# Geometric Series

*GeometricSeries.tns*

Name _____

Class _____

**Terms of an Infinite series**

**1.** Find the next three terms of the infinite series

**a.** $\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\ldots$ **b.** $\frac{1}{2}+\frac{2}{3}+\frac{3}{4}+\ldots$ **c.** $2+\frac{3}{2}+\frac{9}{8}+\ldots$

*Divide each of the terms by the first term. What do you notice?*

**2.** Write an expression in terms of *n* that describe each of the above series using sigma notation.

**a.** **b.** **c.**

**Finding the sum of a geometric series**

Use the *Calculator* application on page 2.1 to find the sixth partial sum of two geometric series. To find the sum of the series go to the calculator page, press [menu] and select **Sum** template or select the **Sum** command from the **Calculus** menu. The bottom should read *n* = 1, the top number should be 6, and the function should be entered in the parentheses.

**3.** $\sum_{n=1}^{6}\left(\frac{1}{2}\right)^{n}=$

**4.** $\sum_{n=1}^{6}2\left(\frac{3}{4}\right)^{n-1}=$

### Convergence and divergence of geometric Series

Pages 3.2 uses the *Lists & Spreadsheet* application to display the partial sums of several series. Study this data. What do you notice about the terms?

On page 3.4 click the *y*-axis to change the variable and see the graph of the other series.

Sketch each graph below.

Decide if each geometric series converges or diverges. If the series converges, give your best guess as to its value.

### Extension

Page 4.3 gives you the opportunity to change a common ratio by clicking on and moving the slider. Observe which values result in convergence.

What do you notice? For what values of *r* does it converge?