Arithmetic Sequence

1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Sequence of numbers.
with a common difference.

Graph is a straight line.

$$t_n = a + (n-1)d$$

$a \rightarrow$ first term

$d \rightarrow$ common difference

1. Determine a formula for the general term of an arithmetic sequence with a = 8 and d = 2

8, 10, 12, ...

$t_n = a + (n-1)d$

$t_n = 8 + (n-1)2$ → $t_n = 2n + 6$

2. For the sequence 17, 13, 9, 5, ...

-4 -4 -4

Determine a recursive formula

$t_1 = 17 \quad t_n = t_{n-1} - 4$

Determine a ~~general~~ Explicit formula

$t_n = a + (n-1)d$ → $t_n = -4n + 21$

(a = 17, d = -4)

Determine the 23rd term

$t_n = -4n + 21$

$t_{23} = -4(23) + 21$

$t_{23} = -92 + 21$

$t_{23} = -71$

Geometric Sequence

ex 2, 4, 8, 16, 32, ...

- Common multiple (ratio)

$$t_n = a(r)^{n-1}$$

a → first term

r → ratio

1. Determine a formula for the general term of an geometric series with a = 3 and r = $\sqrt{2}$

$3, 3\sqrt{2}, 3\sqrt{2}\sqrt{2}, 6\sqrt{2}, 6\sqrt{2}\sqrt{2}$

$3, 3\sqrt{2}, 6, 6\sqrt{2}, 12$

$t_n = 3(\sqrt{2})^{n-1}$

2. For the sequence $\frac{1}{9}, \frac{1}{3}, 1, 3$ ....

Determine a recursive formula

$t_n = 3t_{n-1}$

Determine a general formula

$t_n = \frac{1}{9}(3)^{n-1}$

Determine the 23rd term

$t_{23} = \frac{1}{9}(3)^{23-1}$

$t_{23} = \frac{1}{9}(3)^{22}$

$= 3\,486\,784\,401$

Investigate
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Arithmetic Series

Sum of even #'s to 1000

$$2+4+6+8+10+\cdots\cdots+998+1000$$
$$+1000+998+996+994+\cdots\cdots+6+4+2$$
$$1002+1002+1002+1002+\cdots\cdots+1002$$

$$\frac{1002 \times 500}{2} = 250\,500$$

$$a+(a+d)+(a+2d)+(a+3d)+\cdots+(a+(n-1)d)$$
$$(a+(n-1)d)+(a+(n-2)d)+\cdots+(a+d)+a$$

$$a+(a+(n-1)d)$$
$$2a+(n-1)d$$

← n of these

$$S_n = \frac{n}{2}(2a+(n-1)d)$$

$$S_n = \frac{n}{2}[2a+(n-1)d]$$

$$S_n = \frac{n}{2}(a+(a+(n-1)d))$$

$$S_n = \frac{n}{2}(a+t_n)$$

Determine the sum of the series 3 + 8 + 13 + ... + 58

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1, 3, 4, 8, 9