Mathematics

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(Chapter – 12) (Algebraic Expressions)

(Class – VII)

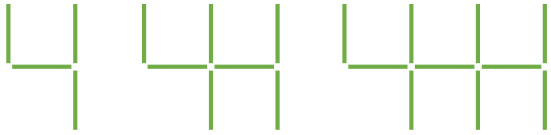
Exercise 12.4

Question 1:

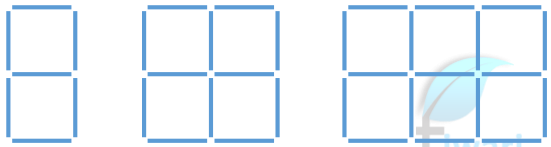
Observe the patterns of digits made from line segments of equal length. You will find such segmented digits on the display of electronic watches or calculators.

(a) 

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

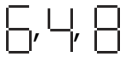
(b) 

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

(c) 

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

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 

Answer 1:

S. No.	Symbol	Digit's number	Pattern's Formulae	No. of Segments
(i)		5	$5n+1$	26
		10		51
		100		501
(ii)		5	$3n+1$	16
		10		31
		100		301

(iii)		5	$5n+2$	27
		10		52
		100		502

(i) $5n+1$

Putting $n=5$, 5 x 5 + 1 = 25 + 1 = 26

Putting $n=10$, 5 x 10 + 1 = 50 + 1 = 51

Putting $n=100$, 5 x 100 + 1 = 500 + 1 = 501

(ii) $3n+1$

Putting $n=5$, 3 x 5 + 1 = 15 + 1 = 16

Putting $n=10$, 3 x 10 + 1 = 30 + 1 = 31

Putting $n=100$, 3 x 100 + 1 = 300 + 1 = 301

(iii) $5n+2$

Putting $n=5$, 5 x 5 + 2 = 25 + 2 = 27

Putting $n=10$, 5 x 10 + 2 = 50 + 2 = 52

Putting $n=100$, 5 x 100 + 2 = 500 + 2 = 502

Question 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)	$3n+2$	2	5	8	11	---	---	---	---	---	---
(iii)	$4n+1$	5	9	13	17	---	---	---	---	---	---
(iv)	$7n+20$	27	34	41	48	---	---	---	---	---	---
(v)	n^2+1	2	5	10	17	---	---	---	---	10001	---

Answer 2:

(i) $2n-1$

Putting $n=100$, 2 x 100 – 1 = 200 – 1 = 199

(ii) $3n+2$

Putting $n=5$, 3 x 5 + 2 = 15 + 2 = 17

	Putting	$n = 10,$	3 x 10 + 2 = 30 + 2 = 32
	Putting	$n = 100,$	3 x 100 + 2 = 300 + 2 = 302
(iii)	$4n+1$		
	Putting	$n = 5,$	4 x 5 + 1 = 20 + 1 = 21
	Putting	$n = 10,$	4 x 10 + 1 = 40 + 1 = 41
	Putting	$n = 100,$	4 x 100 + 1 = 400 + 1 = 401
(iv)	$7n+20$		
	Putting	$n = 5,$	7 x 5 + 20 = 25 + 20 = 55
	Putting	$n = 10,$	7 x 10 + 20 = 70 + 20 = 90
	Putting	$n = 100,$	7 x 100 + 20 = 700 + 20 = 720
(v)	n^2+1		
	Putting	$n = 5,$	5 x 5 + 1 = 25 + 1 = 26
	Putting	$n = 10,$	10 x 10 + 1 = 100 + 1 = 101
	Putting	$n = 100,$	100 x 100 + 1 = 10000 + 1 = 10001

Now complete table is,

S.No.	Expression	Terms									
		1st	2nd	3rd	4th	5th	...	10th	...	100th	...
(i)	$2n-1$	1	3	5	7	9	---	19	---	**199**	---
(ii)	$3n+2$	2	5	8	11	**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	---