

MEMO 2018-10 ED-00003(1)

(1) Consider the following sequence and answer the questions: 383 ; 379 ; 375 ; ; 255

(a) Determine the general term of the sequence.

$$\begin{aligned}T_n &= a + (n-1)d && \text{with} && a = 383 \\T_n &= 383 + (n-1)(-4) && && d = 379 - 383 = -4 \\T_n &= 383 - 4n + 4 \\T_n &= 387 - 4n\end{aligned}$$

(b) Determine the 22nd term.

$$\begin{aligned}T_n &= 387 - 4n \\ \therefore T_{22} &= 387 - 4(22) \\ \therefore T_{22} &= 387 - 88 \\ \therefore T_{22} &= 299\end{aligned}$$

(c) How many terms does the sequence consist of?

$$\begin{aligned}T_n &= 387 - 4n && \text{with} && a = 383 \\ \therefore 255 &= 387 - 4n && && d = -4 \\ \therefore 4n &= 387 - 255 && && T_n = 255 \\ \therefore 4n &= 132 && && n = ? \\ \therefore n &= 33 \\ \therefore &\text{The sequence consists of 33 terms.}\end{aligned}$$

(2) Complete the next five terms of each of the following sequences.

Also describe the number pattern in words:

(a) -14 ; -17 ; -20 ; -23 ; **-26 ; -29 ; -32 ; -35 ; -38**

Subtract 3 / Decrease with 3

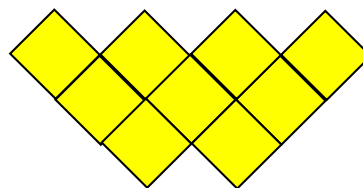
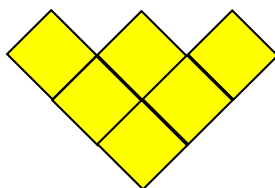
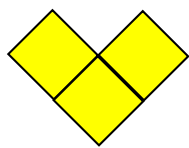
(b) 11 ; -110 ; 1 100 ; **-11 000 ; 110 000 ; -1 100 000 ; 11 000 000 ; -110 000 000**

Multiply with -10

(c) 0 ; 3 ; 8 ; 15 ; **24 ; 35 ; 48 ; 63 ; 80**

One less than the complete squares e.g. $(1)^1 - 1 = 1 - 1 = 0$

- (3) Pattern 1 Pattern 2 Pattern 3



(a) Complete the following table:

Pattern (n):	1	2	3	4	5
Number of squares:	3	6	9	12	15
Number of contact lines between squares:	2	6	10	14	18

(b) Write the general term for each of the following:

(i) the number of squares.

$$\begin{aligned}
 T_n &= a + (n-1)d && \text{with} && a = 3 \\
 T_n &= 3 + (n-1)(3) && && d = 6 - 3 = 3 \\
 T_n &= 3 + 3n - 3 \\
 T_n &= 3n
 \end{aligned}$$

(ii) number of contact lines between squares.

$$\begin{aligned}
 T_n &= a + (n-1)d && \text{with} && a = 2 \\
 T_n &= 2 + (n-1)(4) && && d = 6 - 2 = 4 \\
 T_n &= 2 + 4n - 4 \\
 T_n &= 4n - 2
 \end{aligned}$$

(c) How many squares will there be in pattern 18?

$$\begin{aligned}
 T_n &= 3n && \text{with} && n = 18 \\
 \therefore T_{18} &= 3(18) \\
 \therefore T_{18} &= 54
 \end{aligned}$$

(d) How many contact lines between squares will there be in pattern 25?

$$\begin{aligned}
 T_n &= 4n - 2 && \text{with} && n = 25 \\
 \therefore T_{25} &= 4(25) - 2 \\
 \therefore T_{25} &= 100 - 2 = 98
 \end{aligned}$$

(e) In which pattern will there be 6 more contact lines between squares than the number of squares?

$$\text{Number of squares} = T_n = 3n$$

$$\text{Number of contact lines between squares} = T_n = 4n - 2$$

$$\therefore \text{Number of contact lines between squares} = \text{Number of squares} + 6$$

$$4n - 2 = 3n + 6$$

$$\therefore 4n - 3n = 6 + 2$$

$$\therefore n = 8$$

$\therefore$ In the 8th term there will be 6 more contact lines between the squares than there are squares.