

Summations – Day 3

Unit 7: Representations of Exponential Relations

Evaluate the related series of each sequence.

<p>1. $-2, 6, -18, 54, -162$</p> $-2 + 6 - 18 + 54 - 162 = \boxed{-122}$	<p>2. $-3, -18, -108, -648$</p> $-3 - 18 - 108 - 648 = \boxed{-777}$
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Evaluate each geometric series described.

<p>3. $1 - 4 + 16 - 64 \dots, n = 9$</p> $S_9 = 52429$	<p>4. $-1 - 2 - 4 - 8 \dots, n = 8$</p> $S_8 = -255$
<p>5. $\sum_{m=1}^9 -2^{m-1}$</p> $S_9 = -511$	<p>6. $\sum_{m=1}^8 (4)^{m-1}$</p> $S_8 = 21845$
<p>7. $\sum_{i=1}^7 -3(5)^{i-1}$</p> $S_7 = -58593$	<p>8. $\sum_{k=1}^7 -3(-2)^{k-1}$</p> $S_7 = -129$
<p>9. $a_1 = 4, a_n = 8748, r = 3$</p> $S_n = 13120$	<p>10. $a_1 = 1, a_n = 2187, r = 3$</p> $S_n = 3280$

Evaluate each geometric series described.

11. $a_1 = -3, a_n = 786432, r = -4$

$$S_n = 629145$$

12. $a_1 = 4, a_n = 262144, r = 4$

$$S_n = 349524$$

13. $a_1 = -4, a_9 = -1024, r = 2$

$$S_9 = -2044$$

14. $a_1 = 3, a_9 = 196608, r = 4$

$$S_9 = 262143$$

15. $a_1 = -1, a_9 = -6561, r = -3$

$$S_9 = -4921$$

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

$$S_7 = -26042$$

17. $a_1 = 4, r = 2, n = 9$

$$S_9 = 2044$$

18. $a_1 = -4, r = -3, n = 10$

$$S_{10} = 59048$$

19. $a_1 = -2, r = 3, n = 10$

$$S_{10} = -59048$$

20. $a_1 = -1, r = -2, n = 10$

$$S_{10} = 341$$

$$\textcircled{3} 1 - 4 + 16 - 64 \dots, n = 9$$

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

$$S_9 = \frac{1(1-(-4)^9)}{1-(-4)} = \frac{1(1-(-262144))}{1-(-4)} = \frac{1(1+262144)}{1+4} = \frac{262145}{5} = \boxed{52429}$$

$$a_1 = 1, n = 9, r = \frac{-4}{1} = -4$$

$$\textcircled{4} -1 - 2 - 4 - 8 \dots, n = 8$$

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

$$S_8 = \frac{-1(1-2^8)}{1-2} = \frac{-1(1-256)}{1-2} = \frac{-1(-255)}{-1} = \boxed{-255}$$

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

$$\textcircled{5} \sum_{m=1}^9 -2^{m-1}$$

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

$$S_9 = \frac{-1(1-2^9)}{1-2} = \frac{-1(1-512)}{1-2} = \frac{-1(-511)}{-1} = \frac{511}{-1} = \boxed{-511}$$

$$a_1 = -1, n = 9, r = 2$$

$$\textcircled{6} \sum_{m=1}^8 (4)^{m-1}$$

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

$$S_8 = \frac{1(1-4^8)}{1-4} = \frac{1(1-65536)}{1-4} = \frac{1(-65535)}{-3} = \frac{-65535}{-3} = \boxed{21845}$$

$$a_1 = 1, n = 8, r = 4$$

$$\textcircled{7} \sum_{i=1}^7 -3(5)^{i-1}$$

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

$$S_7 = \frac{-3(1-5^7)}{1-5} = \frac{-3(1-78125)}{1-5} = \frac{-3(-78124)}{-4} = \frac{234372}{-4} = \boxed{-58593}$$

$$a_1 = -3, n = 7, r = 5$$

$$\textcircled{8} \sum_{k=1}^7 -3(-2)^{k-1}$$

$$a_1 = -3, \quad n = 7, \quad r = -2$$

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

$$S_7 = \frac{-3(1-(-2)^7)}{1-(-2)} = \frac{-3(1-(-128))}{1-(-2)} = \frac{-3(1+128)}{1+2} = \frac{-3(129)}{3} = \frac{-387}{3}$$

