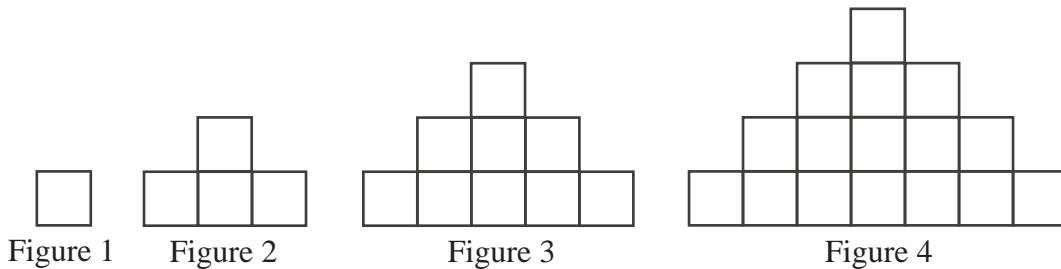


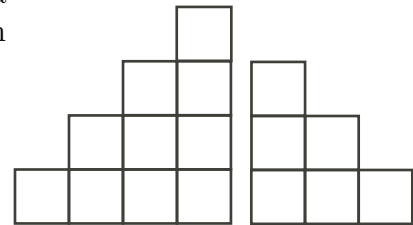
2010 Fryer Contest (Grade 9)
Friday, April 9, 2010

1. Consider the following sequence of figures showing arrangements of square tiles:



More figures can be drawn, each having one row of tiles more than the previous figure. This new bottom row is constructed using two tiles more than the number of tiles in the bottom row of the previous figure.

- (a) Figure 4 is cut into two pieces as shown. Draw a rearrangement of these two pieces showing how they can be formed into a square having $4^2 = 16$ tiles.



- (b) Determine the number of tiles in Figure 5.
- (c) Determine the number of tiles in the bottom row of Figure 10.
- (d) Determine the difference between the total number of tiles in Figure 11 and the total number of tiles in Figure 9.
2. (a) Determine the average of the integers 71, 72, 73, 74, 75.
- (b) Suppose that $n, n + 1, n + 2, n + 3, n + 4$ are five consecutive integers.
- (i) Determine a simplified expression for the sum of these five consecutive integers.
- (ii) If the average of these five consecutive integers is an odd integer, explain why n must be an odd integer.
- (c) Six consecutive integers can be represented by $n, n + 1, n + 2, n + 3, n + 4, n + 5$, where n is an integer. Explain why the average of six consecutive integers is never an integer.

3. Train 1 is travelling from Amville to Batton at a constant speed.
Train 2 is travelling from Batton to Amville at a constant speed.



- (a) Train 1 travels at 60 km/h and travels $\frac{2}{3}$ of the distance to Batton in 9 hours. Determine the distance from Amville to Batton.
- (b) Train 2 travels $\frac{2}{3}$ of the distance to Amville in 6 hours. How fast is the train going?
- (c) Train 2 started its trip $3\frac{1}{2}$ hours after Train 1 started its trip. Both trains arrived at Cuford at 9:00 p.m. What time did Train 1 leave Amville?
4. A *palindrome* is a positive integer that is the same when read forwards or backwards. For example, three palindromes are 7, 121 and 7739377.
- (a) Determine the number of palindromes less than 1000.
- (b) Determine the number of palindromes with 7 digits.
- (c) If the palindromes in part (b) are written in increasing order, determine the 2125th palindrome in the list.
- (d) Determine the number of six-digit palindromes that are divisible by 91.