

The sum of the first three terms of a geometric series is 61.  
 The sum to infinity is 125.  
 Find the common ratio.

$$S_n = \frac{U_1(1 - r^n)}{1 - r} = \frac{U_1(r^n - 1)}{r - 1}$$

$$S_\infty = \frac{U_1}{1 - r}, \quad -1 < r < 1$$

$$\frac{U_1(1 - r^3)}{1 - r} = 61$$

$$\frac{U_1}{1 - r} = 125$$

$$\frac{U_1(1 - r^3)}{1 - r} = 61$$

$$\frac{U_1}{1 - r}(1 - r^3) = 61$$

$$125(1 - r^3) = 61$$

$$1 - r^3 = \frac{61}{125}$$

$$r^3 = 1 - \frac{61}{125}$$

$$r^3 = \frac{125}{125} - \frac{61}{125}$$

$$r^3 = \frac{64}{125}$$

$$r = \sqrt[3]{\frac{64}{125}}$$

$$r = \frac{\sqrt[3]{64}}{\sqrt[3]{125}}$$

$$r = \frac{4}{5}$$