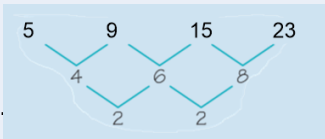


# Sequences

<b>Keywords:</b>	Arithmetic / $n$ th term / Geometric / Term / Quadratic / Iterate					
<b>Definition / Description:</b>	Arithmetic – a sequence where terms are found by adding or subtracting an equal amount.	$n$ th term – The general rule of a number sequence.	Geometric - A sequence in which you find each term by multiplying the previous term by a fixed value.	Term – a part of an equation, expression or sequence.	Quadratic – A sequence where the difference increases or decrease by an equal amount each time	Iterate - a quantity arrived at by iteration.
<b>Knowledge points:</b>	Nth term of a linear sequence	Finding terms in a sequence	Nth term of a Quadratic sequence	Geometric Progression	Sequences by iteration	
<b>Knowledge point examples:</b>	<p>n: 1    2    3    4</p> <p>    2    5    8    11...</p> <p>      +3    +3    +3    <math>3n - 1</math></p> <p>The <math>n</math>th term of a linear sequence is always of the form <math>An \pm b</math>, where: <math>A</math>, is the difference between each term and the next term. <math>b</math> is the difference between the first term and <math>A</math>.</p> <p>n: 0    1    2    3    4</p> <p>    13   11   9    7    5</p> <p>      +2    -2    -2    -2</p> <p>    <u><math>13 - 2n</math></u></p> <p>In a descending sequence we find the <u>zero term</u> to discover what we are taking <math>An</math> way from.</p>	<p>From the sequence 5, 12, 19, 26, 33... work out the 50<sup>th</sup> term.</p> <p>The <math>n</math>th term of this sequence is <math>7n - 2</math></p> <p>Find the 50th term by substituting <math>n=50</math> into the rule, <math>7n - 2</math></p> <p><math>= 7 \times 50 - 2 = 350 - 2 = 348</math>.</p>	<p>Find the <math>n</math>th term in the sequence: 5, 9, 15, 23...</p> <p>Term</p> <p>1<sup>st</sup> Diff.</p> <p>2<sup>nd</sup> Diff.</p>  <p>The second differences are constant (2) so the sequence is quadratic and the coefficient of <math>n^2</math> is 1. So the <math>n</math>th term includes <math>1n^2</math>. To find the remainder of the <math>n</math>th term, we subtract <math>1n^2</math> from our sequence and find the <math>n</math>th term of the linear sequence left over:</p> <p>5   9   15   23 -   -   -   - 1   4   9   16 4   5   6   7... The <math>n</math>th term of this sequence is <math>n + 3</math>.</p> <p><i>Nth term of quadratic sequence</i> <math>= n^2 + n + 3</math></p>	<p>Geometric progression is a sequence of non-zero numbers where each term after the first is found by multiplying the previous one by a number.</p> <p><u>Find the next two terms of the sequence</u></p> <p>3   6   12   24...</p> <p>   x2   x2   x2</p> <p>The term to term rule here is <math>\times 2</math> therefore the next two terms are  <math>24 \times 2 = 48</math>  <math>48 \times 2 = 96</math></p>	<p>Find the first four iterations of the iterative formula <math>x_{n+1} = 3x_n - 2</math> with <math>x_1 = 2</math>.</p> <p><math>x_2 = 3x_1 - 2</math>  <math>= 3 \times 2 - 2 = 4</math></p> <p><math>x_3 = 3x_2 - 2</math>  <math>= 3 \times 4 - 2 = 10</math></p> <p><math>x_4 = 3x_3 - 2</math>  <math>= 3 \times 10 - 2 = 28</math></p> <p><math>x_5 = 3x_4 - 2</math>  <math>= 3 \times 28 - 2 = 82</math></p>	

<b>Linked Knowledge</b>	Notation and manipulation / Functions / Multiples, Primes, Factors / Index Numbers
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