

Question3

Like a sports competition, we weight two apples and pick the heavier one. For the first turn, we would weight $1024/2$ times and pick the 512 winners. Then, we would weight $1024 * (\frac{1}{2})^2$ times in second turn. Thus, before the heaviest winner appear, we weight $(512 + 256 + 128 \dots + 2 + 1)$ 1023 times.

During weighing, a record could be maintained for finding the 10 apples which have compared with the heaviest apple. Then, we could find the heaviest apple in these 10 apples. This would cost 9 times comparison with the same method before and would find the second heaviest apples in 1024 apples.

Thus, the total number of comparison is $1023 + 9 = 1032$ times.