Professor Jonathan Farley
Hollywood Consultant

Q: Our firm -- Hollywood Math and Science Film Consulting -- helps ensure that the technical details in movies and on TV are accurate and believable. Some of the recent projects we've worked on include the TV shows "Numb3rs" and "Medium."

The hit show "Numb3rs" revolves around FBI agents. Below is an example of a binary tree. Binary trees can be used to represent the communication paths within organizations.

This binary tree represents an FBI chain of command with the director as the top level. When he/she sends a message, the time it takes to travel from one organizational level to the next doubles. If it takes the director 15 minutes to get a message to a section chief, how long will it take the message to travel from a director to an agent (the bottom)?

A. 0 hours and 45 minutes
B. 1 hour and 15 minutes
C. 1 hour and 30 minutes
D. 1 hour and 45 minutes **
E. 2 hours and 00 minutes

Tip: Split the problem up by finding the time for a message to travel from one level to the next.

A: It takes 15 minutes for the message to travel from the director to the section chief. If it takes twice as long for the message to get from the section chief to special agents it will take 30 minutes (15 minutes x 2 = 30 minutes). The same holds true for the message to get from a special agent to an agent, so that will take 60 minutes (30 minutes x 2 = 60 minutes).

Now add together the time it takes to travel from one level to the next (15 minutes + 30 minutes + 60 minutes = 105 minutes). Finally, convert from

minutes to hours. There are 60 minutes in an hour so divide the total number of minutes by 60 and keep the remainder as minutes. The answer will be 1 hour and 45 minutes (105 / 60 = 1*R*45).

Sample FBI Chain of Command