Tower of Hanoi Building Block A

Look at the sequence below:
1, 2, 4, 8, 16…

Can you describe how to get from one term to the next?

Can you describe the nth term of the sequence?

Now try adding together terms from the sequence:
1+2
1+2+4
1+2+4+8
Do you notice anything interesting?

Can you predict what 1+2+4+…+64+128 would be? Check to see if you are right.

How could you write the answer to $1+2+4+…+2^n$?
Justify why your formula works.

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Tower of Hanoi Building Block B

What is the smallest number of moves needed to complete the Tower of Hanoi game with:
i) One disc?
ii) Two discs?
iii) Three discs?
iv) Four discs?

Do you notice anything interesting about the way the number of moves increases?
Can you explain any patterns you find?

Tower of Hanoi Building Block C

The Tower of Hanoi puzzle can be completed in 3 moves with two discs. Can you use this to work out how many moves would be needed with three discs?

The Tower of Hanoi puzzle can be completed in 15 moves with four discs. Can you use this to work out how many moves would be needed with five discs?

In general, can you describe a way of working out how many moves are needed when one extra disc is added?

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Tower of Hanoi Final Challenge

Explain how you could work out the number of moves needed for the Tower of Hanoi puzzle with n discs.

EXTENSION
There is a legend that a 64-disc version of the Tower of Hanoi is being played out in a temple, and when the final move is made, the world will come to an end. If one move is made each second, how long would it take to complete the game with 64 discs? Do we need to worry yet, if the first disc was moved at the very beginning of time?