

## **2014 System-Wide Math Contest for Connecticut Community Colleges**

### **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

# 24<sup>th</sup> Annual Connecticut Community Colleges Statewide Math Contest

April 2014

## Section 1: Each question is worth 1 point.

1. Angelo wants to find the coefficient of the linear term,  $bx$ , of the quadratic equation:  $y = ax^2 + bx + c$  that is satisfied by the ordered pairs:  $(2, 11)$  and  $(-2, -5)$ . What is the coefficient he is looking for?
2. A cork and a bottle together cost \$1.10. The bottle costs \$1.00 more than the cork. What is the cost of the cork?
3. We know that 4 *tablespoons* equal  $\frac{1}{4}$  of a cup. How many *tablespoons* will equal  $\frac{2}{3}$  of a cup?
4. Find the next number in the pattern: 1, 2, 9, 64, 625, ?
5. A piano has 88 keys each being white or black. If 2 white keys were added, then 60% of the keys would be white. How many black keys are there?
6. CC Sabathia won 11 less than twice as many games as Jon Lester. Lester won 6 fewer games than CC. How many games did CC win?

**Section 2: Each question is worth 2 points.**

7. Lauren noticed that if she subtracted 17 times her age 17 years ago from her age 17 years from now, the result would be her current age. How old is Lauren now?
8. The mean (average) on a college math exam was 71. The teacher realized that she made a mistake in grading one question, so she added one point to each student's grade. The sum of all the grades became 936. How many students were in the class?
9.  $G(x) = \sqrt{\frac{4+x}{4-x}}$  and  $f(G(x)) = 10x$  Calculate  $f(3)$
10. Two years ago, Dana was one-fourth as old as her uncle. Two years from now, she will be one-third as old as her uncle. How old was Dana's uncle when she was born?
11. At a county fair, Fary tried a game of target shooting. She received 10 *cents* for each hit, but had to pay 5 *cents* for every miss. If 30 shots cost her 15 *cents*, how many hits did she score?
12. A line is given by  $y = 2x + 6$ . A second line is perpendicular, but has the same  $y - intercept$ . Find the positive distance between the  $x - intercepts$  of the two lines.
13. The sum of a positive real number and six times its reciprocal is equal to its cube. What is the square of the number?
14. The base of a parallelogram is increased by 20% while the height of the parallelogram is decreased by 20%. By what percentage is the area of the parallelogram increased or decreased?

**Section 3: Each question is worth 3 points.**

15. What is the smallest integer greater than one that is both a perfect cube and a perfect fourth power?

16.  $p$ ,  $q$ , and  $r$  are all positive numbers, and they all satisfy the following equations:  $p - \frac{1}{q} = 3$ ,  $q - \frac{1}{r} = 4$ , and  $r - \frac{1}{p} = 5$ .

Compute the value of:  $pqr - \frac{1}{pqr}$

17. There are four treasure chests in front of you, each with its own sign as follows:

Wooden Chest: *The treasure is in here*

Stone Chest: *The treasure is NOT in here*

Iron Chest: *The treasure is NOT in the Wooden Chest*

Gold Chest: *The treasure is in the Iron Chest*

Only one sign is true, and only one chest contains the treasure (not necessarily the same chest); the other chests are booby trapped. Which chest should you safely open?

18. Anh, Ana, and Ann have an average age of A.

Anh, Ana, Ann, and Ann's twin Amy have an average age of B.

If Ann is 12 years older than Anh, and Anh and Ana have the same age, then find the value of B - A.

19. A group of friends decide to meet for pizza, and one person calls ahead and orders. However, 3 of the friends do not show up at the pizza parlor. The friends who do show up must each throw in \$3 more than they originally planned, to cover the \$70 bill. How many friends ate pizza?

20. Find three consecutive positive integers, such that the cube of the smallest, minus the square of the largest, is 5 more than 3 times the square of the middle integer.