LET'S

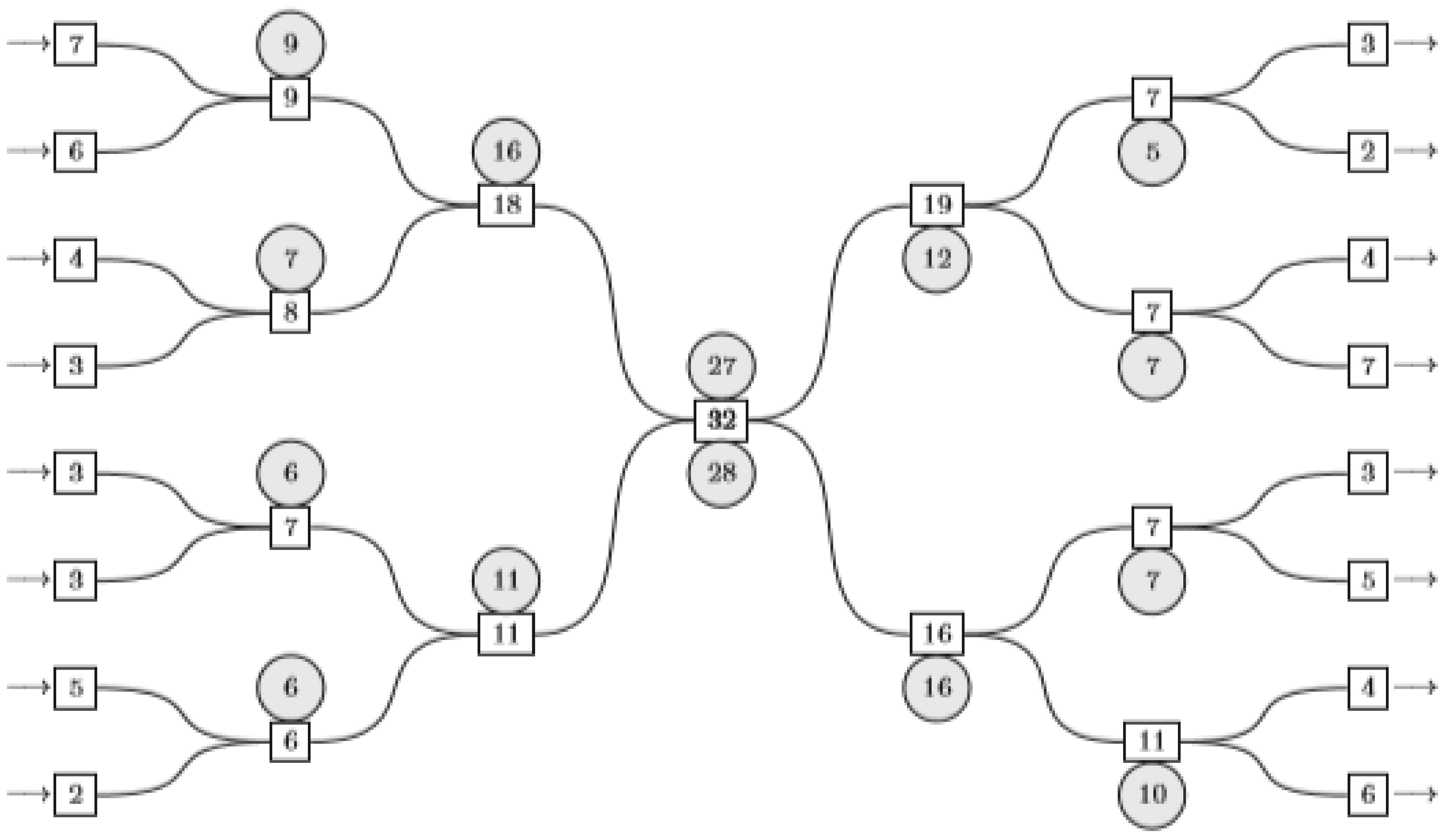
POSTER SOLUTIONS

PLAY

Maximum Flow

The maximum flow problem answers questions such as 'A network of connected pipes is given. The pipes have different flow capacities. What is the maximum rate that water can flow through the network from a starting point to an ending point?' The pipes may be water pipes, or bridges with limited carrying capacities, or internet connections, or electrical cables, and so on.

The maximum flow through each pipe on the left is the smaller of the capacity of the pipe and the sum of the maximum flows coming into it. These are shown in circles above the pipe. The maximum flow through the pipes on the right is the smaller of the capacity of the pipe and the sum of the maximum flows exiting it. These are shown by circles below the pipe. Finally the maximum flow through the network is the smaller of the two flows at the central pipe.



The maximum flow through the network is 27 (choice B).

