

MONTANA COUNCIL OF TEACHERS OF MATHEMATICS  
2005 MATH CONTEST

**FINITE**

DIRECTIONS: DO NOT WRITE ON THIS TEST. Place the best answer for each question on the separate answer sheet.

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1. How many distinct permutations are there in the letters of **MONTANA**? A) 1260 B) 2520 C) 5040 D) 21
2. The following chart shows the number of rabbits each month for several months.

Month	0	1	2	3	4	5
Adult Pairs	0	1	1	2	3	5
Newborn Pairs	1	0	1	1	2	3
Total Pairs	1	1	2	3	5	8

Starting with one pair of newborn rabbits, how many pairs of rabbits would there be at the end of a year and a half?

- A) 2584 B) 4181 C) 6765 D) 987
3. Find the next term in the following geometric sequence: 27, 18, ? A) 27 B) 9 C)  $\frac{3}{2}$  D) 12
4. In recent Olympics, the times for the 200 meter sprint for men and women have both been improving. Assuming times are improving in a linear pattern, in what year, if ever, will women have a better time than the men? Use 3 significant figures in ALL your calculations.

years since 1960	0	4	8	12	16	20	24	28
men	20.5	20.3	19.8	20.0	20.2	20.2	19.8	19.7
women	24.0	23.0	22.5	22.4	22.3	22.0	21.9	21.3

- A) 2015 B) 2016 C) 2027 D) women will never catch up
5. The probability of a person having  $X$  car accidents in one's lifetime is given by the following table:

0	1	2	3	4	5
0.40	0.20	0.17	0.10	0.08	0.05

A policy for a person with no accidents costs \$500 and goes up \$100 for every accident. What does the average customer expect to be charged?

- A) \$500 B) \$786 C) \$25 D) \$641
6. Professional basketball players have a normal distribution of heights. The mean is 81" with a standard deviation of 2.6". How tall would a player be if he were at the 16<sup>th</sup> percentile?  
A) 78.4" B) 83.6" C) 81" D) 75.8"
7. April rainfall in a county has historically had a normal distribution with a mean of 2.8" and a standard deviation of 0.6". About what percent of the time would the rainfall be in the interval from 3.4" to 4.0"?  
A) 2.5% B) 18.5% C) 16% D) 13.5%
8. Among 20 students, three are left-handed and the rest are right-handed. If a group of 7 students is randomly chosen, what is the probability that exactly one person would be left-handed?  
A) 0.479 B) 0.552 C) 0.391 D) 0.350

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9. A scholarship fund earns income from three investments at simple interest rates of 5%, 6%, and 10%. The annual income available from the three investments is \$1000. If the amount invested at five percent is five times the amount invested at 6%, and the total amount invested at 10% is equal to the total amount invested at 5% and 6%, to the nearest \$100 find how much is invested at each rate.

- A)  $\begin{cases} 5500 \\ 1100 \\ 6600 \end{cases}$       B)  $\begin{cases} 5000 \\ 1000 \\ 6000 \end{cases}$       C)  $\begin{cases} 6000 \\ 1200 \\ 7200 \end{cases}$       D)  $\begin{cases} 6500 \\ 1300 \\ 7800 \end{cases}$

10. A study was designed to see what relationship exists between the amount of weekly study time (in hours) and the grades of college students. What is the correlation coefficient?

Study time	1	5	8	9	10	11	13	14	15	16
GPA	1.0	1.8	2.0	2.4	2.8	2.6	2.6	3.6	3.8	3.9

- A) 0.959      B) 0.919      C) 0.190      D) 0.979

11. A farmer can make a profit of \$500 for every ton of sugar beets harvested and \$300 for every ton of barley. Sugar beets require 4 hours per ton to harvest and barley requires 2 hours per ton. Each crop requires 1 hour per ton for planting. The planting time available is 400 hours and the harvest time is 1000 hours. How much of each crop should the farmer grow in order to maximize the profit?

- A) 200 t sugar beets & 200 t barley      B) 200 t sugar beets & 0 t barley  
C) 100 t sugar beets & 300 t barley      D) 0 t sugar beets & 400 t barley

12. On a transcontinental trip, an 18-wheeler has a probability of 2% that any one tire will have a blowout. What is the probability that the truck will have exactly two blowouts?

- A) .0004      B) 0.6951      C) 0.2554      D) 0.0443

13. The run times of a marathon runner are approximately normally distributed. The z-score for her run this week is -2. Which of the following is the best interpretation of her z-score?

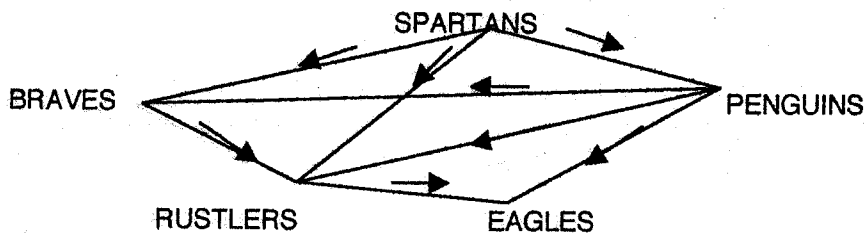
- A) 2 minutes faster than the previous week.      C) 2 minutes faster than her average time.  
B) 2 minutes faster than her best time ever.      D) 2 standard deviations faster than her average time.

14. Find the sum of all integers between 100 and 1000 that are multiples of 7.

- A) 69787      B) 70336      C) 994      D) 128

15. Five teams are involved in a tournament in which each team plays each of the other four exactly once. After the games have been played, the results are shown as a graph in which an arrow from one team to another team indicates that the first team defeated the second. At the end of the competition, which team should be ranked first?

- A) Braves      B) Rustlers  
C) Spartans      D) Eagles



16. On Main Street, there are 2 traffic lights operating independently. Your probability of stopping at one light is  $\frac{1}{3}$  and  $\frac{3}{4}$  at the other light. What is the probability you will be stopped at exactly one light?

- A)  $\frac{7}{12}$       B)  $\frac{5}{12}$       C)  $\frac{59}{144}$       D)  $\frac{1}{2}$