SM3 13.2 NH: Geometric Sequences

Memorize: General Rule: $a_n = a_1 \cdot r^{n-1}$ Recursive Rule: $a_n = r \cdot a_{n-1}$

Vocab: a: a sequence of numbers n: the number of terms in a sequence a

a_1: the first term of a sequence a a_n: the nth term of sequence a

r: the common ratio of a sequence a; multiply by r to get from any term to the next term; divide by r to get from any term to the previous term.

Let $a = 2, 8, 32, \dots$. Evaluate the following:

1) $a_1 =$

2) $a_3 =$

3) $a_5 =$

4) $a_8 =$

5) $n =$

6) $r =$

Let $b = \frac{1}{3}, -\frac{1}{9}, \frac{1}{27}, -\frac{1}{81}, \dots$. Evaluate the following:

7) $b_1 =$

8) $b_3 =$

9) $b_5 =$

10) $b_{12} =$

11) $n =$

12) $r =$

Let $c = \frac{5}{8}, \frac{5}{4}, \dots, 80$. Evaluate the following:

13) $c_1 =$

14) $c_3 =$

15) $c_5 =$

16) $c_7 =$

17) $n =$

18) $r =$

For problems 19-28, write the explicit formula for the sequence $a_n = a_1 \cdot r^{n-1}$ and find the indicated term.

19) $h = 2,8,32,128, \dots$

$h_n =$
$h_{10} =$

20) $k = 0.5,1,2,4, \dots$

$k_n =$
$k_{11} =$

21) $m = -\dfrac{27}{4}, \dfrac{9}{2}, -3, 2, \dots$

$m_n =$
$m_{10} =$

22) $p = -0.5, -2, -8, -32, \dots$

$p_n =$
$p_9 =$

23) $q = 4,2,1,\dfrac{1}{2}, \dots$

$q_n =$
$q_{10} =$

24) $s = -1,5,-25,125, \dots$

$s_n =$
$s_{10} =$

25) $t = 1,\dfrac{1}{3},\dfrac{1}{9},\dfrac{1}{27}, \dots$

$t_n =$
$t_{11} =$

26) $u = 2,10,50,250, \dots$

$u_n =$
$u_9 =$

27) $v = -\dfrac{3}{2},1,-\dfrac{2}{3},\dfrac{4}{9}, \dots$

$v_n =$
$v_{12} =$

28) $w = 0.25, -1, 4, -16, \dots$

$w_n =$
$w_{11} =$

William deposits $5 into a savings account that has a 2% annual compound interest rate. Let c represent the amount of money in the account during the nth year that the account is open.

29) Is c a geometric sequence? Justify your response.

30) $c_1 =$ 31) $r =$

32) How much money does William have after 5 years have passed?

33) How much money does William have after 25 years have passed?

A group of 500 students begin their mathematical career that will consist of SM1, SM2, SM3, Calc, and Stats. Each year, 10% of the students fail to complete the course. Let sequence w represent the number of students still in contention for having never failed a course where w_n represents number of students in the nth class of the path listed above. If a fraction of a student fails the course, round up and have the whole student fail the course (we can't very well fail your arms but pass your legs, can we?).

34) Is w a geometric sequence? Justify your response.

35) $w_1 =$ 36) $r =$

37) Write sequence w:

38) What percent of the initial group of students pass Stats?

39) If there are 5 courses that could be failed, and we lose 10% of the 500 students each year, why are there not 250 students passing Stats?

To help his students learn to persevere in tough testing environments, Mr. Wytiaz turns off the heat to the classroom during a unit test. The room begins at 70°F, but the temperature falls by 3% every minute! Let t represent the temperature in the room after n minutes have passed, rounded to the nearest tenth.

40) $t_1 =$ 41) $t_2 =$

42) $t_5 =$ 43) $r =$

44) When will the room reach a temperature of 50°F or colder?