The 32nd 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 32nd Annual Miguel Garcia Math Contest

Sponsored by MATYCONN

Spring 2023

One-point questions:

1. Zain ate 3 more than twice as many gummies as Aja. Altogether, they ate 33 gummies. How many gummies did Zain eat?

2. Mathew, Michael and Sam combined for 36 hits for the Yankees. Mathew got 4 more hits than Michael , and Michael got 4 more hits than Sam. How many hits did Michael get?

3. The product of four unique positive integers is 100. Compute the sum of those integers.

4. Ten $5 bills, ten $10 bill, and ten $20 bills are place in an urn. A blindfolded person must remove bill, one at a time, with no replacement, and stops, once she has drawn three of the same type of bill. What is the most amount of money that she can remove from the urn?

5. Nick and Steve's Ice Cream Store sells five different flavors of ice cream. How many different two-scoop combinations can be made , if each scoop must be a different flavor?

6. Leonel makes 5 round trips to Colombia to see his family. It's 1,500 miles to Miami, and another 1,500 miles to his family in Colombia. How many total miles does Leonel fly altogether?

Two-point questions:

7. If the length and the width of a rectangle are each increased by 10%, then how much has the area of the rectangle increased given as a percentage?

8. The average age of a grandmother, grandfather, and their 7 grandchildren is 28. The average age of the 7 grandchildren is 15. The grandmother is 3 years younger than the grandfather. What is the age of the grandfather?

9. The average of nine consecutive positive integers is 2006. Compute the largest of these integers.

10. When a barrel is 30% empty, it contains 30 gallons more water than when it is 30% full. What is the capacity of the barrel in total gallons?

11. Given that $\frac{x^2+y^2}{xy} = 2$ compute the value of: $\frac{7x+5y}{2x+y}$

12. Given that $x^2 + y^2 = 1$ find the maximum value of the expression $x + y$.

13. Solve for z, given that $z > 0$, and that $\sqrt{2-z} + \sqrt{2+z} = z$

14. Find all possible solutions for x, if $\frac{1}{x} + \frac{1}{x^2} = \frac{3}{4}$

Three-point questions:

15. Each of 18 cards is numbered with either a 4 or a 5. The sum of the numbers on all of the 18 cards is divisible by 17. How many cards are labeled with a 4?

16. Given that $f(1+x) = f(1) + f(x)$ and $f(1) = 3$, then compute the value of $f(50)$.

17. Solve for x: $x + \frac{4}{\sqrt{x}} = 17$

18. If $a^2 + ab = 28$ and $b^2 + ab = 21$, then compute the value of ab.

19. If $2^{3x-1} = 8^{5-x}$, then solve for x.

20. The Phillies defeated the Red Sox in a 7-game series. The Phillies won games 1,3,5 and 7, each by a 2-run margin. The Red Sox won games 2,4 and 6, each by a 1-run margin. The Phillies scored 10 runs in the first game, and one less run in every subsequent game (9 runs in game 2, 8 runs in game 3, etc). How many total runs were scored?

Four-point questions:

21. If $|x-2| \leq 1$, then find the maximum value of $|x^3 - 2x^2 - 5x + 10|$

22. Given a parabola of the form: $y = x^2 + cx + d$, which passes through the points $(1, 0)$, $(3, -4)$, and $(5, 0)$ and a line which passes through the points $(-1, 3)$ and $(4, -7)$ compute the point where the line intersects the parabola.

23. Given that integers a, b, and c are all two-digit prime numbers that satisfy the following relationships: $\frac{c+1}{2} = b$ and $\frac{b+1}{2} = a$.
Find the values of a, b, and c

24. Determine how many integers satisfy the following condition:
When twice the integer is subtracted from twice the square of the integer, the result is at most 12.

25. In the Fibonacci sequence, let a, b, c, and d be four consecutive terms of this sequence. If $a + b + c = 3194$ and $b + c + d = 5168$, then compute the value of a.