

Up Or Down Solution

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Our solution to the Up Or Down problem is five steps long. The game is guaranteed to end within the five steps but may end earlier given chance regarding the initial orientation of the cups.

1. Open two adjacent containers. Regardless of the current cup orientation, ensure both are upside down. This means you know that there are two adjacent cups upside down.
2. Open two diagonally opposite containers. One was involved in step 1 and will therefore be upside down already. Ensure both cups are upside down. This means you know that there are three cups upside down.
3. Open two diagonally opposite containers again. If one is right-side up, turn it upside down and the game will end. If not, turn one of them right-side up. This means you know that there are two adjacent cups upside down, and the two remaining adjacent cups are right-side up.
4. Open two adjacent containers. If both cups are upside down or both cups are right-side up, turn them both to face the other way thus ending the game. If one is upside down and one is right-side up, turn them both to face the opposite way. This means you know that there are two diagonally opposite cups upside down, and the two remaining diagonally opposite cups are right-side up.
5. Open two diagonally opposite containers. Regardless of the pair you pick, you know that they will be facing the same way as each other and this is the opposite direction to the two other cups. Turn both cups to face the other way and the game will end.

The game has distinct points in steps 3, 4, and 5 where the player may cause the game to end however the game may end in steps 1 or 2 by chance.