

The n th Term of a Quadratic Sequence *stretch*

ANSWERS

1



Find the n th term of

7 16 29 46 67

second difference 4, so $2n^2$

what is left: 5, 8, 11, ... = $3n + 2$

Answer $2n^2 + 3n + 2$

2



Find the n th term of

3 7 12 18 25

second difference 1, so $\frac{1}{2}n^2$

what is left: 2.5, 5, 7.5, ... = $\frac{5}{2}n$

Answer $\frac{1}{2}n^2 + \frac{5}{2}n$

3



Find the 20th term of

4 10 18 28

$n^2 + 3n$

$20^2 + 3 \times 20 = 400 + 60$

Answer 460

4



Everyone in a group shakes hands with everyone else once.

The numbers of handshakes make a quadratic sequence.

How many handshakes are there in a group of 30?

people	2	3	4	5
handshakes	1	3	6	10

people n : $\frac{n(n-1)}{2}$

$\frac{30 \times 29}{2} = 435$

Answer 435

5



The n th term of a sequence is $an^2 + bn$. Its first two terms are 5 and 14. Find a and b .

$a + b = 5$, $4a + 2b = 14$

$2a + 2b = 10$, so $2a = 4$

Answer $a = 2$, $b = 3$

6



Ben says the n th term of this sequence is $4n^2 + 1$

5 11 21 35 53

Explain his mistake and find the correct n th term.

the second difference is 4: halve it, $2n^2$

his rule gives 5, 17, ..., not 5, 11

Answer $2n^2 + 3$

7



Will the sequence

40 31 24 19

ever have a negative term?

Explain your answer.

$n^2 - 12n + 51 = (n - 6)^2 + 15$

the differences go -9, -7, -5, -3, -1, +1

Answer No: the smallest term is 15

8



Explain why every term of the sequence with n th term $n^2 + 3n$ is even.

$n^2 + 3n = n(n + 3)$

n and $n + 3$: one odd, one even

Reason one factor is always even