
a)



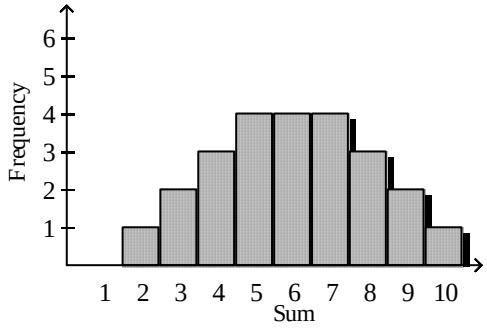
c)



b)



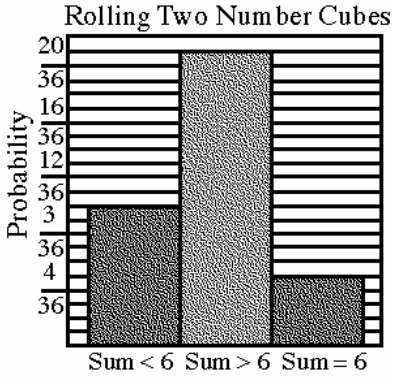
d)



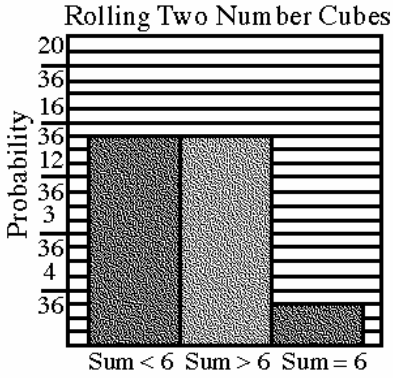
e) NOTA

2. Suppose you roll two number cubes. Graph the probability distribution for the sample space {sum of numbers < 6, sum of numbers > 6, sum of numbers = 6}.

a)

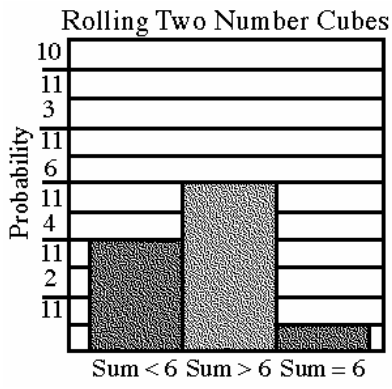


c)

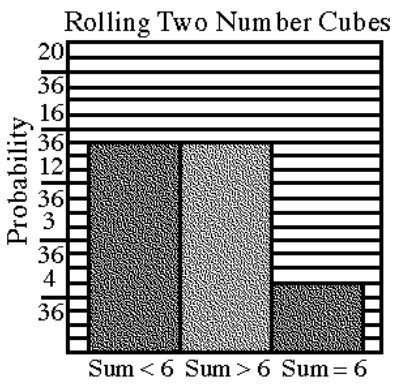


e) NOTA

b)


Rolling Two Number Cubes
Probability
10
11
3
11
6
11
4
11
2
11
Sum < 6
Sum > 6
Sum = 6

d)


Rolling Two Number Cubes
Probability
20
36
16
36
12
36
3
36
4
36
Sum < 6
Sum > 6
Sum = 6

3. Each person in a group of students was identified by year and asked when he or she preferred taking classes: in the morning, afternoon, or evening. The results are shown in the table. Find the probability that the student preferred afternoon classes given he or she is a junior. Round to the nearest thousandth.

When Do You Prefer to Take Classes?

	Freshman	**Sophomore**	**Junior**	**Senior**
Morning	19	2	6	16
Afternoon	17	3	13	15
Evening	8	14	9	7

a) 0.571 b) 0.464 c) 0.342 d) 0.158 e) NOTA

4. A class of 40 students has 11 honor students and 10 athletes. Three of the honor students are also athletes. One student is chosen at random. Find the probability that this student is an athlete if it is known that the student is not an honor student. Round to the nearest thousandth.
a) 0.241 b) 0.345 c) 0.252 d) 0.034 e) NOTA

5. Find the mean and standard deviation of the of data. Round to the nearest tenth.
the height (in feet) of a sample of trees in the school playground:
12.5, 9.8, 13.5, 11.2, 12.3, 14.2, 11.7, 9.8, 12.6, 10.4
a) mean = 11.8 ft; standard deviation = 1.43 ft
b) mean = 13.1 ft; standard deviation = 1.43 ft
c) mean = 11.8 ft; standard deviation = 4.52 ft
d) mean = 13.1 ft; standard deviation = 4.52 ft
e) NOTA

6. Susan keeps track of the number of tickets sold for each play presented at The Community Theater. Within how many standard deviations of the mean do all the values fall?
137, 134, 91, 61, 150, 155, 110, 148, 90, 169, 67, 61
a) 5 b) 4 c) 2 d) 3 e) NOTA

7. A survey of junior high school students found that 79% of students plan on attending college. If you pick three students at random, what are the chances that at least two plan on attending college? Round to the nearest percent.
a) 89% b) 51% c) 11% d) 39% e) NOTA

8. The numbers of cookies in a shipment of bags are normally distributed, with a mean of 64 and a standard deviation of 4. What percent of bags of cookies will contain between 60 and 68 cookies?
a) 50% b) 13.5% c) 68% d) 34% e) NOTA

