Geometric $S_n = \sum_{k=1}^{n} a_1(r)^{k-1}$

Arithmetic $S_n = \sum_{k=1}^{n} a_1 + d(k-1)$

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Algebra II

Finding the Sum of a Series (Summation Notation)

1. Write an expression in summation form to find the sum of the first n terms of the sequence
$3+6+12+24...$
Use your formula to find the sum of the first three terms.

geometric

$S_n = \sum_{k=1}^{n} 3(2)^{k-1}$ $\quad S_3 = \sum_{k=1}^{3} 3(2)^{k-1}$

$3(2)^{1-1} = 3$
$3(2)^{2-1} = 6$
$3(2)^{3-1} = 12$
$3+6+12$

2. Write an expression in summation form to find the sum of the first n terms of the sequence
$5+7+9+11+...$
Use your formula to find the sum of the first three terms.

$a_1+d(n-1)$
$5+2(n-1)$
$5+2n-2$
$2n+3$

arithmetic

$S_n = \sum_{k=1}^{n} a_1 + d(k-1)$ $\quad S_n = \sum_{k=1}^{n} 2k+3$ $\quad S_3 = \sum_{k=1}^{3} 2k+3$

$2(1)+3 = 5$
$2(2)+3 = 7$
$2(3)+3 = 9$
$5+7+9$

3. Write an expression in summation form to find the sum of the first n terms of the series
$3+15+75+375+...$
Use your formula to find the sum of the first three terms.

geometric

$S_n = \sum_{k=1}^{n} a_1(r)^{k-1}$ $\quad S_n = \sum_{k=1}^{n} 3(5)^{k-1}$ $\quad S_3 = \sum_{k=1}^{3} 3(5)^{k-1}$

$3(5)^{1-1} = 3$
$3(5)^{2-1} = 15$
$3(5)^{3-1} = 75$
$3+15+75$

4. Write an expression in summation form to find the sum of the first n terms of the sequence
$11+18+25+32+...$
Use your formula to find the sum of the first three terms.

$a_1+d(n-1)$
$11+7(n-1)$
$11+7n-7$
$7n+4$

arithmetic

$S_n = \sum_{k=1}^{n} a_1 + d(k-1)$ $\quad S_n = \sum_{k=1}^{n} 7k+4$ $\quad S_3 = \sum_{k=1}^{3} 7k+4$

$7(1)+4 = 11$
$7(2)+4 = 18$
$7(3)+4 = 25$
$11+18+25$

5. Write an expression in summation form to find the sum of the first n terms of the sequence
$8+6+4+2+\ldots$ (−2, −2, −2)

Use your formula to find the sum of the first three terms.

$a_1+d(n-1)$

$8-2(n-1)$

$8-2n+2$

$-2n+10$

arithmetic

$S_n=\sum_{k=1}^{n} a_1+d(k-1)$

$S_n=\sum_{k=1}^{n} -2k+10$

$S_3=\sum_{k=1}^{3} -2k+10$

$-2(1)+10=8$

$-2(2)+10=6$

$-2(3)+10=4$

$8+6+4$

6. Write an expression in summation form to find the sum of the first n terms of the sequence
$4-12+36-108\ldots$ (·−3, ·−3, ·−3)

Use your formula to find the sum of the first three terms.

geometric

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

$S_n=\sum_{k=1}^{n} 4(-3)^{k-1}$

$S_3=\sum_{k=1}^{3} 4(-3)^{k-1}$

$4(-3)^{1-1}=4$

$4(-3)^{2-1}=-12$

$4(-3)^{3-1}=36$

$4-12+36$

7. Write an expression in summation form to find the sum of the first n terms of the series
$\frac{1}{4}+\frac{1}{2}+1+2+\ldots$ (·2, ·2, ·2)

Use your formula to find the sum of the first four terms.

Geometric

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

$S_n=\sum_{k=1}^{n} \frac{1}{4}(2)^{k-1}$

$S_3=\sum_{k=1}^{4} \frac{1}{4}(2)^{k-1}$

$\frac{1}{4}(2)^{1-1}=\frac{1}{4}$

$\frac{1}{4}(2)^{2-1}=\frac{1}{2}$

$\frac{1}{4}(2)^{3-1}=1$

$\frac{1}{4}(2)^{4-1}=2$

$\frac{1}{4}+\frac{1}{2}+1+2\ldots$

8. Write an expression in summation form to find the sum of the first n terms of the sequence
$-12-10-8-6-\ldots$ (+2, +2, +2)

Use your formula to find the sum of the first four terms.

$-12+2(k-1)$

$-12+2k-2$

$2k-14$

arithmetic

$S_n=\sum_{k=1}^{n} a_1+d(k-1)$

$S_n=\sum_{k=1}^{n} -12+2(k-1)$

$S_n=\sum_{k=1}^{n} 2k-14$

$S_4=\sum_{k=1}^{4} 2k-14$

$2(1)-14=-12$

$2(2)-14=-10$

$2(3)-14=-8$

$2(4)-14=-6$

$-12-10-8-6$