TD Canada Trust

Lakehead UNIVERSITY

Department of Mathematical Sciences

March 21, 2013 HIGH SCHOOL MATHEMATICS COMPETITION

JUNIOR COMPETITION

Grades 9 and 10

Name: _____

E-Mail: _____

School & Grade: _____

Telephone: _____

Question #	*Your Answer*	For Markers Use only
1		/5
2		/5
3		/5
4		/5
5		/5
6		/5
7		/5
8		/5
9		/5
10		/5
11		/5
12		/5
13		/5
14		/5
15		/5
	Number of Unanswered Questions	x 1
		/75

Name: _____

School: _____

Place all answers in the multiple choice boxes on the front page of the answer booklet.

Each question is worth:

5 marks for a correct answer
1 mark for a blank answer
0 marks for an incorrect answer.

(1) The sum of the first 50 positive even integers is 2550. What is the sum of the first 50 positive odd integers?

(A) 2499 (B) 2500 (C) 2501 (D) 2549 (E) 2600

(2) Plant A has a height of 100 cm. Plant B has a height of 120 cm. If Plant A grows 5 cm per day, and Plant B grows 3 cm per day, how tall (in cm) will they be when they are the same height?

(A) 125 (B) 150 (C) 165 (D) 180 (E) they will never be the same height

(3) Simplifying $(6^{2013}+9)^2-(6^{2013}-9)^2$ we find that it equals:

(A) 3^{2013} (B) 3^{2015} (C) 6^{2012} (D) 6^{2015} (E) 9^{2012}

(4) If $f(x)=x^2+ax+b$ and $f(3)=10$, then $f(4)$ is

(A) $b+16$ (B) $b+25$ (C) $(16-b)/3$ (D) $(52-b)/3$ (E) none of these

(5) For what value of x does $2^{x+4}=(1/4)^{7-x}$?

(A) 0 (B) 2 (C) 14 (D) 18 (E) none of these

(6) For which of the following values of k does the quadratic x^2+5x+k have no real roots?

(A) 0 (B) 1 (C) 3 (D) 4 (E) none of these

(7) How many integers between 1 and 10^{12} are divisible by 9 and have all digits equal?

(A) 12 (B) 20 (C) 26 (D) 36 (E) none of these

(8) Let f be a function such that $f(xy)=f(x)+f(y)$, for all positive numbers x and y. If $f(2)=1$, then $f(1/64)=$

(A) -6 (B) -2 (C) $1/64$ (D) $1/8$ (E) 4

(9) The only common factor of the polynomials $x^4-11x^2+18x-8$ and $x^4+3x^3-x^2-x-2$ is

(A) x (B) $x-1$ (C) $x+1$ (D) $x-2$ (E) $x+2$

(10) Let T be an equilateral triangle such that the area of T is numerically equal to the length of one of its sides. What is the area of T?

(A) $2/\sqrt{3}$ (B) $4/\sqrt{3}$ (C) $\sqrt{3}/2$ (D) $1/\sqrt{2}$ (E) $\pi/2$

(11) How many pairs of positive integers (a, b) satisfy $(1/a) + (1/b) = 1/13$?

(A) 0 (B) 1 (C) 2 (D) 3 (E) more than 3

(12) Among Julie, Dave, Anya, Vladimir and Xena, there is exactly one spy. Each person makes one statement. The spy and exactly one other person will tell the truth. The statements are given in this order:

Julie: Vladimir is not the spy.
Dave: Vladimir is going to lie.
Anya: The spy is either Dave or Vladimir.
Vladimir: The spy has already made a statement.
Xena: I am the spy.

Who is the spy?

(A) Julie (B) Dave (C) Anya (D) Vladimir (E) Xena

(13) How many points with integer coefficients lie on, or inside, the circle with radius $\sqrt{5}$ centred at the origin?

(A) 12 (B) 17 (C) 21 (D) 24 (E) none of these

(14) I begin with 2^{14} dollars. I make 14 bets, each time either winning or losing exactly half of the amount I have. If I win 7 times, how much do I win or lose?

(A) I lose \$2187.
(B) I lose \$14197.
(C) I break even (and end up with 2^{14} dollars).
(D) I win \$2187.
(E) The answer depends on the order of my wins and losses.

(15) Find the sum of the coefficients of the polynomial obtained by expanding out $(1-x)^{2012}(1+x)^{2013}$.

(A) -2013 (B) -1 (C) 0 (D) 1 (E) 2013