Geometric Series Date ___________________

The nth term of an arithmetic sequence	$u_n = u_1 + (n-1)d$	The nth term of a geometric sequence	$u_n = u_1 r^{n-1}$
The sum of n terms of an arithmetic sequence	$S_n = \frac{n}{2}(2u_1 + (n-1)d) = \frac{n}{2}(u_1 + u_n)$	The sum of n terms of a finite geometric sequence	$S_n = \frac{u_1(r^n - 1)}{r-1} = \frac{u_1(1-r^n)}{1-r}$, $r \neq 1$

Example 1: Find the sum of the first 12 terms of the series: $2 + 6 + 18 + 54 + \cdots$.

Example 2: Create a formula for S_n, the sum of the first n terms of the series: $9 - 3 + 1 - \frac{1}{3} + \cdots$.

Homework: Page 171: 1ab, 2ad, 3, 4a, 5

1 Find the sum of the following series:

a $12 + 6 + 3 + 1.5 + \ldots$ to 10 terms

b $\sqrt{7} + 7 + 7\sqrt{7} + 49 + \ldots$ to 12 terms

2 Find a formula for S_n, the sum of the first n terms of the series:

a $\sqrt{3} + 3 + 3\sqrt{3} + 9 + \ldots$

d $20 - 10 + 5 - 2\frac{1}{2} + \ldots$

3 A geometric sequence has partial sums $S_1 = 3$ and $S_2 = 4$.

a State the first term u_1.

b Calculate the common ratio r.

c Calculate the fifth term u_5 of the series.

4 Evaluate these geometric series:

a $\sum_{k=1}^{10} 3 \times 2^{k-1}$

5 Each year a salesperson is paid a bonus of $2000 which is banked into the same account. It earns a fixed rate of interest of 6% p.a. with interest being paid annually. The total amount in the account at the end of each year is calculated as follows:

$$A_0 = 2000$$
$$A_1 = A_0 \times 1.06 + 2000$$
$$A_2 = A_1 \times 1.06 + 2000 \quad \text{and so on.}$$

a Show that $A_2 = 2000 + 2000 \times 1.06 + 2000 \times (1.06)^2$.

b Show that $A_3 = 2000[1 + 1.06 + (1.06)^2 + (1.06)^3]$.

c Find the total bank balance after 10 years, assuming there are no fees or withdrawals.