Investigation Arithmetic Sequences

Name:

A sequence is an ordered list that follows a set pattern.

Amarithmetic sequence is a sequence with a constant common difference, or, in plain language, where you add a certain number to get from term to term.

Example: 2, 4, 6, 8, 10, 12, . . .

common difference d=2



common difference = d =

For #1 & 2:

a) Determine whether the sequence is arithmetic or not,
b) find the common difference, and
c) list the next three terms

1) 11, 8, 5, 2, ...

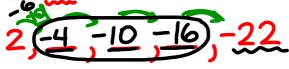
a) Arithmetic? **yes**b) d = -32) 5, 10, 15, 20, ...+5
a) Arithmetic? **yes**b) d = -3b) d = -3

Missing terms in an arithmetic sequence are called arithmetic means.

Example: Find the arithmetic mean of 13 and 19:

Since we know this is an arithmetic sequence, the pattern constant each time.

3) Find three arithmetic means of 2 and -22.



4) Find four arithmetic means of -18 and 62

$$-18 = \frac{14}{30} = \frac{30}{46} = \frac{62}{50} = \frac{62}{50}$$

Recursive and Explicit Formulae and Notation -

The n^{th} term of a sequence is written $\underline{a_n}$. n is the number of the term and a_n is the actual term.

In the sequence 24 6, 8, 10, 12

$$a_1 = 2$$
 $a_2 = 4$

Fill in the missing term names in the sequence $a_1, a_2, a_3, ..., a_n = a_n, a_n, a_n = a_n, a_n$

A recursive formula for a sequence is a rule that defines a new term, based on previous terms.

Example: To get the n^{th} term of the sequence $2, 5, 8, 11 \dots$ we can use the rule $a_n = a_{n-1} + 3$ because to get a term, you add 3 to the previous term.

So, to find the 4^{th} term, we take the 3^{rd} term and add 3. $a_4 = 6 \cdot 3 + 3 = 6$

The recursive formula for an arithmetic sequence is:

$$a_n = a_{n-1} + d$$

where a_{n-1} is the previous term d is the common difference

Example: $\begin{cases} a_1 = 12 \\ a_n = a_{n-1} = 7 \end{cases}$, for $n \ge 2$

What are the first 5 terms? 12.5, -2.5

An explicit formula for a sequence is like a function where you plug in any number n to get the nth term.

Example: To get the n^{th} term of the sequence $25, 8, 11, \ldots$ we can use the rule

 $a_n = 2 + (n-1)(3)$, because the sequence starts at 2 and the difference between the terms is 3 (like a slope).

The explicit formula for an arithmetic sequence is:

$$a_n = a_1 + (n-1) d$$
 where a_1 is the first term,

n is the number of the term that you want *d* is the common difference.

Example: $a_n = 15 + (n-1)(5)$ = 5

What are the first 5 terms? 15, 10, 5, 0, = 5

What is the 21st term? = 85

What is the 21^{st} term? __85 Q__=15+(21-1)(-5) Write a recursive and an explicit formula for each 15+ (20)(-5)

Decursive: an=an-1+d

Explicit: $Q_n = Q_n + (n-1)(d)$

$$\begin{cases} a_n = 3 \\ a_n = a_{n-1} + 4 \end{cases}$$

$$Q_n = 3 + (n-1)(4)$$

6) (3) 7, 1, -5, ...

Recursive:

(
$$a_1 = 13$$

($a_n = 0$

7) $a_n = 25 + (n-1)(10)$
a) What are the first 5 terms? 25, 35, 45, 55, 65
b) What is the 11th term? 125

($a_1 = 12$

($a_1 = 13$

($a_1 = 12$

(a_1