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# Test n°2

## Algebra - Troisième (English)

Duration 1 hour - Coeff. 4

Score on 20 points

*The use of calculator is allowed. You will be given 1 point for spelling and presentation.*

### Exercice 1. D'après brevet 2014

**7 points**

We consider those two calculation's programs :

#### Program A :

Choose a number  
Subtract 0,5 to the number  
Multiply the result by the double  
of the number you choose

#### Program B :

Choose a number  
Calculate the square of this number  
Multiply the result by 2  
Subtract to the result the number  
you first chose

1.
  1. a. [1 point] Show that if the program A is applied to the number 10, the result is 190.
  1. b. [1 point] Apply the program B to the number 10.
2. [1,5 point] Apply the program A and the program B to a number you choose.
3. [0,5 point] What conjecture can you do ? (A conjecture is a proposition that is unproven.)
4. [2 point] Prove this conjecture.
5. [1 point] What two numbers would you choose if you want to obtain 0 at the end of these programs ?

### Exercice 2.

**4,5 points**

We consider the expression

$$A(x) = (x + 1)(2 - x) - 2(x + 1)(2x + 3)$$

1. [2 points] Prove that  $A(x) = -5x^2 - 9x - 4$ .
2. [1,5 point] Factorize  $A(x)$ .
3. [1 point] Calculate  $A(x)$  by replacing  $x$  by  $-1$ .

### Exercice 3.

**4 points**

We consider the expression

$$B(x) = 5x + 10 - (x + 2)^2$$

1. [0,5 point] Factorize  $5x + 10$ .
2. [1,5 point] Hence factorize  $B(x)$ .
3. [1 point] Expand  $B(x)$ .
4. [1 point] Calculate  $B(x)$  by replacing  $x$  by  $-1$ .

**Exercice 4. D'après Brevet 2014****4,5 points**

Lea thinks that when you multiply two consecutive odd numbers, and add 1, the result is always a multiple of 4.

1. An example :

5 and 7 are two consecutive odd numbers.

1. a. [0,5 point] Calculate  $5 \times 7 + 1$ .

1. b. [0,5 point] For this example, is she right ?

2. Here is a spreadsheet obtained using a Spreadsheet Program (like Excel) by Lea.

	A	B	C	D	E
1		Odd number	Next odd number	Product of those two odd numbers	Result
2	$x$	$2x + 1$	$2x + 3$	$(2x + 1)(2x + 3)$	$(2x + 1)(2x + 3) + 1$
3	0	1	3	3	4
4	1	3	5	15	16
5	2	5	7	35	36
6	3	7	9	63	64
7	4	9	11	99	100
8	5	11	13	143	144
9	6	13	15	195	196
10	7	15	17	255	256
11	8	17	19	323	324
12	9	19	21	399	400

2. a. [0,5 point] According to this spreadsheet, what results do you get using 17 as the odd number ?

2. b. [0,5 point] Show that this is an integer multiple of 4.

2. c. [0,5 point] Two of the following four spreadsheet formulas have been entered in the cell D3. Which ones ? No justification is expected.

Formula 1 :  $= (2 * A3 + 1) * (2 * A3 + 3)$

Formula 2 :  $= (2 * B3 + 1) * (2 * C3 + 3)$

Formula 3 :  $= B3 * C3$

Formula 4 :  $= (2 * D3 + 1) * (2 * D3 + 3)$

3. Algebra :

3. a. [1 point] Expand  $(2x + 1)(2x + 3) + 1$ .

3. b. [1 point] Explain why Lea was right : when you multiply two consecutive odd numbers, and add 1, the result is always a multiple of 4.

- That's all folks -