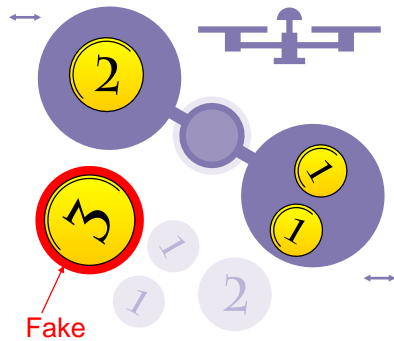


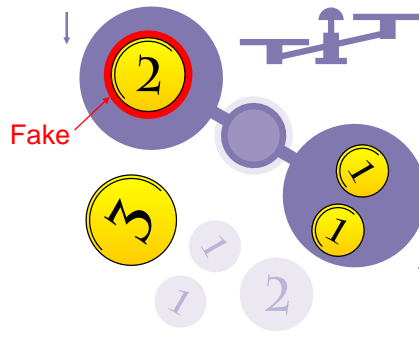
A certain country uses gold coins called buckazoids. The coins weigh the same as their denominations. A 1-buckazoid coin weigh 1 gram, a 2-bucazoid coin weighs 2 grams and so on.

Problem 1. Someone has given you two 1-buckazoid coins, one 2-bucazoid coin, and one 3-buckazoid coin. One of them is fake; it weighs too much. How can you find the fake coin by using only a pan balance? You have no other weighs except for these four coins.

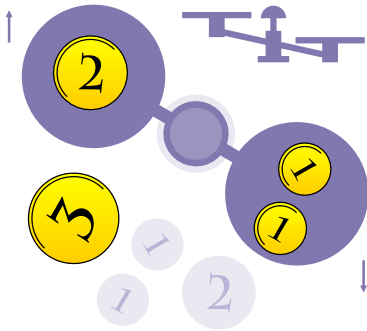
Problem 2. How would you find the fake coin if all you knew was the wrong weight but didn't know whether it was too heavy or too light?



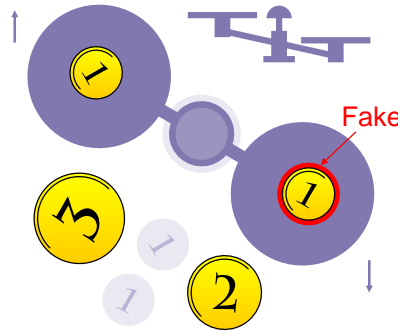
A1 Result of the weighing 1



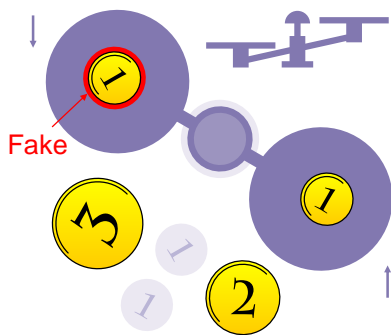
B1 Result of the weighing 1



C1 Result of the weighing 1



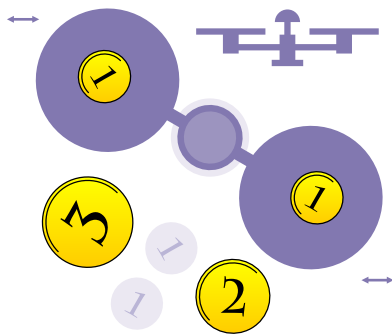
C2 Result of the weighing 2



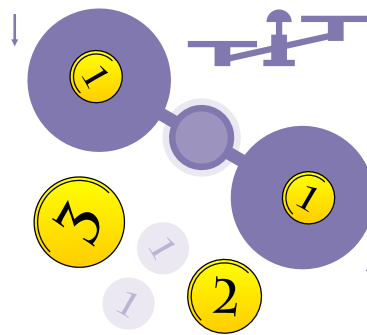
C3 Result of the weighing 2

**Problem 1.**

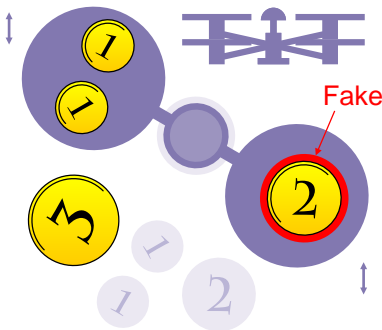
Weigh 2 against 1 and 1. If they balance, then 3 is the fake (diagram A1). If they don't balance and 2 is heavier then 2 is the fake (diagram B1). If they don't balance and 2 is light (diagram C1), the one of the 1-buckazoid coins is fake. In this case, weigh the 1-buckazoid coins against each other. The heavier one is fake (diagrams C2 and C3).



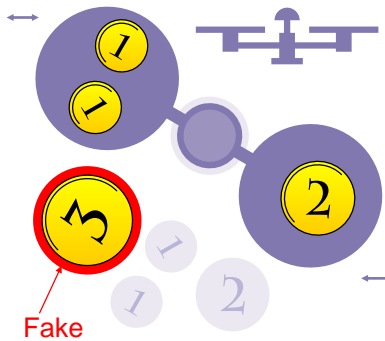
A1 Result of the weighing 1



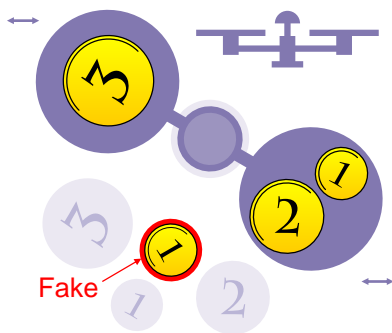
B1 Result of the weighing 1



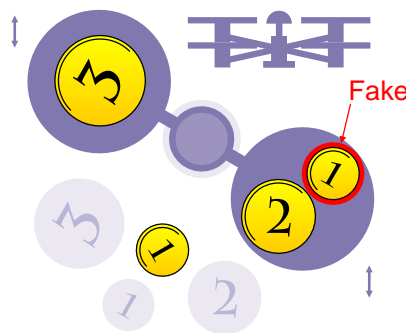
A2 Result of the weighing 2



A3 Result of the weighing 2



B2 Result of the weighing 2



B3 Result of the weighing 2

**Problem 2.**

Step 1. Compare the two 1-buckazoid coins. They either balance (diagram A1) or they don't (diagram B1). We treat each possibility differently. If they balance, go to step 2, if they don't balance, go to step 3.

Step 2. We know that both 1 buckazoid coins are real, so weigh the 2-buckazoid coin against the two 1-buckazoid coins. If they don't balance (diagram A2), then the 2-buckazoid coin is fake. If they balance (diagram A3), the 3-buckazoid coin is fake, and we are finished.

Step 3. One of the 1-buckazoid coins is fake, and both the 2- and 3-buckazoid coins are real. Put the 3-buckazoid coin in one pan, and one of the 1-buckazoid coins and the 2-buckazoid coin in the other, and this will tell which of the 1 buckazoid coins is fake - diagrams B2 and B3 respectively.