## GP ALGEBRAICALLY

Multiply out these expressions:
What do you notice?
Does this pattern continue?
Try a few more steps.
If you think that the pattern continues, can you prove it?

$(1+r)(1-r)$,
$(1+r+r^2)(1-r)$,
$(1+r+r^2+r^3)(1-r)$,
$(1+r+r^2+r^3+r^4)(1-r)$,
$\cdots$

Why does this pattern show that, for $r \neq 1$, the sum of the powers of r from 0 to (n -1) is given by this formula

$$\sum_{i=0}^{n-1} r^i = 1 + r + r^2 + r^3 + \ldots + r^{n-1} = \frac{1-r^n}{1-r}?$$

For $-1 < r < 1$ what happens to $r^n$ as n gets bigger? What can you say about $\lim_{n\to\infty} r^n$

What does this suggest to you about the infinite sum of the geometric series:
$\sum_{i=0}^{\infty 1} r^i = 1 + r + r^2 + r^3 + \cdots$ for $-1 < r < 1$?

## HELP

Writing out the multiplications in full will help you to see the pattern.

## NEXT

GP Geometrically https://aiminghigh.aimssec.ac.za/grade-12-gp-geometrically/