32 marbles

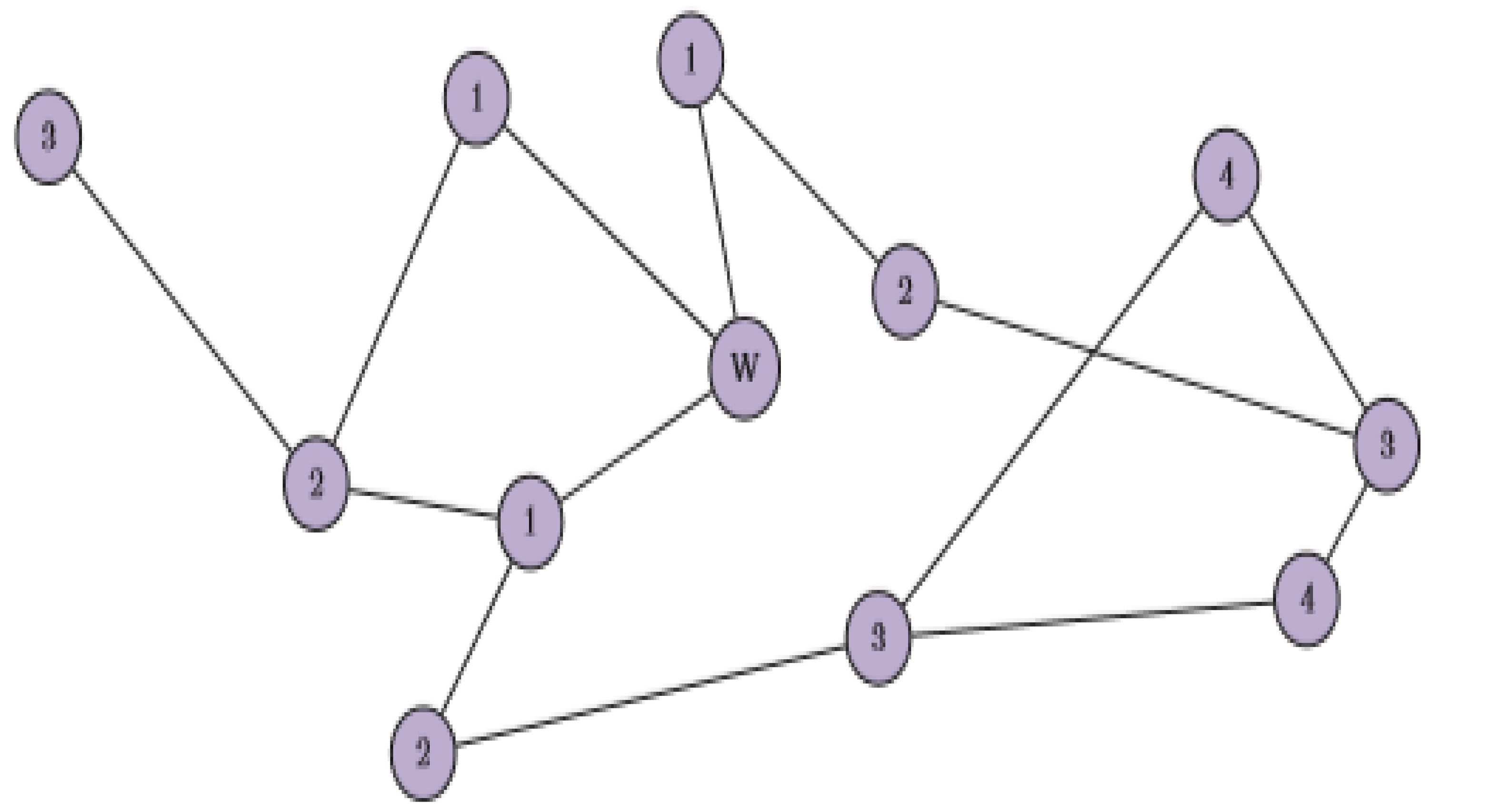
This question has a winning strategy for the first player, and the task is to determine it.

Start from the final state and work backwards. If the number of marbles left is between 1 and 4, the player whose turn it is can take all of them and win. If there are 5 marbles left, any move must leave between 1 and 4 marbles. So 5 marbles is a losing state.

Similarly 10, 15, 20, 25 and 30 marbles are losing states. So the winning move with 32 marbles is to take 2.

Wilma has a secret

The numbers below show the day when the secret is known to the friend.



The secret is known to all the friends after 4 days.

Sierpinski triangle

The analyst is trying to find out what happens to the complexity of the problem as the data increases. If a pattern can be found and a formula derived from it, this can influence the algorithm chosen to solve the problem.

The 1st Sierpinski triangle has 0 white triangles.
The 2nd Sierpinski triangle has 1 white triangle.
The 3rd Sierpinski triangle has 4 white triangles.
The 4th Sierpinski triangle has 13 white triangles.

The pattern for finding the number of white triangles in the (n+1)th Sierpinksi triangle is 3 times the number of white triangles in the nth Sierpinski triangle plus 1. So there are $3 \times 13 + 1 = 40$ white triangles in the 5th Sierpinski triangle (choice D).

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Events that spark interest in Algorithmics