Fight with the Dragon

THIS ISSUE'S PUZZLE

A scary and always hungry dragon has appeared in a peaceful village and has a habit of eating at least five villagers every day. Many citizens have tried to fight the dragon off, but to no avail. They have inevitably become meals for the voracious monster.

Finally, a brave soldier, Cornelius, got his lucky sword, went to the center square, which the dragon has occupied, and challenged the three-headed monster to the duel. With every swing of his sword Cornelius can miss or chop one or two heads off the dragon. If Cornelius chops off one head, a new head immediately pops up in its place (even if the dragon has had only a single head). If he removes two heads with one stroke, the monster loses them, and they do not grow back. If the soldier misses, the dragon grows a new head.

Cornelius' probability of missing with the swing of the sword is the same regardless of the number of heads. If the monster has two or more heads, the soldier is as likely to take two heads off as to miss altogether. The dragon gets more strength with every miss by Cornelius. In fact, the moment it gets five heads, it will eat the soldier alive. On the other hand, once the dragon loses all of its heads for good, it is killed. The fight must continue until the deadly end.

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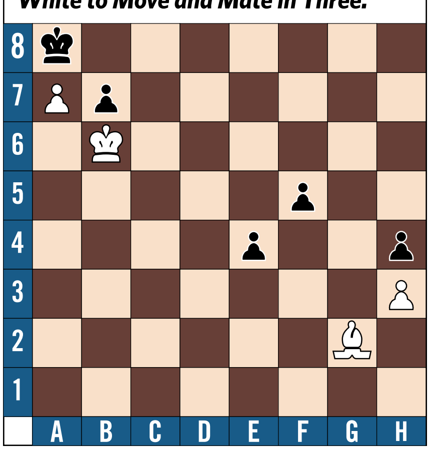
Please answer the following questions:

1. What are the soldier's chances of winning?

2. (Requires computer calculations) How many times need Cornelius be as likely to chop two heads off as to miss in order to make it a fair duel (fair means the winning chances are equal for both fighters)?

THIS ISSUE'S CHESS PUZZLE

White to Move and Mate in Three.



SOLUTIONS FOR THE MARCH/APRIL PUZZLES

Peculiar Star Position

1. The infinite number of S stars are arranged as a straight line and the distances from them to the M star in the middle are 10^6 km, 2×10^6 km, 3×10^6 km, etc.

2. Star L is 24×10^6 km away and the outer star M is 12×10^6 km away.

SOLUTION:

1. Because the distances from the star L and the outer star M to the middle star M shrank at the same rate, the corresponding forces increased by 33% ($(2/\sqrt{3})^2 = 4/3$). Given that the angles did not change at time 2 and the S stars are still lined up, for all three forces (from star L, outer star M and the combined force from the S stars) to offset, the S stars in total have to produce a force on the middle star M which is 4/3 times as much as that at time 1. Such force at time 1 is proportionate to the sum of inverse squares of odd integers (the force will be the sum of the forces from each of the S stars): $1 + 1/3^2 + 1/5^2 + \ldots$. One can note the following relationship: $1/2^2 + 1/4^2 + 1/6^2 + \ldots = 1/2^2 \times (1+1/2^2 + 1/3^2 + \ldots)$. From this we conclude that $1+1/3^2 + 1/5^2 + \ldots = 3/4 \times (1+1/2^2 + 1/3^2 + \ldots)$, which is the same as $1+1/2^2 + 1/3^2 + \ldots = 4/3 \times (1+1/3^2 + 1/5^2 + \ldots)$. This expression shows exactly how the S stars are now arranged—they are situated as a straight line, with distances to the middle M star equaling to 10^6 km, 2×10^6 km, 3×10^6 km, etc.

2. Precise calculation of the other distances requires knowledge of the expression above. The limit of the sum of inverse squares of integers is $\pi^2/6$. For the gravitational forces to offset each other at time 2 the vector of the combined force of the outer star M and the series of S stars has to lie on the same line as the vector of the force from star L. Besides, the absolute values of the former two forces need to be the same. Using the mass information given in the problem we find that the distance between the two M stars equals 12×10^6 km. Using the cosine rule we also find that the combined force to offset the force from the L star is $\sqrt{3}$ times as much as the force from the outer M star. From this we conclude that the star L is 24×10^6 km away.

Chess Puzzle

Case A1—(1) Ba6! (zugzwang) axb; (2) Bb7 bxc; (3) Qa1#

Case A2—(1) Ba6! (zugzwang) axb; (2) Bb7 Bxb7; (3) Qxb7#

Case B1—(1) Ba6! (zugzwang) Bxa8; (2) b7! Kg2; (3) bxaQ#

Case B2—(1) Ba6! (zugzwang) Bxa8; (2) b7! Bxb7; (3) Bxb7#

SOLVER LISTS

Due to an administrative deadline, names of only those people who submitted correct solutions by March 31, 2006, are shown on the lists.

Star Puzzle: Bill Carroll, William Cross, Mark Evans, Michael Failor, Toby Hall, John Hubenschmidt, Lee Michelson, Stephen Peeples, David Promislow, Philip Silverman, Al Spooner, Scott Stelljes, Elnatan Sulimanoff, Tony Torelli, Kevin Trapp, Virginia Young

Chess Puzzle: Casey Abell, Steven Azar, Robert Burrell, Bill Carroll, Rob Drozd, Jeffrey Dvinoff, Leigh Halliwell, Bob Howard, Krishna Kothoor, Philip Lehpamer, Raja Malkani, Mark Mercier, Lee Michelson, Chris Norman, Don Onnen, David Parsons, Mark Peterson, Hugh Ramler, Boris Raskin, Noam Segal, Edward Scher, Ron Stokes, Kevin Trapp, Lee Zinzow

Solutions may be e-mailed to cont_puzzles @yahoo.com or mailed to Puzzles, 25 Sparrow Walk, Newtown, Pa. 18940.

In order to make the solver lists (separately maintained for the regular and chess puzzles), please submit your answers and solutions by May 31, 2006. Depending on the response volume, solver lists may contain only the names of people who solved puzzles on the first attempt.

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