The 25th 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, and some are 3 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 that are not whole numbers MUST be given as reduced fractions, NOT decimal, unless otherwise indicated.
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 25th Annual Connecticut Community Colleges Math Contest - April 2015

Section 1: Worth One Point Each

1. Compute the value of: $\left[(10-3)^0 + \left(\frac{27}{2}\right)\left(\frac{2}{3}\right)^3\right]^2$

2. Find all positive integer solutions for the equation: $3x^3 = 61x^2 - 20x$

3. The number B is 25% more than the number A. The number C is 20% more than B. The number D is x % less than C. For what value of x will $D = A$.

4. Given: $-\frac{3}{2}y + 5x^2 = 8$ Find y when $x = 2$.

5. What number is $\frac{1}{8}\% \ of$ 20,000?

6. Brian McCann hit 6 less than twice as many home runs as Miguel Cabrera. Cabrera also hit 19 fewer home runs than McCann. How many home runs did McCann hit?

Section 2: Worth Two Points Each

7. An isosceles right triangle has $Area = 144\ ft^2$. What is the length of the

   hypotenuse?

8. An integer plus its reciprocal is 25.04, what is the integer?

9. Find a number n, such that the line determined by the points

   $(n, 4)\ and\ (2, -1)$ is perpendicular to the line $y = 6x - 7$

10. You rode your motorcycle $20\ mph$ one way and then returned the same

    distance travelling $25\ mph$. The round trip took $1\ hour\ and\ 48\ minutes$.

    How many miles did you ride one way?

11. Given: $x + 3y = 1$
                     $x - y = 3z - 4$
                     $2z = x - 5$

    What is the value of $x + y + z$?

12. An inlet pipe can fill Blake's pool in $4\ hours$, while its outlet pipe can

    empty it in $6\ hours$. Blake needs to fill his empty pool, but in his haste to

    surf the internet, he left both pipes open. How long did it take to fill the

    pool?

13. Given $y = 31 - 12x + 3x^2$ What is the minimum value for y?

14. Let $A = n(3n - 5)$ For what integer value of n will $A = 1,100$?

Section 3: Worth Three Points Each

15. The sum of two numbers is 25. The sum of their squares is 325. Find the positive difference between these two numbers.

16. A parabolic function $f(x)$ is concave down, with a vertex of $(3, 13)$ and a y-intercept of $(0, -5)$. Compute the value $f(5)$.

17. Find the point on the line $y = 2x + 3$ that is closest to the origin.

18. Amanda collected some duck eggs, and took one third of them. Beth took one third of the remaining eggs. Clarissa took one third of the remaining eggs. Debbie took one third of the remaining eggs. Eli took all of the remaining eggs. Everyone got at least one egg, and no eggs were broken. What is the smallest number of eggs that Eli could have got?

19. Amy, John, and Eric live in 3 different towns and have 3 different occupations.

    a. John visited the sociologist in Cairo.
    b. Amy visited the mathematician in Tokyo.
    c. Eric emailed the physicist in Shanghai.
    d. John faxed the lab results to the mathematician.

    What town does John live in?

20. When $x = a + \frac{1}{a}$ and $a = \frac{1}{\sqrt{2}-1}$, find the value of $a^2 + ax$