Pre Calc Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

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 WS Assessment

Target 9

Sequence, Series

Induction proofs

* Sequence: Explicit and Recursive Formula
* Series: Finite and Infinite Sum
* Induction proof

HW 9 Series www.deltamath.com

1. Write the next two terms of the sequence: 2, 5, 10, 17, 26, \_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Write the implicit formula (recursive) U(n) = ? to generate the sequence and check with calculator. Note: implicit formula = how to find the next term from the previous one

Write the explicit formula y = ? to generate the sequence and check with calculator.

Note explicit formula = how to find the term by its index position

2. Given the sequence: 5, 7, 9, 11,....

Write the implicit formula (recursive) and explicit formula. Check it with calculator and show me both MODE for stamp.

Given the sequence: 1, 4, 8, 13, 19, 26,... Show me for stamp on both MODE

4. The two simplest sequences to work with are arithmetic and geometric sequences.

An arithmetic sequence goes from one term to the next by always adding (or subtracting) the same value. For instance, 2, 5, 8, 11, 14,... and 7, 3, –1, –5,... are arithmetic

y = ax + b and u(n) = u(n – 1) + d

A geometric sequence goes from one term to the next by always multiplying (or dividing) by the same value. So 1, 2, 4, 8, 16,... and 81, 27, 9, 3, 1, 1/3,... are geometric

y = abr and u(n) = u(n – 1)\* r

Identify the name of sequence and write its both formula (check with calculator)

a. -6, -2, 2, 6, 10 b. 3, 6, 12, 24, 48

The second and fifth term of a sequence are 3 and 24, respectively. Find the explicit and recursive formula for the sequence if it is an arithmetic and geometric (4 in 1)

The fifth and ninth term of a sequence are -5 and -17, respectively. Find the explicit and recursive formula for the sequence if it is an arithmetic and geometric. Stamp (4 in 1)

Shifted Geometric Sequence:

A geometric sequence that includes an added term in the recursive rule. U(n) = U(n-1)+r + d

Antonio and Deanna are working at the community pool for the summer. They need to provide a “Shock” treatment of 450g of dry chlorine to prevent the growth of algae in the pool, then they add 45g of chlorine each day after the initial treatment. Each day the sun burns off 15% of the chlorine. Find the amount of chlorine after 1 day, 2 days, and 3 days. Determine the long run value.

Explicit formula $y=u\_{o}r^{x}+d\frac{r^{x}-1}{r-1}$. Resolve the problem with explicit formula here.

You borrow a $32000 loan at 4.9% annual interest rate and paying $1000 a month. How much you owe after one month, one year? Show me on calculator for stamp in both MODE

5 . For a sequence whose nth term is a n, as n increases without bound, if the terms of the sequence get closer and closer to a particular value L, then the sequence is said to **converge** to L. *L is called the limit of a sequence.* When, the sequence that does not converge is said to **diverge**

Determine whether the sequence converges or diverges. If it converges, give the value of the limit L

a. $1,\frac{1}{2},\frac{1}{3},\frac{1}{4},…,\frac{1}{n} $ b. $\frac{2}{1},\frac{3}{2},\frac{4}{3},\frac{5}{4},…$ c. 2, 4, 6, 8, ….

Write the first five terms of the given sequence, then determine whether the sequence converges or diverges. If it converges, give the value of the limit L

 $\left\{\frac{3n}{n+1}\right\}$ $\left\{\frac{5n^{3}}{n^{3}+1}\right\}$ $\left\{\frac{n^{3}+2}{n^{2}+n}\right\}$

Fibonacci Sequence are generated by setting u0=0, u1=1, and then using the recursive formula un= un-1+un-2 to get the rest. Generate the first 10 term of this sequence and find the explicit formula (extra)

A "sequence" is an ordered list of numbers; the numbers in this ordered list are called "terms".

For instance, "1, 2, 3, 4" is a sequence, with terms "1", "2", "3", and "4";

A "series" is the value you get when you add up all the terms of a sequence; this value is called the "sum". The corresponding series of the sequence above is the sum "1 + 2 + 3 + 4" = 10.

