

12.3 Notes - Series

An arithmetic series is the expansion formed by adding the terms of an arithmetic sequence.

- 1) The louvre has 4 panes of glass in the top row. Each row below it adds 4 more panes. How many total panes of glass are there in 17 rows?

$$S(17) = 4 + 8 + 12 + \dots + \boxed{68} \quad f(17) = 4 \cdot 4(16) = 68$$

series sum

$$S(n) = \frac{n}{2}(f(1) + f(n))$$

$$S(17) = \frac{17}{2}(4 + 68) = 612$$

A geometric series is the expression formed by adding the terms of a geometric sequence.

- 2) Given $f(1) = 6$; $f(n) = 2 \cdot f(n-1)$; $n \geq 2$
Find $S(8)$ (the sum of the 1st 8 terms)

$r=2$

$$n \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8$$

$$f(n) \quad 6 + 12 + 24 + 48 + 96 + 192 + 384 + 768 = 1,530$$

★ Formula for a geometric series $S(n) = a \left(\frac{1-r^n}{1-r} \right)$

$$S(8) = 6 \left(\frac{1-2^8}{1-2} \right)$$

3) Given the geometric series

$1000 + 600 + \dots + 46.656$
find the sum $S(n)$
 $a = 1000$
 $r = \frac{600}{1000} = 0.6$

$$S(n) = a \left(\frac{1-r^n}{1-r} \right)$$

1	2	3	4	5	6	7
1000	600	360	216	129.6	77.76	46.656

$$S(7) = 1000 \left(\frac{1-0.6^7}{1-0.6} \right) = 2,430.016$$