Infinite 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	$S_n = \frac{u_1(r^n - 1)}{r-1} = \frac{u_1(1-r^n)}{1-r}, \ r \neq 1$
		The sum of an infinite geometric sequence	$S_\infty = \frac{u_1}{1-r}, \ \lvert r \rvert < 1$

Example 1: Find the sum of $\sum_{i=1}^{\infty} 3(\frac{1}{5})^i =$

Example 2: Write $0.\overline{7}$ as a rational number.

Homework 6.G2, page 173: 1, 2ab, 4, 5, 7

1 Consider $0.\overline{3} = \frac{3}{10} + \frac{3}{100} + \frac{3}{1000} + \ldots$ which is an infinite geometric series.

a Find: **i** u_1 **ii** r

b Using **a**, show that $0.\overline{3} = \frac{1}{3}$.

2 Write as a rational number: **a** $0.\overline{4}$ **b** $0.\overline{16}$

4 Find the sum of each of the following infinite geometric series:

a $18 + 12 + 8 + \frac{16}{3} + \ldots$ **b** $18.9 - 6.3 + 2.1 - 0.7 + \ldots$

5 Find each of the following:

a $\sum_{k=1}^{\infty} \frac{3}{4^k}$ **b** $\sum_{k=0}^{\infty} 6\left(-\frac{2}{5}\right)^k$

7 The second term of a convergent infinite geometric series is $\frac{8}{5}$. The sum of the series is 10. Show that there are two possible series, and find the first term and the common ratio in each case.