

The 28th Annual Connecticut Community Colleges Math Contest

Directions for Student Participants

Please read these directions carefully before starting the test!

1. Only students currently enrolled in the community college system are eligible to participate.
2. Do not begin the test until instructed by the test monitor.
3. You have two hours to complete all of the questions. Some questions are worth 1 point, some are 2 points, some are 3 points, and some are 4 points.
4. You are allowed to use calculators. No books, notes, or other aids are allowed. You may not share calculators during the test.
5. You will be provided with scrap paper and graph paper, on which you can do all of your work.
6. All answers **MUST** be recorded on the answer sheet provided. Answers must be fully simplified and exact answers must be given unless otherwise specified.
7. All answers must be complete, legible, and with the proper units or labels (for example: inches, pounds, dollars, miles per hour, etc.) No partial credit is given.
8. Please record all answers with a ball point pen.
9. Please sign the answer sheet and initial the test question sheet with a ball point pen.
10. Please return all test papers to the test monitor before leaving (which you can do once you are done).

Sincerely, the Contest Committee

The 28th Annual Miguel Garcia Math Contest

Sponsored by MATYCONN

April 2018

One Point Questions:

1. What is the result of finding the difference of the largest two-digit number and 39 and dividing that result by the smallest two-digit number?
2. If $(x - y)^2 = 121$ and $(x + y)^2 = 169$, what is xy ?
3. The sum of two prime numbers is 85. What is the product of these two numbers?
4. Find the area of the triangle bounded by the x -axis, the y -axis, and the line $2x + 3y = 6$
5. Harry was shopping for books. He had four books in his cart and the average cost was \$5 per book. He added a new book to his cart and the average cost was now \$6 per book. How much did the new book cost?
6. Mike Schmidt hit 3 less than twice as many homeruns as John Kruk. Kruk hit 17 fewer homeruns than Schmidt. How many homeruns did Mike Schmidt hit?

Two Point Questions:

7. At Jana's school, there are three parking lots with a total of 175 parking spaces. Three-fifths of these spaces are reserved for juniors and seniors who drive to school. There are twice as many parking spaces assigned to seniors as there are assigned to juniors. How many of the parking spaces at Jana's school are not assigned to seniors?
8. An eight-digit number contains two 1s, two 2s, two 3s, and two 4s. The 1s are separated by 1 digit, the 2s by 2 digits, the 3s by 3 digits, and the 4s by 4 digits. What is a possible number?
9. Find the rational number between $\frac{1}{2}$ and $\frac{2}{3}$ which is three times further from $\frac{1}{2}$ than it is from $\frac{2}{3}$.
10. In Mrs. Ray's class, there are 30 students and the ratio of boys to girls is 3 to 2. In Mr. Winston's class, there are 28 students and the ratio of girls to boys is 4 to 3. How many girls are there in the two classes combined?
11. The sum of the reciprocals of two positive consecutive even integers is $\frac{3}{4}$. Find the larger of the integers.
12. Harry is building a doghouse. He got a deal and saved \$2.50 while only paying \$25 for the lumber. What is the percentage he saved rounded to the nearest percent?
13. What is the smallest prime number with two sevens in it?
14. The MATYCONN farm consists of people (two legs), horses (four legs and a tail), and chickens (two legs and a tail). Altogether, there are seventy legs, thirty heads, and twenty tails. How many horses are on the farm?

Three Point Questions:

15. The smallest integer in a set of consecutive integers is -32. The sum of all of the integers in the set is 67. How many integers are in the set?
16. Suppose a and b are two different real numbers, such that $f(x) = x^2 + ax + b$, and $f(a) = f(b)$. What is the value of $f(2)$?
17. During target practice, Bob can earn 5, 8, or 10 points for hitting the target. He hit the 10 point mark as many times as he hit the 8 point mark. Altogether, Bob managed to earn 99 points while missing the target 25% of the time. How many times did Bob fire at the target?
18. Given that a, b , and c are positive integers with $a < b < c$ such that $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 1$. What is a possible value of $a + b + c$?
19. For 23 days in a row, Sue ate either an apple, banana, carrot or a combination of those for breakfast. She had an apple on 6 of the days, a banana on 12 of those days, and a carrot on 15 of those days. On two of those days, she had just a carrot and an apple. On two of those days, she had just a banana and an apple, and on only one day, Sue ate all three. On how many days did Sue eat just a banana and a carrot?
20. Given $A_1 = 3$, $A_2 = 7$, and $A_n = \frac{A_{n-1}}{A_{n-2}}$ for $n \geq 3$.
Compute the value of A_{12}

Four Point Questions:

21. The McDonalds are planning a long car journey of 27,000 miles. If they use tires that last 12,000 miles each, what is the fewest number of tires they need to buy?
22. W is 10% larger than X . X is 20% larger than Y . Y is 25% smaller than Z . By what % is W smaller than Z ?
23. A man paddling a canoe upstream sees a glove in the water as he passes under a bridge. Fifteen minutes later, he turns around and paddles downstream. He passes under the bridge and travels another mile before reaching the glove again. If he paddled at the same speed the whole time and lost no time in turning around, what is the speed of the current?
24. What three digits are represented by X , Y , and Z in this addition problem?

$$\begin{array}{r} XZY \\ + XYZ \\ \hline YZX \end{array}$$

25. Each pair of statements contains one true and one false statement about a number. Find the number.
- 1a) I have two digits
 - 1b) I am even
 - 2a) I contain a '7'
 - 2b) I am prime
 - 3a) I am the product of two odd integers
 - 3b) I am one more than a perfect square
 - 4a) I am divisible by 11
 - 4b) I am one more than a perfect cube
 - 5a) I am a perfect square
 - 5b) I have three digits