

Name: \_\_\_\_\_ Date: \_\_\_\_\_

### Geometric Sequences and Series

Determine whether each sequence could be geometric or arithmetic. If possible find the common ratio or common difference.

1.) 1.1, -3.3, 9.9, -29.7, 89.1, ... $\frac{-3.3}{1.1} = \frac{9.9}{-3.3} = \frac{-29.7}{9.9} = -3$ Geometric	2.) -18, -7, 4, 15, 26, ... $-7 - (-18) = 11$ $4 - (-7) = 11$ $15 - 4 = 11$ $26 - 15 = 11$ Arithmetic
3.) 1, 2, 6, 24, 120, 720, ... $2 - 1 \neq 6 - 2$ $\frac{2}{1} \neq \frac{6}{2}$ Neither	4.) 3125, 2500, 2000, 1600, 1280... Geometric $\frac{2500}{3125} = \frac{2000}{2500} = \frac{1600}{2000} = \frac{1280}{1600} = .8$

Find the 10<sup>th</sup> term of each geometric sequence.

5.) 1600, 800, 400, 200, ... $\frac{800}{1600} = \frac{400}{800} = \frac{200}{400} = \frac{1}{2} = R$ $a_{10} = a_1 R^9 = 1600 \left(\frac{1}{2}\right)^9 = \frac{25}{8} = 3.125$	6.) 0.0000001, 0.00001, 0.001, 1, ... $\frac{0.00001}{0.0000001} = \frac{0.001}{0.00001} = \frac{1}{0.001} = 100 = R$ $a_{10} = a_1 R^9 = 0.0000001 (100)^9 = 100,000,000,000$
7.) -64, 96, -144, 216, ... $\frac{96}{-64} = \frac{-144}{96} = \frac{216}{-144} = -\frac{3}{2}$ $a_{10} = a_1 R^9 = -64 \left(-\frac{3}{2}\right)^9 = 2460.375$	8.) 2, -6, 18, -54, ... $\frac{-6}{2} = \frac{18}{-6} = \frac{-54}{18} = -3$ $a_{10} = a_1 R^9 = 2(-3)^9 = -39,366$

Find the 8<sup>th</sup> term of the geometric sequence with the given terms.

9.) $a_3 = 12, a_6 = 96$ $a_6 = a_3 R^3$ $\frac{96}{12} = \frac{12 R^3}{12}$ $8 = R^3$ $R = 2$ $a_8 = a_6 R^2$ $a_8 = 96(2)^2$ $a_8 = 384$	10.) $a_{15} = 100, a_{17} = 25$ $a_{17} = a_{15} R^2$ $25 = 100 R^2$ $\sqrt{\frac{1}{4}} = R$ $R = \frac{1}{2}$ $a_8 = \frac{a_{15}}{R^7} = \frac{100}{\left(\frac{1}{2}\right)^7} = 12,800$
11.) $a_{11} = -4, a_{13} = -36$ $a_{13} = a_{11} R^2$ $\frac{-36}{-4} = \frac{-4 R^2}{-4}$ $R^2 = 9$ $R = 3$ $a_8 = \frac{a_{11}}{R^3} = \frac{-4}{3^3} = -\frac{4}{27}$	12.) $a_3 = -4, a_5 = -36$ $a_5 = a_3 R^2$ $\frac{-36}{-4} = \frac{-4 R^2}{-4}$ $9 = R^2$ $R = 3$ $a_8 = (-36)(3)^3 = -972$

Find the geometric mean of each pair of numbers.

13.) 2 and 8 $\sqrt{2 \cdot 8} = \sqrt{16} = 4$	14.) 4 and 25 $\sqrt{4 \cdot 25} = \sqrt{100} = 10$	15.) 2 and 3 $\sqrt{2 \cdot 3} = \sqrt{6}$
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Find the indicated sum for each geometric series.

16.) $S_7$ for 14, 42, 126, 378... $A_1 = 14$ $R = \frac{42}{14} = \frac{126}{42} = \frac{378}{126} = 3$ $S_7 = 14 \left( \frac{1 - 3^7}{1 - 3} \right) = 15,302$	17.) $\sum_{k=1}^8 (-4)^{k-1}$ $A_1 = 1$ $R = -4$ $S_8 = 1 \left( \frac{1 - (-4)^8}{1 - (-4)} \right) = -13,107$
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34.) 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.

$A_1 = 1$   $R = 10$   $S_8 = 1 \left( \frac{1 - 10^8}{1 - 10} \right) = 11,111,111$