Honors Algebra 2 | Unit 7 Mathematical Modeling | 7.5 - Practice

Name: Sweet Date: _____

Geometric Sequences and Series

Determine whether each sequence could be geometric. If so, find the formula.

1. 1.1, 3.3, 9.9, 29.7, 89.1, ...

$\frac{3.3}{1.1} = 3$ $\frac{9.9}{3.3} = 3$ $\frac{29.7}{9.9} = 3$ $r = 3$

$a_n = 1.1(3)^{n-1}$

2. 1, 2, 6, 24, 120, 720, ...

not geometric

3. $-1, 4, -16, 64, \ldots$

$a_n = -1(-4)^{n-1}$

4. 3125, 2500, 2000, 1600, 1280...

$a_n = 3125(.8)^{n-1}$

Find the rule and the 10th term of each geometric sequence.

5. 1600, 800, 400, 200,...

$\frac{800}{1600} = \frac{1}{2}$

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

$a_n = 1600\left(\frac{1}{2}\right)^{n-1}$

$a_{10} = 1600\left(\frac{1}{2}\right)^{10-1}$

$a_{10} = \frac{25}{8}$ or 3.125

6. 2, −6, 18, −54,...

$a_n = 2(-3)^{n-1}$

$a_{10} = -39,366$

Write the rule of the geometric sequence with the given terms.

7. $a_3 = 12,\ a_6 = 96$

$a_6 = a_3(r)^{6-3}$

$96 = 12(r)^3$

$8 = r^3$

$r = 2$

$a_3 = a_1(r)^{3-1}$

$12 = a_1(2)^2$

$12 = a_1(4)$

$3 = a_1$

$a_n = 3(2)^{n-1}$

8. $a_{15} = 100,\ a_{17} = 25$

$a_n = 1,638,400\left(\frac{1}{2}\right)^{n-1}$

9. $a_4 = 12,\ a_6 = \frac{1}{3}$

$a_n = 2592\left(\frac{1}{6}\right)^{n-1}$

10. $a_2 = 18,\ a_5 = 3888$

$a_n = 3(6)^{n-1}$

Find the first 5 terms of the sequence

11. $a_n = -4(-2)^{n-1}$

$a_1 = -4(-2)^{1-1}$
$a_2 = -4(-2)^{2-1}$
$a_3 = -4(-2)^{3-1}$
$a_4 = -4(-2)^{4-1}$
$a_5 = -4(-2)^{5-1}$

-4, 8, -16, 32, -64

12. $a_n = 20(0.6)^{n+2}$ ← careful

$a_1 = 20(.6)^{1+2} = 4.32$

4.32, 2.592, 1.555, .933, .560

Find the indicated sum for each geometric series using the formula

13. S_7 for 14, 42, 126, 378...

$S_n = \frac{a_1(1-r^n)}{1-r}$

$S_7 = \frac{14(1-3^7)}{1-3}$ $S_7 = 15,302$

14. $\sum_{k=1}^{8}(-4)^{k-1}$

$S_8 = -13,107$

Find the series using your calculator

15. $2 + 8 + 32 + 128...\ n = 9$

$\sum_{X=1}^{9}(2(4)^{X-1})$ $S_9 = 174,762$

16. S_5 for 4, 8, 16, 32...

$\sum_{n=1}^{5}(4(2)^{n-1}) =$

$S_5 = 124$

17. $\sum_{n=3}^{9}(-4)^{n-1}$

start @ 3rd term
go to 9th term
3, 4, 5, 6, 7, 8, 9
7 terms

$S_7 = 52,432$

18. $\sum_{m=5}^{10}-81\left(\frac{-1}{3}\right)^{m-2}$

$S_6 = \frac{182}{81}$ or ≈ 2.247

19. Deanna received an e-mail asking her to forward it to 10 other people. Assume that no one breaks the chain and that there are no duplicate recipients. How many e-mails will have been sent after 8 generations, including Deanna's.

$a_1 = 1$
$r = 10$
S_8

$S_8 = \frac{1(1-10^8)}{1-10}$

$\sum_{X=1}^{8}(1(10)^{X-1})$

} = 111,111,111 emails were sent out.