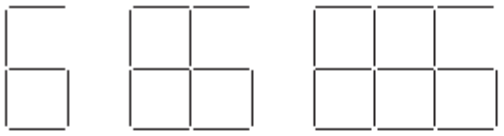
EXERCISE 12.4 PAGE: 246

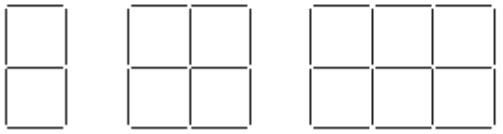
1. Observe the patterns of digits made from line segments of equal length. You will find such segmented digits on the display of electronic watches or calculators.

(a) 

6 11 16 21 ... (5*n* + 1) ...

(b) 

4 7 10 13 ... (3*n* + 1) ...

(c) 

7 12 17 22 ... (5*n* + 2) ...

If the number of digits formed is taken to be n, the number of segments required to form n digits is given by the algebraic expression appearing on the right of each pattern. How many segments are required to form 5, 10, 100 digits of the kind

Solution:-

(a) From the question it is given that the numbers of segments required to form n digits of the kind  is (5n + 1)

Then,

The number of segments required to form 5 digits = ((5 × 5) + 1)
= (25 + 1)
= 26

The number of segments required to form 10 digits = ((5 × 10) + 1)
= (50 + 1)
= 51

The number of segments required to form 100 digits = ((5 × 100) + 1)
= (500 + 1)
= 501

(b) From the question it is given that the numbers of segments required to form n digits of the kind  is (3n + 1)

Then,

The number of segments required to form 5 digits = ((3 × 5) + 1)
= (15 + 1)
= 16

The number of segments required to form 10 digits = ((3 × 10) + 1)
= (30 + 1)
= 31

The number of segments required to form 100 digits = ((3 × 100) + 1)
= (300 + 1)
= 301

(c) From the question it is given that the numbers of segments required to form n digits of the kind  is (5n + 2)

Then,

The number of segments required to form 5 digits = ((5 × 5) + 2)
= (25 + 2)
= 27

The number of segments required to form 10 digits = ((5 × 10) + 2)
= (50 + 2)
= 52

The number of segments required to form 100 digits = ((5 × 100) + 1)
= (500 + 2)
= 502

2. Use the given algebraic expression to complete the table of number patterns.

S. No.	Expression	Terms									
		1st	2nd	3rd	4th	5th	...	10th	...	100th	...
(i)	2n – 1	1	3	5	7	9	-	19	-	-	-
(ii)	3n + 2	5	8	11	14	-	-	-	-	-	-
(iii)	4n + 1	5	9	13	17	-	-	-	-	-	-
(iv)	7n + 20	27	34	41	48	-	-	-	-	-	-
(v)	$n^2 + 1$	2	5	10	17	-	-	-	-	10001	-

Solution:-

(i) From the table (2n - 1)
Then, 100^{th} term =?
Where n = 100
= (2 × 100) – 1
= 200 – 1
= 199

(ii) From the table (3n + 2)
5^{th} term =?
Where n = 5
= (3 × 5) + 2
= 15 + 2
= 17
Then, 10^{th} term =?
Where n = 10
= (3 × 10) + 2
= 30 + 2
= 32
Then, 100^{th} term =?
Where n = 100
= (3 × 100) + 2
= 300 + 2
= 302

(iii) From the table (4n + 1)
5^{th} term =?
Where n = 5
= (4 × 5) + 1
= 20 + 1
= 21
Then, 10^{th} term =?
Where n = 10
= (4 × 10) + 1
= 40 + 1
= 41
Then, 100^{th} term =?

Where n = 100

= (4 × 100) + 1

= 400 + 1

= 401

(iv) From the table (7n + 20)

5^{th} term =?

Where n = 5

= (7 × 5) + 20

= 35 + 20

= 55

Then, 10^{th} term =?

Where n = 10

= (7 × 10) + 20

= 70 + 20

= 90

Then, 100^{th} term =?

Where n = 100

= (7 × 100) + 20

= 700 + 20

= 720

(v) From the table (n^2 + 1)

5^{th} term =?

Where n = 5

= (5^2) + 1

= 25+ 1

= 26

Then, 10^{th} term =?

Where n = 10

= (10^2) + 1

= 100 + 1

= 101

So the table is completed below.

S. No.	Expression	Terms									
		1st	2nd	3rd	4th	5th	...	10th	...	100th	...
(i)	2n – 1	1	3	5	7	9	-	19	-	199	-
(ii)	3n + 2	5	8	11	14	17	-	32	-	302	-
(iii)	4n + 1	5	9	13	17	21	-	41	-	401	-
(iv)	7n + 20	27	34	41	48	55	-	90	-	720	-
(v)	$n^2 + 1$	2	5	10	17	26	-	101	-	10001	-