Day 02 Geometric Series Practice $S_n = \frac{a_1(1-r^n)}{(1-r)}$

1-6: Find the sum (S_n) for each geometric series described.

1. $a_1 = -2, a_7 = -31250, r = 5$

$$S_7 = \frac{-2(1-5^7)}{(1-5)} = \frac{156248}{-4}$$

-39062

2. $a_1 = 3, a_9 = 19683, r = -3$

$$S_9 = \frac{3(1-(-3)^9)}{(1-(-3))} = \frac{59052}{4}$$

14763

3. $-3, 9, -27, 81, \ldots$ to a_{15}

$r = \frac{9}{-3} = -3$

$$S_{15} = \frac{-3(1-(-3)^{15})}{(1-(-3))} = \frac{-43046724}{4} = -10761681$$

4. $a_1 = 4, n = 8, r = \frac{1}{2}$

$$S_8 = \frac{4(1-(\frac{1}{2})^8)}{(1-\frac{1}{2})} = \frac{3.984375}{.5}$$

7.96875

5. $\sum_{p=1}^{7} 6^{p-1}$

$$S_7 = \frac{1(1-6^7)}{(1-6)} = \frac{-279935}{-5} = 55987$$

6. $\sum_{m=0}^{10} 2^{m-1}$

$$S_{11} = \frac{\frac{1}{2}(1-2^{11})}{(1-2)} = \frac{-1023.5}{-1} = 1023.5$$

7-8: Use sigma notation to express each series and find the sum.

7. $1, \frac{1}{3}, \frac{1}{9}, \frac{1}{27}$

$r = \frac{1}{3}$

$\sum_{m=1}^{4} 1\left(\frac{1}{3}\right)^{m-1}$

$S_4 = \frac{40}{27}$

8. $-4, 8, -16, 32, -64, 128$

$r = \frac{8}{-4} = -2$

$\sum_{p=1}^{6} -4(-2)^{p-1}$

$S_6 = 84$

9-10: Write each series in expanded form, and find its sum.

9. $\sum_{n=0}^{5} 3^{n-1}$

$$S_6 = \frac{1}{3} + 1 + 3 + 9 + 27 + 81 = \frac{364}{3}$$

10. $\sum_{r=2}^{7} \left(\frac{2}{3}\right)^{r-1}$

$$S_6 = \frac{2}{3} + \frac{4}{9} + \frac{8}{27} + \frac{16}{81} + \frac{32}{243} + \frac{64}{729} = \frac{1330}{729}$$

11-12: Find a_1 for each geometric series described.

11. $S_n = 720, n = 4, r = 3$

$$720 = \frac{a_1(1-3^4)}{(1-3)}$$

$$720 = \frac{a_1(-80)}{-2}$$

$-1440 = -80a_1$

$a_1 = 18$

12. $S_n = -936, r = 5, a_n = -750$

$$-936 = \frac{a_1(1-5^n)}{(1-5)}$$

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

$-750 = a_1(5)^{n-1}$

You can't solve this traditionally... see if you can get this on your own

13: Solve the word problem.

13. A virus goes through a computer, infecting its files. If one file was infected initially (a_0) and the total number of files infected doubles every minute ($r = 2$), how many files will be infected in 20 minutes?

$$\sum_{n=0}^{20} 1(2)^n$$

$$\frac{1(1-2^{21})}{(1-2)} = \frac{-2,097,151}{-1} = 2,097,151$$

over 2 million!

Day 02 Geometric Sequence Practice

Name Master C

Date _____ Block ____

1-4: For each geometric sequence, find the next 3 terms, the common ratio, the nth term named in the problem, and finally, write an equation that models the sequence.

1. 4, -12, 36, -108, . . . Find a_8 $r = \frac{-12}{4} = -3 = r$

$a_n = 4(-3)^{n-1}$ ...324, -972, 2916

$a_8 = 4(-3)^7 = -8748$

2. 1, -4, 16, -64, . . . Find a_{10} $r = \frac{16}{-4} = -4 = r$

$a_n = 1(-4)^{n-1}$ or $(-4)^{n-1}$ ...256, -1024, 4096

$a_{10} = (-4)^9 = -262144$

3. -4, 16, -64, 256, . . . Find a_9 $r = \frac{16}{-4} = -4 = r$

see #2!

$a_n = -4(-4)^{n-1}$ ...-1024, 4096, -16384

$a_9 = -4(-4)^8 = -262144$

4. 54, 18, 6, 2, . . . Find a_{11} $r = \frac{2}{6} = \frac{1}{3} = r$

$a_n = 54\left(\frac{1}{3}\right)^{n-1}$

$a_{11} = 54\left(\frac{1}{3}\right)^{10} \approx 9.14 \times 10^{-4}$ or .0009144

5-6: Find the nth term named in the problem.

5. $r = .25$, $a_1 = -2$. Find a_5

$a_5 = -2(.25)^4 = .0078125$

$a_1 = \frac{6}{3} = 2$

6. $r = 3$, $a_2 = 6$. Find a_{13} $a_n = a_1(r)^{n-1}$ $a_{13} = a_2(r)^{n-2}$

$a_{13} = 6(3)^{11}$ or $2(3)^{12}$ 1062882

7-8: Find the indicated term in each arithmetic sequence.

7. .... 0.75, ± 3, 12, ± 48, 192, . . .

$.75r^4 = 192$

$r^4 = 256$

$r = \sqrt[4]{256} = \pm 4$

8. ..., $\pm\frac{3}{2}$, 3, ± 6, 12, ± 24, 48, . . .

$3r^4 = 48$

$r^4 = 16$

$r = \pm 2$

9: Show your work to solve the word problem.

$a_0 = 50$

9. Max has $20 to spend on his girlfriend for Valentine's Day. If the gift he wants to buy costs $50, but it will be reduced by 25% each day, how many days will he have to wait in order to purchase the gift?

$y = 50(1 - .25)^x$

$20 = 50(.75)^x$

$.4 = (.75)^x$ → $\log_{.75} .4 = x$ 3.185 4 days!

50, 37.5, 28.13, 21.09, 15.82