



# Intermediate Math Circles

## February 22, 2012

### Contest Preparation III

The Pascal, Cayley and Fermat Contest are all written, Thursday, February 23, 2012.

The two warm-up problems that we will look at have been taken from past Pascal and Cayley contests.

#### Warm-Up #1: 2006 Pascal #24

A bag contains eight yellow marbles, seven red marbles, and five black marbles. Without looking in the bag, Igor removes  $N$  marbles all at once. If he is to be sure that, no matter which choice of  $N$  marbles he removes, there are at least four marbles of one colour and at least three marbles of another colour left in the bag, what is the maximum possible value of  $N$ ?

- (A) 6      (B) 7      (C) 8      (D) 9      (E) 10

Since the solution can be found online, it will not be reprinted here. However, as a quick check, the correct answer is (B) 7.

Note: Since we are looking for the maximum value of  $N$ , one strategy would be to start with the largest answer to see if it works. Then progress through the answers until the correct answer is determined.

#### Warm-Up #2: 2007 Cayley #24

The number 8 is the sum and product of the numbers in the collection of four positive integers  $\{1, 1, 2, 4\}$ , since  $1 + 1 + 2 + 4 = 8$  and  $1 \times 1 \times 2 \times 4 = 8$ . The number 2007 can be made up from a collection of  $n$  positive integers that multiply to 2007 and add to 2007. What is the smallest value of  $n$  with  $n > 1$ ?

- (A) 1171    (B) 1337    (C) 1551    (D) 1777    (E) 1781

Since the solution can be found online, it will not be reprinted here. However, as a quick check, the correct answer is (B) 1337.

For the remainder of the time tonight, we will work on Problem Set #6 and the *Australian Mathematics Competition* Warm-Up Paper Intermediate 9.



Problem Set 6:

1. C
2. A
3. B
4.  $[-6, 6]$
5.  $T = 3, U = 2$  and  $T = 8, U = 6$
6. 69375
7. C
8. A
9. C
10. E

Australian Mathematics Competition

Warm-Up Paper - Intermediate 9:

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

Full solutions will be found online at [www.cemc.uwaterloo.ca](http://www.cemc.uwaterloo.ca). Go to web resources and then Math Circles. Go to Math Circles material and then to Winter 2012 Intermediate Feb 22/2012 Solutions.

Good success on whatever contest you participate in.