SUMMING GEOMETRIC SERIES

STUDENT RESOURCE

- Look at this pattern:

$$1 = 1$$
$$1 + 2 = 3$$
$$1 + 2 + 4 = 7$$
$$1 + 2 + 4 + 8 = 15$$

Continue the pattern for three more lines.
What will the sum of the 10^{th} line, the 100^{th} line, the n^{th} line?

- Repeat this for

$$1 = 1$$
$$1 + 3 = 4$$
$$1 + 3 + 9 = 13$$
$$1 + 3 + 9 + 27 = 40$$

and for

$$1 = 1$$
$$1 + 4 = 5$$
$$1 + 4 + 16 = 21$$
$$1 + 4 + 16 + 64 = 85$$

- Write down a general pattern of this kind.
What would be the sum of the n^{th} row of this general pattern?

- Does your rule still work for these sequences?

1

$1 + \frac{1}{2}$

$1 + \frac{1}{2} + \frac{1}{4}$

1

$1 + \frac{3}{2}$

$1 + \frac{3}{2} + \frac{9}{4}$

- What happens if the pattern does not start with 1?
e.g. $8 + 16 + 32 + 64 \ldots$
or $9 + 36 + 144 + 576 \ldots$

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