9. A grocery store will only accept yellow onions that are at least 3 in. in diameter. A grower has a crop of onions with diameters that are normally distributed, with a mean diameter of 3.25 in. and a standard deviation of 0.25 in. What percent of the onions will be accepted by the grocery store?
a) 34% b) 97.5% c) 84% d) 50% e) NOTA

10. Betty's Bite-Size Candies are packaged in bags. The number of candies per bag are normally distributed, with a mean of 50 candies and a standard deviation of 3. At a quality control checkpoint, a sample of bags are checked, and 4 bags contain fewer than 47 candies. How many bags were probably taken as samples?
a) 25 bags b) 12 bags c) 8 bags d) 5 bags e) NOTA

11. Write an equation for the nth term of the given arithmetic sequence.
–14, –30, –46, –62, ...

a) $a_n = -14n + 1$

b) $a_n = -16n - 30$

c) $a_n = 16n - 30$

d) $a_n = -16n + 2$

e) NOTA

12. Brian, a scientist, is writing a research paper on projectile motion. During one of his experiments, he throws a ball from a point marked as Point A, with a certain velocity in the horizontal direction. The ball travels a horizontal distance of 0.6 meter in the 1st second, 1.2 meters in the 2nd second, 1.8 meters in the 3rd second, and so on. It hits the ground on the 8th second. Brian marks the point where the ball landed as Point B. Calculate the distance between Point A and Point B.

a) 4.2 c) 5.4 e) NOTA
b) 4.8 d) 9.0

13. James covers a distance of 8 meters in the first second of a 100 meter race. Then, he sprints at a speed of 9 meters per second. How far is James from the finish line 9 seconds after the race has started?

a) 11 c) 28 e) NOTA
b) 20 d) 80

14. Two cars, A and B, 100 miles apart, move toward each other. Car A covers 0.7 mile in the first minute, and then moves with an average speed of 0.8 mile per minute. Car B covers 0.6 mile in the first minute, and then moves with an average speed of 0.7 mile per minute. How many miles apart are the cars after 10 minutes?

a) 85.2 c) 83.7 e) NOTA
b) 14.8 d) 16.3

15. A bus moves away from a bus stop in a straight line. It moves 10 meters in the 1st second, 20 meters in the 2nd second, and 30 meters in the 3rd second. How many meters away is the bus from the bus stop after 10 seconds?

a) 100 c) 120 e) NOTA
b) 110 d) 190

16. A landscaper is designing a wall made of white bricks. The pattern consists of 130 white bricks in the bottom row, 110 white bricks in the second row, and 90 white bricks in the third row. How many white bricks will the 6th row have?

a) 10 c) 80 e) NOTA
b) 30 d) 230

17. Find the arithmetic means in the given sequence.
145, ?, ?, ?, 205

a) 160, 175, 190 c) 155, 165, 175 e) NOTA
b) 165, 185, 195 d) 190, 175, 160

18. Find the sum of the given arithmetic series.
24 + 48 + 72 + 96 + ... + 480

a) 5280 c) 10080 e) NOTA
b) 9576 d) 5040

19. Write an equation for the nth term of the given geometric sequence.
–12, –36, –108, ... a_n

a) $-108(3)^{n-1}$ c) $-12(3)^{n-1}$ e) NOTA
b) $-12(-3)^{n-1}$ d) $-12(3)^{n+1}$

20. Find the geometric means in the following sequence.
$-8, \_\_?\_\_, \_\_?\_\_, \_\_?\_\_, \_\_?\_\_, -25000$

a) –200, –1000, –5000, –25015 c) −40, −200, −1000, −5000 e) NOTA

b) –800, –1200, –1600, –2000

d) 40, 200, 1000, 5000

21. Find the first five terms of the given sequence.
$a_1 = 4, a_{n+1} = a_n - n + 7$

a) 4, 9, 13, 16, 18
b) 4, 10, 15, 19, 22
c) 4, –2, –7, –11, –14
d) 4, 7, 7, 7, 7
e) NOTA

22. There are 24 children in a class, 16 brown-haired and 8 black-haired. Two students are randomly selected for a stage performance. Find the probability of the following selection.
P(2 brown-haired children)

a) $\frac{7}{69}$
b) $\frac{10}{23}$
c) $\frac{32}{69}$
d) $\frac{7}{39}$
e) NOTA

23. A fruit basket contains 6 apples and 8 oranges. Sarah randomly selects one, puts it back, and then randomly selects another. What is the probability that both selections were oranges?

a) $\frac{4}{49}$
b) $\frac{9}{49}$
c) $\frac{12}{49}$
d) $\frac{16}{49}$
e) NOTA

24. Laura has moved to a new apartment. Her schoolbooks comprising of different subjects are mixed in a bag during the move. Four books are of mathematics, three are English, and six are science. If Laura opens the bag and selects books at random, find the given probability.
P(2 science and 2 mathematics books)

a) $\frac{3}{143}$
b) $\frac{18}{143}$
c) $\frac{45}{143}$
d) $\frac{6}{143}$
e) NOTA

25. How many 4-digit numbers can be formed using the digits 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0? No digit can be used more than once.

a) 210
b) 5040
c) 302,400
d) 151,200
e) NOTA