Sample Documents

UNC Charlotte Math Contest
(UNC)

EducAide Software

Week of November 1–6

Monday

Recall that an unparenthesized arithmetic expression is evaluated as follows:

1) Multiplications and divisions are evaluated from left to right.
2) Then additions and subtractions are evaluated from left to right. [For example, $2-3+6\div 2 \to 2-3+3 \to -1+3 \to 2$.]

Insert in the four boxes of the expression below all four basic arithmetic operations ($+$, $-$, $\times$, $\div$), one per box, so that the value of the expression below is as large as possible. The largest such value M satisfies:

8 ☐ 3 ☐ -2 ☐ 5 ☐ 7

Tuesday

Determine the number of ways `FIRST` can be "spelled out" (moving from an `F` left, right, or down one letter at a time until `T` is reached.)

```
          F
        F I F
      F I R I F
    F I R S R I F
  F I R S T S R I F
```

Wednesday

In a survey of the chewing gum tastes of a group of baseball players, it was found that:

22 liked juicy fruit

25 liked spearmint

39 like bubble gum

9 like both spearmint and juicy fruit

17 liked juicy fruit and bubble gum

20 liked spearmint and bubble gum

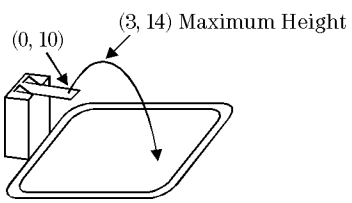
6 liked all three

4 liked none of these

How many baseball players were surveyed?

Thursday

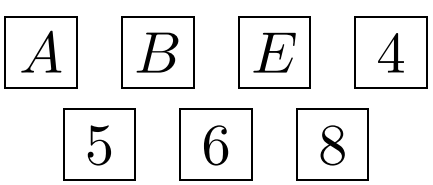
The path of the diver shown in the figure can be represented by the parabola $y = ax^2 + bx + c$. Then, $a =$



Friday

Each of the cards shown below has a number on one side and a letter on the other. How many of the cards must be turned over to prove the correctness of the statement:

Every card with a vowel on one side has a prime number on the other side.



Saturday

Let z_1, z_2 represent two complex numbers whose lengths are greater than 1 and which are graphed on identically scaled axes in Figure 1. Which complex number in Figure 2 might reasonably represent the product $z_1 z_2$?

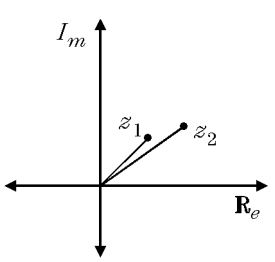


Figure 1

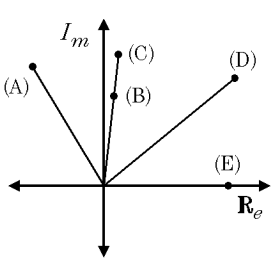


Figure 2

1/15/99

Catalog List

UNC CHARLOTTE

1998 MATHEMATICS CONTEST

Name _____ Date _____

You will have 60 minutes to complete this test.

1. Find the sum $\frac{1}{1\cdot 2}+\frac{1}{2\cdot 3}+\cdots+\frac{1}{10\cdot 11}$.

   (A) 1 **(B)** 2 **(C)** $\frac{10}{11}$ **(D)** $\frac{11}{12}$

   (E) none of A, B, C or D

2. The mean test score in a math class with 27 students was 72. A student who scored 85 was moved to another class. What was the mean score of the remaining 26 students?

   (A) 69.5 **(B)** 70.5 **(C)** 70 **(D)** 71 **(E)** 71.5

3. Suppose the value of a new car declines linearly over a ten year period from the original value of \$20,000 to the value \$2,000. What is the value of the car after six years?

   (A) \$8,800 **(B)** \$12,800 **(C)** \$13,200 **(D)** \$9,200 **(E)** \$11,000

4. Which of the five fractions has the smallest value?

   (A) $\frac{250{,}386{,}765{,}412}{250{,}384{,}765{,}412}$ **(B)** $\frac{250{,}384{,}765{,}412}{250{,}383{,}765{,}412}$ **(C)** $\frac{250{,}385{,}765{,}412}{250{,}384{,}765{,}412}$

   (D) $\frac{250{,}386{,}765{,}412}{250{,}385{,}765{,}412}$ **(E)** $\frac{250{,}387{,}765{,}412}{250{,}386{,}765{,}412}$

5. The square of an integer is called a *perfect square*. If n is a positive perfect square, which of the following represents the largest perfect square less than n?

   (A) n **(B)** n^2+n **(C)** $n-1$

   (D) $n-2\sqrt{n}+1$ **(E)** n^2-2n+1

6. Let $f(x)=x^3+kx-3$. For what value of k is $x-1$ a factor of $f(x)$?

   (A) 2 **(B)** $\frac{1}{2}$ **(C)** $\frac{3}{2}$ **(D)** $-\frac{1}{2}$ **(E)** 1

7. In the triangle $\triangle ABC$, $AB = x$, $BC = x + 1$, and $AC = x + 2$. Which of the following *must* be true?

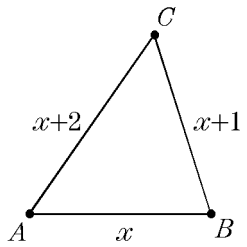
   i. $x \geq 1$

   ii. $x \leq 5\sqrt{2}$

   iii. $m\angle C \leq 60^\circ$

   (A) ii only **(B)** i and iii only **(C)** i and ii only

   (D) iii only **(E)** i only



8. Each of the cards shown below has a number on one side and a letter on the other. How many of the cards must be turned over to prove the correctness of the statement:

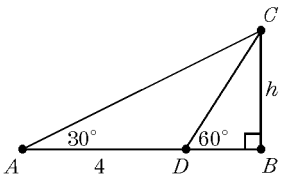
   Every card with a vowel on one side has a prime number on the other side.

   (A) 4 **(B)** 5 **(C)** 2 **(D)** 6 **(E)** 3

9. In the right triangle $\triangle ABC$, the point D on $\overline{AB}$ is 4 units from A, $m\angle CDB = 60^\circ$ and $m\angle CAB = 30^\circ$. What is the altitude h?

   (A) 4 **(B)** $3\sqrt{2}$ **(C)** $2\sqrt{3}$ **(D)** 3 **(E)** $\sqrt{14}$



10. The numbers x, y, and z satisfy

    $$|x + 2| + |y + 3| + |z - 5| = 1.$$

    Which of the following could be $|x + y + z|$?

    (A) 2 **(B)** 0 **(C)** 5 **(D)** 10 **(E)** 7

UNC CHARLOTTE 1998 MATHEMATICS CONTEST 3/11/97

Answer List

1. C	2. E	3. D
4. E	5. D	6. A
7. B	8. D	9. C
10. B		

Catalog List

1. UNC AF 27	2. UNC CF 59	3. UNC DC 38
4. UNC AB 37	5. UNC FC 33	6. UNC AC 28
7. UNC EB 31	8. UNC EN 14	9. UNC EA 13
10. UNC CF 60		