

The 31st 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 31st Annual Miguel Garcia Math Contest

Sponsored by MATYCONN

Spring 2022

One-point questions:

1. Steve's math class is taking a test and $\frac{3}{7}$ of his class has finished. If there are 12 students left, how many total students are in Steve's class?
2. Solve for x given that x is an integer and $(x + 2)(x - 2)(x - 4) = 385$
3. What number is $\frac{2}{5}$ of the way from -5 to 5 ?
4. A grandfather has four grandchildren. James was born before Kirk, but not directly. Kirk was born directly before Lars, and Cliff was the second born. What is the birth order (oldest first) of his grandchildren?
5. Solve for x given: $\sqrt{x} = x - 2$
6. A sweater that used to cost \$30 now costs \$40. What is the percentage discount needed to restore the price to its original amount?

Two-point questions:

7. What is the x -intercept of the line connecting points $(-4, 2)$ and $(1, -8)$?
8. Chuck needs to drain his pool. He uses four pumps at the same time. The first pump could drain the pool alone in 1 hour. The second pump could drain the pool in half an hour. The third pump could drain the pool in 20 minutes. The fourth pump could drain the pool in 10 minutes. How long will it take to drain the pool with all four pumps working at once?
9. A circle with a radius of 1 is inscribed inside a square with sides of length 2. Find the area of the region which is inside the square but outside the circle.
10. Find the positive solution to: $|x + 3| - |x - 1| = x + 1$
11. Three people from three different cities each have a different job working together to design a race car. Tina is a machinist. Louise is from Middletown. Gene is neither an engineer nor from Hartford. The technician is from Farmington. Where is the machinist from?
12. Sue is celebrating her graduation with her mom, dad, and brother. During the toast everyone clinks glasses exactly once with everyone else. How many times will glasses be clinked total?
13. Given: $x^2yz = 4^3$
 $xy^2z = 4^4$
 $xyz^2 = 4^5$
What is the positive numerical value of xyz ?
14. Georgia scored 5 more than twice as many points as Alabama. Alabama scored 15 fewer points than Georgia. How many points did Georgia score?

Three-point questions

15. If $2^x = 4^y = 8^z$ and $\frac{1}{2x} + \frac{1}{4y} + \frac{1}{6z} = 6$, what is the value of z ?

16. If: $8 \div 6 = 214$

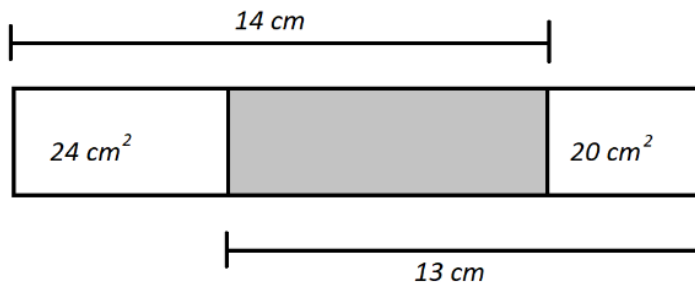
$3 \div 1 = 24$

$9 \div 5 = 414$

$6 \div 3 = 39$

What does $5 \div 2 =$?

17. Find the area of the shaded region, include units.



18. Solve for n given: $n! = 1716 \cdot 6! \cdot 7!$

19. A bunch of very confused economists are trying to determine what day it is. Only one of them is actually correct:

- Gia thinks it is Wednesday
- Paul thinks tomorrow is Wednesday
- Christina thinks yesterday was Wednesday
- Alex thinks today is Saturday
- Jose thinks Saturday was yesterday
- Franco thinks that today is either Saturday or Monday
- Julia thinks today is not Saturday

What day of the week is it?

20. Last baseball season, Bryce had as many hits as Didi and Rhys combined. Two times the number of hits Bryce had is equal to three times the number of hits Andrew had. Rhys had as many hits as Didi and Andrew combined. If Andrew had 100 hits, how many did Rhys have?

Four-point Questions

21. If $a^2 + b^2 = 3ab$, then what is the value of $\left(\frac{a+b}{a-b}\right)^2$?
22. If the sum of the digits of the value given by $10^n - 1$ is equal to 81, what is the value of n ?
23. Find the largest value of n such that $\frac{n+7}{\sqrt{n-1}}$ is an integer.
24. If $x = \frac{3-\sqrt{5}}{2}$, what is the value of $x^2 + \frac{1}{x^2}$?
25. If $f(2x - 1) + f(2) = 4x - 1$
Then what is the value of $f(2)$?