1.

Get 1 pill from bottle 1, 2 pills from bottle 2... 10 pills from bottle 10.

Measure the weight.

If the weight is 0.1 gram more than 55. The Ans is bottle 1.

.................0.x gram more than 55. The Ans is bottle x.

2.

Collision doesn’t happen only in following two cases:

1. All ants move in counterclockwise direction.
2. 2) All ants move in clockwise direction.

Out of 23 possibilities, only 2 don’t cause collision. So, the probability of collision is **6/8** and the probability of non-collision is **2/8**.

3. The number of toggles of a door determines its final status. If a door is toggled for odd times, it will end up with open. If even time, the door will be closed at the end. Also noticed that, after nth pass, door number <= n will not be touched anymore.

Answer always will be square (N. of doors)