

CBSE Class –VII Mathematics
NCERT Solutions
Algebraic Expressions (Ex. 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.



11 16 21... $(5n + 1) \dots$



7 10 13... $(3n + 1) \dots$



7 12 17 22...

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:

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 $n = 5$, $5 \times 5 + 1 = 25 + 1 = 26$

Putting $n = 10$, $5 \times 10 + 1 = 50 + 1 = 51$

Putting $n = 100$, $5 \times 100 + 1 = 500 + 1 = 501$

(ii) $3n + 1$

Putting $n = 5$, $3 \times 5 + 1 = 15 + 1 = 16$

Putting $n = 10$, $3 \times 10 + 1 = 30 + 1 = 31$

Putting $n = 100$, $3 \times 100 + 1 = 300 + 1 = 301$

(iii) $5n + 2$

Putting $n = 5$, $5 \times 5 + 2 = 25 + 2 = 27$

Putting $n = 10$, $5 \times 10 + 2 = 50 + 2 = 52$

Putting $n = 100$, $5 \times 100 + 2 = 500 + 2 = 502$

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: (i) $2n - 1$

Putting $n = 100$, $2 \times 100 - 1 = 200 - 1 = 199$

(ii) $3n + 2$

Putting $n = 5$, $3 \times 5 + 2 = 15 + 2 = 17$

Putting $n = 10$, $3 \times 10 + 2 = 30 + 2 = 32$

Putting $n = 100$, $3 \times 100 + 2 = 300 + 2 = 302$

(iii) $4n + 1$

Putting $n = 5$, $4 \times 5 + 1 = 20 + 1 = 21$

Putting $n = 10$, $4 \times 10 + 1 = 40 + 1 = 41$

Putting $n = 100$, $4 \times 100 + 1 = 400 + 1 = 401$

(iv) $7n + 20$

Putting $n = 5$, $7 \times 5 + 20 = 25 + 20 = 55$

Putting $n = 10$, $7 \times 10 + 20 = 70 + 20 = 90$

Putting $n = 100$, $7 \times 100 + 20 = 700 + 20 = 720$

(v) $n^2 + 1$

Putting $n = 5$, $5 \times 5 + 1 = 25 + 1 = 26$

Putting $n = 10$, $10 \times 10 + 1 = 100 + 1 = 101$

Putting $n = 100$, $100 \times 100 + 1 = 10000 + 1 = 10001$

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	---