

Find the next 3 numbers. Describe How you find them

1. $3, 0.5, -2, -4.5, \underline{-7}, \underline{-9.5}, \underline{-12}$ sub 2.5
(add -2.5)

$$\frac{2.5}{2} = 1.25$$

2. $2, 2.5, 3.125, 3.906, \underline{4.88}, \underline{6.10}, \underline{7.63}$ mult 1.25

$+0.5$ $+0.5$ $+0.5$

3 3.5

3. $1, 1, 2, 3, 5, 8, \underline{13}, \underline{21}, \underline{34}$ add last 2 numbers together

fibonacci's sequence

Sequence

- List of numbers in a specific order.

3, 0.5, -2.5, -4.5,
1st 2nd 3rd 4th

~~3, -4.5, 0.5, 2.5~~

- Recursive Sequence
 - Do the same thing each time
 - Use a previous number or numbers

- term \Rightarrow a number in the sequence
(keep track of its position)

3 1st term
0.5 2nd term

Common Sequences

Arithmetic

add the same number

3, 0.5, -2, -4.5...

add -2.5 each time

$$0.5 - 3 = -2.5$$

Common difference

Geometric

mult by the same thing

2, 2.5, 3.125, 3.906...

mult by 1.25 each time

$$\frac{2.5}{2} = 1.25$$

Common ratio

1, 1, 2, 3, 5, ...

diff

$$\begin{array}{l} 1-1=0 \\ 2-1=1 \end{array} \text{ not arithmetic}$$

ratio

$$\begin{array}{l} \frac{1}{1} = 1 \text{ no} \\ \frac{2}{1} = 2 \text{ geometric} \end{array}$$

Recursive notation

need to know \Rightarrow know the pattern
what to do to find
the next

recursive
formula

$$\boxed{\begin{array}{l} u_1 = 5 \\ u_n = u_{n-1} + 2 \end{array}}$$

$$u_n = u_{n-1} + 2 \quad (\text{recursive rule})$$

\Rightarrow add 2 to last number

n 1st 2nd 3rd 4th 5th 6th

u \Rightarrow 5, 7, 9, 11, 13, ...

$u_n \leftarrow$ any number sequence name

$u_1 = 5$
 $u_2 = 7$
 $u_3 = 9$ \rightarrow position

$u_6 = u_{6-1} = u_5$

need a place to start

Find the next 3 numbers. Describe How you find them

1. $3, 0.5, -2, -4.5, \underline{-7}, \underline{-9.5}, \underline{-12}$ minus 2.5
(plus -2.5)

2. $2, 2.5, 3.125, 3.906, \underline{4.882}, \underline{6.102}, \underline{7.629}$ $\frac{\text{number} + \text{num}}{4}$

3. $1, 1, 2, 3, 5, 8, \underline{13}, \underline{21}, \underline{34}$

Fibonacci's Sequence

Sequence \Rightarrow list of Numbers
in a specific order

name of
↓
sequence

$$u = 3, 0.5, -2, -4.5 \dots$$

~~$0.5, -2, 3, -4.5$~~

Does not
need to have
a pattern

term \Rightarrow a number in the sequence
 $n \Rightarrow$ term number \Rightarrow where in the sequence

$$u_1 = 3 \Rightarrow \text{1st term}$$

$$u_2 = 0.5 \Rightarrow \text{2nd term}$$

$$u_3 = -2 \quad \text{3rd term}$$

$$u_n = \text{nth term (general)}$$

Sequences

Arithmetic

3, 0.5, -2, -4.5, ...

add the same number
each time

add -2.5

$$0.5 - 3 = -2.5$$

$$-2 - 0.5 = -2.5$$

$$-4.5 - (-2) = -2.5$$

-2.5 common
difference

now - previous

Geometric

2, 2.5, 3.125, 3.906, ...

mult by the same number
each time.

