**Pen & Paper (A3) Solutions**

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S1:

S2:

S3:

S4:

S5:

S6:

S7:

S8:

S9:

S10:

S11:

S12:

S13:



<Insert pic from notes>



There are infinite plans that lead to the satisfaction of the goal as you can infinitely sail in green waters forever. Even without being able to sail in green waters forever you can still sail back and forth between different waters, hence there are still infinite plans. The most optimal plan would be as follow:

SailOut(Bay, White) 🡪 SailOut(White, Blue) 🡪 Dive(Blue) 🡪 Pick(Blue) 🡪 Surface() 🡪 SailIn(Blue, White) 🡪 SailIn(White, Bay)

Therefore the number of actions in the most optimal plan is 7.



Fluents that are always true: Next(Bay, White), Next(White, Blue), Next(Blue, Green)

Fluents that are always false: Next(Bay, Blue), Next(White, Green), Next(Bay, Green)

<Insert pic from notes>

There are 4 actual physical states in the initial belief state. There are still infinite number of plans that lead to the satisfaction of the goal as you can still forever sail in green waters. The most optimal plan would be as follows:

SailOut(Bay, White) 🡪 SailOut(White, Blue) 🡪 SailOut(Blue, Green) 🡪 SailIn(Green, Blue) 🡪 Dive(Blue) 🡪 Pick(Blue) 🡪 Surface 🡪 SailIn(Blue, White) 🡪 SailIn(White, Bay)

To find the optimal path with 100% success rate, we need to assume the boat is furthers from the green waters as we are unable to observe which waters we are in. It doesn’t matter which waters we are in initially as we can forever sail in the green waters so as long as we sailout 3 times we know for sure we are in the green waters. From there we know what state we are in so we can follow the logical steps to getting the treasure. Hence the above action plan is just an example, for all we knew we could have been sailing out from the green waters 3 times but we wouldn’t know for sure what state we were in until we completed those actions.