

Lesson Plan

King Arthur's Dilemma

This lesson was taught by Rich Moss (Maplewood Middle School, Maplewood, NJ), videotaped by New Jersey Network & Stevens Institute of Technology, and shown as a part of a videoconference entitled "Computers in Secondary Mathematics Education".

Classroom setup: Students are sitting at desks arranged in a circle. There is one computer in the back of the room.

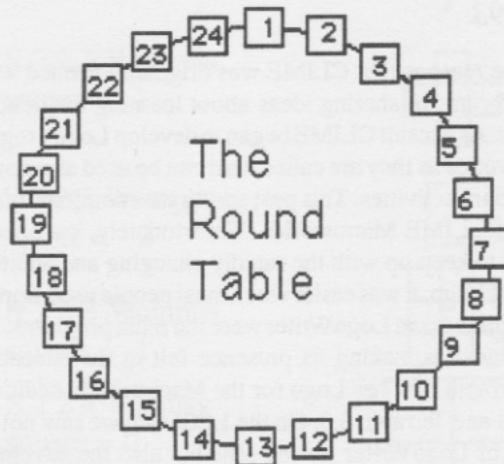
Background/previous experiences: This lesson is a followup to the Problem Solving chapter in *Transition Mathematics* (UCSMP) - grade 7.

Objective: The student will practice and extend his/her ability to determine rules for pairs of numbers.

Software Notes: King Arthur's Dilemma uses one of the CLIME Microworlds, V. III (Knights).

The Lesson: The teacher tells the students that they just have been whisked away to King Arthur's court and that they are now Knights of the Round Table. Also, their teacher is now King Arthur. The teacher tells the story of King Arthur's Dilemma. (See figure #1). The teacher concludes the story by stating the problem: "Where should you sit at the next meeting of the Round Table so that you will win the hand of my daughter?" "How many knights will be at the next meeting?" asked one brave knight. "I'm not sure," says Arthur. "It could be as few as 15 or as many as 750 - or even more!" "We need to discover a pattern," Arthur continues. "Let's see if we can figure out where the best place to sit in this room. There are 28 of you here. Let's find out." King Arthur now goes through the process with the knights. The students eventually discover that the 15th seat is the winning one. But how does one find that out for N seats? Arthur helps them by doing some easy examples with them. If there is only 1 knight, then that knight would be the lucky one. Also if there were 2 knights, the first

knight would get the daughter's hand. When there are 3 knights, they noted that the third knight is the winner. The knights working in small groups try and figure out the pattern. When they think they have a



The Story of King Arthur's Dilemma

During one of the meetings of the Knights of the Round Table, one of the knights asked for the hand of King Arthur's daughter in marriage. Much to the dismay of the King, an outcry came from the knights. Each of the knights asked to be the spouse of the King's daughter. Perplexed by the outcry, the King devised the following scheme to choose the one to marry his daughter. Arthur uses a "sword" (plastic, of course) to point toward the knights as he walks around alternating between saying "you stay" and "you're banished." Eventually only one knight is left - the 25th knight.

Figure 1

No. of knights	Winning Chair
1	1
2	1
3	3
4	1
5	3
6	5
7	7
8	1
9	3
10	5
11	etc.

theory, they go up to the computer and test it.

Comments: Notice that when the winning seat is 1, the number of chairs is a power of 2 (1, 2, 4, 8, 16, etc.). Also when the number of knights is not a binary number, the winning chair number belongs to the sequence of consecutive odd numbers. This sequence continues

See *Knight...page 15*