$$S_7 = -129$$

$$\textcircled{9} \quad a_1 = 4, \quad a_n = 8748, \quad r = 3$$

$$S_n = \frac{a_1 - a_n \cdot r}{1-r}$$

$$S_n = \frac{4 - 8748(3)}{1-3} = \frac{4 - 26244}{1-3} = \frac{-26240}{-2} = \boxed{13120}$$

$$\textcircled{10} \quad a_1 = 1, \quad a_n = 2187, \quad r = 3$$

$$S_n = \frac{a_1 - a_n \cdot r}{1-r}$$

$$S_n = \frac{1 - 2187(3)}{1-3} = \frac{1 - 6561}{1-3} = \frac{-6560}{-2} = \boxed{3280}$$

$$\textcircled{11} \quad a_1 = -3, \quad a_n = 786432, \quad r = -4$$

$$S_n = \frac{a_1 - a_n \cdot r}{1-r}$$

$$S_n = \frac{-3 - 786432(-4)}{1-(-4)} = \frac{-3 - (-3145728)}{1-(-4)} = \frac{-3 + 3145728}{1+4} = \frac{3145725}{5}$$

$$S_n = 629145$$

$$\textcircled{12} \quad a_1 = 4, \quad a_n = 262144, \quad r = 4$$

$$S_n = \frac{a_1 - a_n \cdot r}{1-r}$$

$$S_n = \frac{4 - 262144(4)}{1-4} = \frac{4 - 1048576}{1-4} = \frac{-1048572}{-3} = \boxed{349524}$$

$$(13) a_1 = -4, a_9 = -1024, r = 2$$

$$S_n = \frac{a_1 - a_n \cdot r}{1 - r}$$

$$S_9 = \frac{-4 - (-1024)(2)}{1 - 2} = \frac{-4 - (-2048)}{1 - 2} = \frac{-4 + 2048}{-1} = \frac{2044}{-1} = \boxed{-2044}$$

$$(14) a_1 = 3, a_9 = 196608, r = 4$$

$$S_n = \frac{a_1 - a_n \cdot r}{1 - r}$$

$$S_9 = \frac{3 - 196608(4)}{1 - 4} = \frac{3 - 786432}{1 - 4} = \frac{-786429}{-3} = \boxed{262143}$$

$$(15) a_1 = -1, a_9 = -6561, r = -3$$

$$S_n = \frac{a_1 - a_n \cdot r}{1 - r}$$

$$S_9 = \frac{-1 - (-6561)(-3)}{1 - (-3)} = \frac{-1 - 19683}{1 + 3} = \frac{-19684}{4} = \boxed{-4921}$$

$$(16) a_1 = -2, a_7 = -31250, r = -5$$

$$S_n = \frac{a_1 - a_n \cdot r}{1 - r}$$

$$S_7 = \frac{-2 - (-31250)(-5)}{1 - (-5)} = \frac{-2 - 156250}{1 + 5} = \frac{-156252}{6} = \boxed{-26042}$$

$$(17) a_1 = 4, r = 2, n = 9$$

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

$$S_9 = \frac{4(1 - 2^9)}{1 - 2} = \frac{4(1 - 512)}{1 - 2} = \frac{4(-511)}{-1} = \frac{-2044}{-1} = \boxed{2044}$$

$$(18) a_1 = -4, \quad r = -3, \quad n = 10$$

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

$$S_{10} = \frac{-4(1-(-3)^{10})}{1-(-3)} = \frac{-4(1-59049)}{1+3} = \frac{-4(-59048)}{4} = \frac{236192}{4}$$

$$S_{10} = 59048$$

$$(19) a_1 = -2, \quad r = 3, \quad n = 10$$

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

$$S_{10} = \frac{-2(1-3^{10})}{1-3} = \frac{-2(1-59049)}{1-3} = \frac{-2(-59048)}{-2} = \frac{118096}{-2}$$

$$S_{10} = -59048$$

$$(20) a_1 = -1, \quad r = -2, \quad n = 10$$

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

$$S_{10} = \frac{-1(1-(-2)^{10})}{1-(-2)} = \frac{-1(1-1024)}{1-(-2)} = \frac{-1(-1023)}{1+2} = \frac{1023}{3} = 341$$