

Quadratic nth term: which step breaks?

ANSWERS

Name _____

These follow one sequence, 4, 9, 20, 37, 60, ..., through the steps of finding its n th term in order: first differences, the second difference, halve it, the n^2 part, what is left, its n th term, put them together, then check.

- 1 Find the first differences of 4, 9, 20, 37, 60, ...
STEP 1: FIRST DIFFERENCES • FIX IT CARD 1

5, 11, 17, 23

- 2 The first differences are 5, 11, 17, 23.
Find the second difference.

STEP 2: THE SECOND DIFFERENCE • FIX IT CARD 2

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- 3 The second difference is 6. How does the n th term start?
STEP 3: HALVE IT • FIX IT CARD 3

$3n^2$

- 4 The n th term starts $3n^2$.
Work out $3n^2$ for $n = 1$ to 5.

STEP 4: THE n^2 PART • FIX IT CARD 4

3, 12, 27, 48, 75

- 5 Sequence 4, 9, 20, 37, 60
 n^2 part 3, 12, 27, 48, 75
What is left?
STEP 5: WHAT IS LEFT • FIX IT CARD 5

1, -3, -7, -11, -15

- 6 What is left is 1, -3, -7, -11, -15.
Find its n th term.
STEP 6: THE n TH TERM OF WHAT IS LEFT • FIX IT CARD 6

$-4n + 5$ (or $5 - 4n$)

- 7 The n^2 part is $3n^2$. What is left has n th term $5 - 4n$. Write the n th term.
STEP 7: PUT THEM TOGETHER • FIX IT CARD 7

$3n^2 - 4n + 5$

- 8 To check $3n^2 - 4n + 5$ against the sequence, substitute $n = 4$. What do you get?
STEP 8: CHECK WITH A TERM • FIX IT CARD 8

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The first question wrong is the step that breaks. Give that student the card it names.

The Maths Habit