To show the summation of, say, the first through tenth terms of a sequence {an},

we would write the following: $\sum\_{n=0}^{10}a\_{n}$= a1 + a2 + … + a9 + a10

Write out the following series and find its values (its sum)

$\sum\_{n=1}^{5}3n$ $\sum\_{i=5}^{8}i^{2}$ $\sum\_{x=10}^{12}cos⁡(πx)$ $\sum\_{n=1}^{\infty }\frac{3}{10^{n}}$

Write and find the sum of the first six terms of un, where un = 2un–1+ un–2, u1= 1, and u2= 1. Show me the sigma notation for stamp

Given the sequence 2, –4, 6, –8 , 10 , … Write the corresponding series and write the its summation notation to find value from fifth to tenth terms

|  |  |
| --- | --- |
| Finite Arithmetic Sequence | Finite Geometric Sequence |
| $$\sum\_{k=1}^{n}a\_{k}=n\left(\frac{a\_{1}+a\_{n}}{2}\right)=\frac{n}{2}\left[2a\_{1}+\left(n-1\right)d\right]$$ | $$\sum\_{k=1}^{n}a\_{1}r^{k-1}=\frac{a\_{1}(1-r^{n})}{1-r}$$ |

 Find the sum of the first 50 terms of the sequence 1, 4, 7, 10, 13 …

Using the formula find (then check with sigma calculation)

$\sum\_{n=1}^{43}5+6n$ $\sum\_{n=8}^{50}3+2n$

Find the sum of the first 10 terms of the sequence 5, -10, 20, -40, …

Using the formula find (then check with sigma calculation)

$\sum\_{n=1}^{4}3^{n}$ $\sum\_{n=8}^{15}3\*2^{n}$

In the first row of seats of the famous Sequence Arena, there are 10 seats in each of the two side sections and there are 20 seats in the center section. In the second row, the side sections have 12 seats and the center has 22 seats. The third row is 14 and 24 seats and this pattern continues for the 75 rows in the arena.

a. How many seats are there in the back row of all three sections combined?

b. In the balcony, the pattern is different. The first row has 8 seats, the second has 12, and the third has 18. If the back row of the balcony cannot have more seats than the back row on the floor, how many seats are there in the balcony? How many seats total in the Arena ?

Find the sum of the first 10 terms of the sequence 4, 2, 1, ½ , ¼ ,…

How about 4 + 2 + 1 + ½ + ¼ +… (many many terms , infinite)

Formula If | r | < 1, then $\sum\_{k=1}^{\infty }a\_{1}r^{k-1}=\frac{a\_{1}}{1-r}$

Once a week Mrs. Baker makes sugar cookies. The first week she makes the recipe, she uses the full 2 cups of sugar called for. Each week after that, she reduces the amount of sugar by one third.

(a) How much sugar does she use for the cookies on the fifth week?

(b) How much sugar does she use for cookies over half a year?

(c) If Mrs. Baker became immortal and baked cookies every week for all eternity, how much sugar would she use?

There are several different methods for proving things in math.  One type you've probably already seen is the "two column" proofs  you did in Geometry. In the Algebra world, mathematical induction is the first one you usually learn because it's just a set list of steps you work through.  This makes it easier than the other methods. Just remember to write the four steps below

1. Show that P(1) is true
2. Assume P(k) is true
3. Show P(k+1) also true
4. Since k take any value, write P(n) is proven.

Prove P(n) : 1 + 2 + 3 + … + n = n(n+1) / 2

Prove P(n) : $1^{2}+2^{2}+3^{2}+…+n^{2}=\frac{n(n+1)(2n+1)}{6}$

Prove P(n) = 1 + 3 + 5 +…+ (2n-1) = n2

**Target 9 Assessment**

You are offered 2 jobs! Lucky you! Both jobs offer a starting salary of $30,000 a year. Company 1 offers a $650 raise each year. Company 2 offers a 2% raise each year. Write explicit and recursive formula for each to show how much you earn after 5 years in both companies.

The fourth and seventh term of a sequence are -8 and 4, respectively. Find the explicit and recursive formula for the sequence if it is an arithmetic and geometric

A small planet far, far away named Roscolian had a population of 5.3 million aliens. Each year 4% of the population dies or leaves the planet for a fresh start somewhere else. Also, each year, 145,000 new cute baby aliens are born or other aliens will immigrate to Roscolian. What will the population be in 5 years? What about the long run

Mr. Trinh is a sadistic teacher who likes writing lots of exam questions. He usually starts out the semester with only 10 questions on the first exam, but for each subsequent exam he writes one and a half as many questions as were on the previous exam! Since there's no such thing as half a question and Mr. Trinh likes writing questions, round your answers up to the next integer.

How many questions are on the second exam of the semester? third exam?

If Mr. Trinh wrote 20 exams in a semester, how many total exam questions would they have all together?

Prove P(n) = 2 + 4 + 6 +…+ (2n) = n (n + 1)