



Activity 3: The Tower of Hanoi Solutions

1. Answers will vary with the individual or team.

2.

Number of Discs	Minimum Moves
3	7
4	15
5	31
6	63
7	127
8	255

The rules will vary with the ability of students.

Some students will explain that the next term is one more than double the last term (i.e. 31 is one more than 2×15).

Others may see the rule as: The minimum number of moves = $2^n - 1$.

Some will generalize $a_n = a_{n-1} + 2^{n-1}$.

Some will see the differences as powers of two (see below).

$$15 - 7 = 8 = 2^3$$

$$31 - 15 = 16 = 2^4$$

$$63 - 31 = 32 = 2^5$$

$$127 - 63 = 64 = 2^6$$

3a. 31 minutes.

b. $32,767 \text{ minutes} \div 60 = 546.12 \text{ hours} \div 24 = 22.75 \text{ days}$

4.

seconds per minute = 60

seconds per hour = $60 \times 60 = 3,600$

seconds per day = $3,600 \times 24 = 86,400$

seconds per year = $86,400 \times 365 = 31,536,000$

$18,446,744,073,709,551,615 \div 31,536,000 = 584,942,417,400$ years
approximately 585 billion years