

Lesson 10-3 • Group 2

Reinforce Understanding**10.3 Small Group • Group 2**

I can use patterns and relationships to make sense of the Tower of Hanoi puzzle and think logically about its solutions, explain why the method works, and use it on a problem I have not seen before.

Worked model

Before moving anything, I describe what the solved puzzle will look like: the discs in the same order — smallest on top to largest on bottom — but on a different rod.

1. Then I play the small cases: a one-disc tower takes 1 move, and a two-disc tower takes 3 moves.
2. A three-disc tower takes at least 7 moves. Small cases are how mathematicians play.

Practice

Complete each exercise. Show the reasoning that supports your answer.

1. Use the doubling pattern to complete the table of fewest moves.

Complete the table. Show how you found each value.

Discs	Pattern: double the previous, add 1	Fewest moves
3		
4		
6		

Show your work

2. Match each tower to the calculation that gives its fewest moves.

Write the letter of the matching item on each line.

1. _____ 4-disc tower
 2. _____ 5-disc tower
 3. _____ 6-disc tower
 4. _____ Any n-disc tower
- $A2 \times 7 + 1 = 15$
 - $B2 \times 15 + 1 = 31$
 - $C2 \times 31 + 1 = 63$
 - DDouble the (n – 1)-disc answer, add 1

3. Why is finding a pattern MORE powerful than just solving the three-disc puzzle by hand?

Circle the letter of the best answer. Show how you know.

- A. The pattern lets you skip the rules of the puzzle
- B. The pattern predicts the answer for towers you have never played, like five or six discs
- C. Patterns make the discs move by themselves
- D. A pattern proves the puzzle is impossible

Show your work
