Test 4 : Number patterns [50]

Question 1

1.1 Consider the following sequences and in each case:

- Write down the next three terms.
- State whether the general term will be linear, quadratic or neither of the two.

1.1.1 $3 ; 7 ; 11 ; 15 ; 19 ;$ ………..   1.1.2 $50 ; 44 ; 38 ; 32 ; 26 ;$ ……..
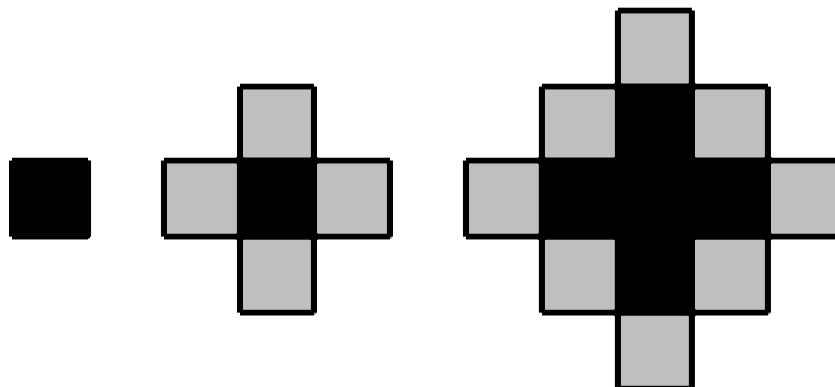
1.1.3 $2 ; 3\frac{1}{2} ; 5 ; 6\frac{1}{2} ; 8$; ………..   1.1.4 $3 ; 6 ; 11 ; 18 ; 27 ;$ ………..

1.1.5 $5+7x ; 7+9x ; 9+11x ; 11+13x ;$ ………….   (10)

1.2   The diagram shows a sequence of tiling patterns. Each one is made by surrounding the previous pattern (shade black) by squares that are shaded grey.

1.2.1   On the square grid on your diagram sheet, draw the next pattern   (2)

1.2.2   There are two sequences formed. The first, is the number of squares added to each new pattern (the grey squares), the second is the total number of squares making up the pattern. Write down the first six terms of each sequence   (6)

1.2.3   Find a formula for the $n-th$ term in each sequence.   (4)

1.3   Consider the following patterns of diamond shapes:

1.3.1   How many diamonds($\blacklozenge$) are there in the next pattern?   (2)
1.3.2   How many diamonds are there in the nth pattern?   (4)
1.3.3   Which pattern has 960 diamonds?   (4)

1.4   A quadratic pattern has a second term equal to 1 and a third term equal to -6 and a
        fifth term equal to -14.

1.4.1   calculate the second differences of this quadratic pattern   (5)
1.4.2   hence, or otherwise, calculate the first term of the pattern   (2)

1.5   The sequence 4; 9;   The pattern 4; 9; x; 37; …. is a quadratic pattern
1.5.1   Calculate the value of x.   (3)
1.5.2   hence or otherwise determine the general term of this pattern.   (4)

1.6   Consider the sequence: 3 ; p ; 10 ; q ; 21. The sequence has a constant second difference
        of 1. Determine the values of p and q.   (4)