DATE: _______________

Unit 7 (Chapter 9): Discrete Mathematics **Pre-Calculus**

9.3 Sequences

Target 7C: Generate and identify the explicit rule for geometric sequences and series

Review of Prior Concepts

Is the sequence arithmetic? If yes, find the common difference.

a) $1, 5, 9, 13, 17, \ldots$

b) $1, 4, 9, 16, 25, \ldots$

c) $4x, x, -2x, -5x, -8x, \ldots$

More Practice

Arithmetic Sequences

https://www.mathsisfun.com/algebra/sequences-sums-arithmetic.html
https://www.khanacademy.org/math/algebra/sequences/constructing-arithmetic-sequences/a/writing-recursive-formulas-for-arithmetic-sequences
http://www.algebralab.org/lessons/lesson.aspx?file=algebra_arithseq.xml
http://www.coolmath.com/algebra/19-sequences-series/05-arithmetic-sequences-01
https://youtu.be/_cooC3yG_p0
https://youtu.be/lj_X9JVSF8k

SAT Connection

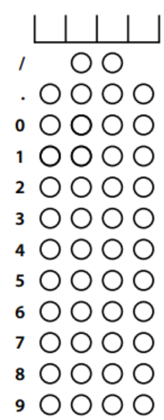
Passport to Advanced Math

10. Interpret parts of nonlinear expressions in terms of their context

Example:

Jessica opened a bank account that earns 2 percent interest compounded annually. Her initial deposit was \$100, and she uses the expression $\$100(x)^t$ to find the value of the account after t years.

What is the value of x in the expression?



NOTE: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

Solution

Geometric Sequence

Geometric Sequence – sequence written as $\{a, ar, ar^2, ar^3, \ldots, ar^{n-1}, \ldots\}$

<u>Explicit Rule</u>

$$a_n = a_1 r^{n-1}$$

<u>Recursive Rule</u>

$$a_n = a_{n-1} \cdot r, \quad \text{for all } n \geq 2$$

Example 1: Find the common ratio and 10th term, and write a recursive rule and explicit rule for the sequence: $9, 18, 36, 72, \ldots$

Example 2: Find the common ratio and 10th term, and write a recursive rule and explicit rule for the sequence: $7, 0.7, 0.07, 0.007, \ldots$

Example 3: Given the geometric sequence terms $a_3 = \frac{1}{2}$ and $a_5 = \frac{9}{2}$, find a_1.

Example 4: The fifth and eighth terms of a geometric sequence are 1920 and 30, respectively. Find a_1.

Example 5: A population of ants is growing at a rate of 8% a year. If there are 160 ants in the initial population, find the number of ants after 6 years.

Example 6: Find which term in the geometric sequence 1, 3, 9, 27, ... is the first to exceed 7,000.

More Practice

Geometric Sequences

http://www.mathsisfun.com/algebra/sequences-sums-geometric.html
http://www.algebralab.org/lessons/lesson.aspx?file=algebra_geoseq.xml
http://www.mathguide.com/lessons/SequenceGeometric.html
https://youtu.be/EJjCXIhP7X0
https://youtu.be/h1HJEOD6u8E
https://youtu.be/C7tE26CDI2M
https://youtu.be/cXy_LJK0Ui8
https://youtu.be/lj_X9JVSF8k

Homework Assignment

p.656 #2-10even,25,27,31

SAT Connection

Solution

The correct answer is 1.02. The initial deposit earns 2 percent interest compounded annually. Thus at the end of 1 year, the new value of the account is the initial deposit of \$100 plus 2 percent of the initial deposit: $\$100 + \frac{2}{100}(\$100) = \$100(1.02)$. Since the interest is compounded annually, the value at the end of each succeeding year is the sum of the previous year's value plus 2 percent of the previous year's value. This is again equivalent to multiplying the previous year's value by 1.02. Thus, after 2 years, the value will be $\$100(1.02)(1.02) = \$100(1.02)^2$; after 3 years, the value will be $\$100(1.02)^3$; and after t years, the value will be $\$100(1.02)^t$. Therefore, in the formula for the value for Jessica's account after t years, $\$100(x)^t$, the value of x must be 1.02.