~~$2.5 - 2 = 0$~~ diff

~~$3.125 - 2.5 = 0.625$~~

ratio

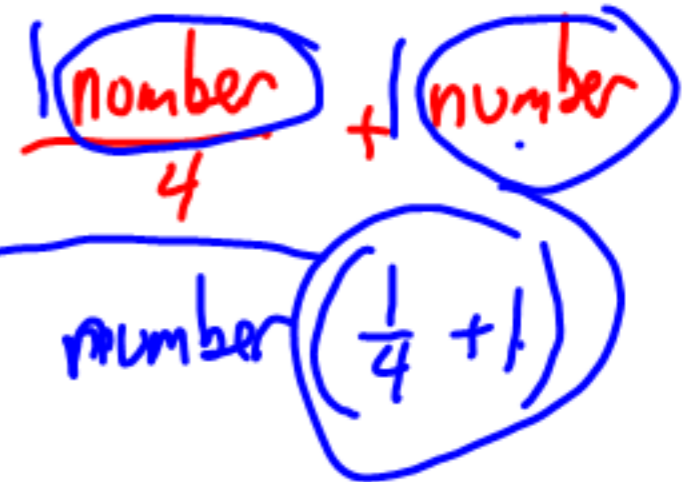
$$\frac{2.5}{2} = 1.25$$

$$\frac{3.125}{2.5} = 1.25$$

$$\frac{3.906}{3.125} \approx 1.25$$

now
previous

Common
ratio



Recursion \Rightarrow use the previous terms
to find the next
 \Rightarrow do the same thing
each time

\Rightarrow Recursive formula

need
need Start
rule

(3) 0.5, -2, -4.5...

$$\begin{cases} u_1 = 3 \\ u_n = u_{n-1} - 2.5 \end{cases}$$

Find the next 3 numbers. Describe How you find them

1. $3, 0.5, -2, -4.5, \underline{-7}, \underline{-9.5}, \underline{-12}$

$$0.5 - 3 = -2.5$$

$$-2 - 0.5 = -2.5$$

$$-4.5 - (-2) = -2.5$$

Sub 2.5
add -2.5

2. $2, 2.5, 3.125, 3.906, \underline{4.88}, \underline{6.10}, \underline{7.63}$ mult by 1.25

$$2.5 - 2 = 0.5$$

$$3.125 - 2.5 = 0.625$$

$$\frac{2.5}{2} = 1.25$$

$$\frac{3.125}{2.5} = 1.25$$

$$\frac{3.906}{3.125} = 1.24999 \approx 1.25$$

3. $1, 1, 2, 3, 5, 8, \underline{13}, \underline{21}, \underline{34}$

add previous two number

Fibonacci's Sequence

Sequences \Rightarrow List of Numbers
In a specific order.

(Do not have to form a pattern)
name of the sequence

$$u = 3, 0.5, -2, -4.5, \dots$$

term \Rightarrow number in the sequence

$n \Rightarrow$ term number \Rightarrow where the term is in
the sequence.

$$u_1 = 3 \Rightarrow \text{1st term}$$

$$u_2 = 0.5 \Rightarrow \text{2nd term}$$

$$u_3 = -2 \Rightarrow \text{3rd term}$$

$$u_n \Rightarrow \text{nth term (general)}$$

Sequences

Arithmetic

3, 0.5, -2, -4.5, ...

add the same #
each time

\Rightarrow Common difference
(now - previous)

Geometric

2, 2.5, 3.125, 3.906...

mult by the same
each time

Common ratio
 $\left(\frac{\text{now}}{\text{previous}} \right)$

$$1 - 1 = 0$$

$$2 - 1 = 1$$

not common - not

1, 1, 2, 3, 5, ...

neither

$$\frac{1}{1} = 1$$

$$\frac{2}{1} = 2$$

not common
not
G.

Recursion

⇒ use your previous answer
to find the next.

⇒ do the same thing each time

↑
Recursive formula
— start
= rule

$$\begin{cases} 3, 0.5, -2, -4.5 \\ u_1 = 3 \\ u_n = u_{n-1} + (-2.5) \end{cases}$$