

What's Going On?

Checking In

Minds on

What's next?

Action!

Arithmetic Sequences

Consolidation

Tipsy Questions

Learning Goal - I will be able to solve problems involving arithmetic sequences.

Minds on

What's next?

$$\begin{array}{ccccccc} -62, & -43, & -24, & -5, & \dots & 14 \\ \underbrace{\hspace{1.5cm}} & \underbrace{\hspace{1.5cm}} & \underbrace{\hspace{1.5cm}} & \underbrace{\hspace{1.5cm}} & & \\ +19 & +19 & +19 & +19 & & \end{array}$$

Minds on

What's the tenth term?

$$\overset{1}{-62}, \overset{2}{-43}, \overset{3}{-24}, \overset{4}{-5}, \dots$$

90 109 128

Minds on

What's the hundredth term?

$-62, -43, -24, -5, \dots$

$+19$

4 100

96

You add 19×96

$$100^{\text{th}} \text{ term} = 19 \times 96 + (-5)$$

Action!

Arithmetic Sequences

A Few Terms

Sequence: An ordered list of numbers.

Examples: 635, 630, 625, 620, 615 ...

128, 64, 32, 16, 8 ...

Term: A number in a sequence. Subscripts are usually used to identify the positions of the terms.

Examples: $t_1 = 635$, $t_2 = 630$, $t_3 = 625$...

Examples: $t_1 = 128$, $t_2 = 64$, $t_3 = 32$...

t_1 means term 1

Action!

Arithmetic Sequences

A Few Terms

Arithmetic Sequence: A sequence that has the same difference, the **common difference**, between any pair of consecutive terms.

Examples: 6, 8, 10, 12, 14 ...

150, 141, 132, 123, 114 ...

Recursive Sequence: A sequence for which one term (or more) is given and each successive term is determined from the previous term(s).

Examples: $6 + 2, (6 + 2) + 2, (6 + 2 + 2) + 2 \dots$

$a, a + d, (a + d) + d, (a + d + d) + d \dots$

$-62, -43, -24, -5, \dots$ *2 times*

$-62, -62 + 19, (-62 + 19) + 19$
 1 2 3

Action!

Arithmetic Sequences

-62, -43, -24, -5, ...

The General Term

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

The Recursive Formula

$$t_1 = a, t_n = t_{n-1} + d, \text{ where } n > 1$$

Action!

Arithmetic Sequences

-62, -43, -24, -5, ...

A sure-fire way to find any term.

The General Term

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

-62, -43, -24, -5, ...

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

$$t_n = -62 + (n-1)19$$

$$t_n = -62 + 19n - 19$$

$$t_n = 19n - 81$$

Action!

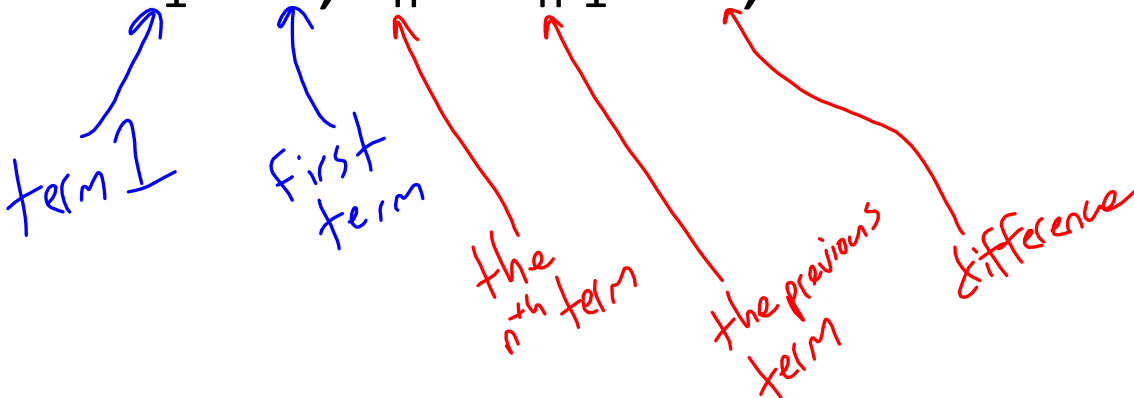
Arithmetic Sequences

-62, -43, -24, -5, ...

The quickest way to find the next term.

The Recursive Formula

$$t_1 = a, t_n = t_{n-1} + d, \text{ where } n > 1$$



-62, -43, -24, -5, ...

$$t_1 = -62, t_n = t_{n-1} + 19$$

The first term is -62, any given term is the previous term plus 19.

Sequence	General Term	Expanded General Term	Recursive Formula	10 th Term
1, 5, 9, 13, 17 ...	$t_n = 1 + (n-1)4$	$t_n = 4n - 3$	$t_1 = 1$ $t_n = t_{n-1} + 4$	37
8, 11, 14, 17, 20 ...	$t_n = 8 + (n-1)3$	$t_n = 3n + 5$	$t_1 = 8$ $t_n = t_{n-1} + 3$	35
28, 19, 10, 1, -8 ...	$t_n = 28 + (n-1)(-9)$	$t_n = -9n + 37$	$t_1 = 28$ $t_n = t_{n-1} - 9$	-53
784, 588, 392 ...	$t_n = 784 + (n-1)(-196)$	$t_n = -196n + 980$	$t_1 = 784$ $t_n = t_{n-1} - 196$	-980

Consolidation

Tipsy Questions

1. Determine the number of terms in this sequence

a) $-20, -25, -30, -35, \dots, -205$

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

We can use the general term equation.

$$t_n = -20 + (n-1)(-5)$$

We know the last term (t_n) we want to know its term number (n).

$$-205 = -20 + (n-1)(-5)$$

$$-205 = -20 - 5n + 5$$

$$-205 = -15 - 5n$$

$$\frac{-190}{-5} = \frac{-5n}{-5}$$

$$n = 38$$

There are 38 terms

Consolidation

Tipsy Questions

2. The 50th term of an arithmetic sequence is 238 and the 93rd term is 539.

State the general term.

* we need a (first term) and d (the difference)

In 43 terms, we go up by 301

$$\text{So } d = \frac{301}{43}$$

$$d = 7$$

To get from the 50th term to the first, we go down by 7, 49 times.

$$a = 238 - (7 \times 49)$$

$$a = 238 - 343$$

$$a = -105$$

$$t_n = -105 + (n-1)(7)$$

Consolidation

Tipsy Questions

3. The 5th term of an arithmetic sequence is 45 and the 8th term is -6.
Determine the 20th term.

Consolidation

Tipsy Questions

What is the general term for the

a) Zeros of $f(x) = \sin x$

b) Max values of $f(x) = \sin x$

c) Min values of $f(x) = \sin x$