

## 2006-2007 BHS Math Club Warm-Up 1

Name \_\_\_\_\_ Grade \_\_\_\_\_

1. You have 3 different explosive tags and 4 different smoke bombs. If you want to choose 1 explosive tag and 2 smoke bombs, how many ways can you do so?
2. Solve for  $x$ :  $x^2 + 3x + 4 = 2(x + 1)^2$ .
3. What is the product of the smallest prime number and the largest prime number less than 50?
4.  $ABCD$  is a square. If its area is  $\pi^2$ , what is the perimeter?
5. Solve for  $a$  in terms of  $b$ :  $9^a \cdot 2^{4a} = 4^b \cdot 3^b$ .
6. 3 days ago, it was Sunday. 250 days from now, what day will it be?
7. I can make 3 clones with my chakra. Each of my clones can make 3 more clones, and each of those clones can also make 3 more. How many clones will I have total after this?
8. Draw a rhombus and find its area if it has diagonals of length 12 and 4.
9. Find the largest positive integer  $x$  that satisfies  $x^2 + 9x + 20 < 120$ .
10. If  $\frac{a}{b} + \frac{c}{d} = 5$ , evaluate  $\frac{a^2}{b^2} + \frac{c^2}{d^2} + \frac{2ac}{bd}$ .
11. If you pick three distinct numbers from the set  $\{1, 2, 3, 4\}$ , what is the probability that their sum is divisible by 3?
12. Determine which values of  $x$  satisfy the following inequalities:  $x^2 \leq 9$ ,  $x + 3 \geq 2$ ,  $\sqrt{x^2 - 4x + 4} > 0$ .
13.  $f(x)$  is an even function. If  $f(1) = 2$  and  $f(x + 3) = f(x) + x$  for  $x \geq 0$ , evaluate  $f(-4)$ .
14. Sasuke and Neji are playing a game. Sasuke starts by choosing a positive real. Then, alternating turns beginning with Neji, they can either take the log of the number or they can square it. A player wins when the opponent faces a negative real (if zero appears, then it is a tie). Determine the set of all numbers that Sasuke can pick so he wins (both players play optimally).
15. Let  $n$  be an integer of the form  $a^2 + b^2$ , where  $a$  and  $b$  are relatively prime integers, such that if  $p$  is a prime and  $p \leq \sqrt{n}$ , then  $p$  divides  $ab$ . Determine all such  $n$ .