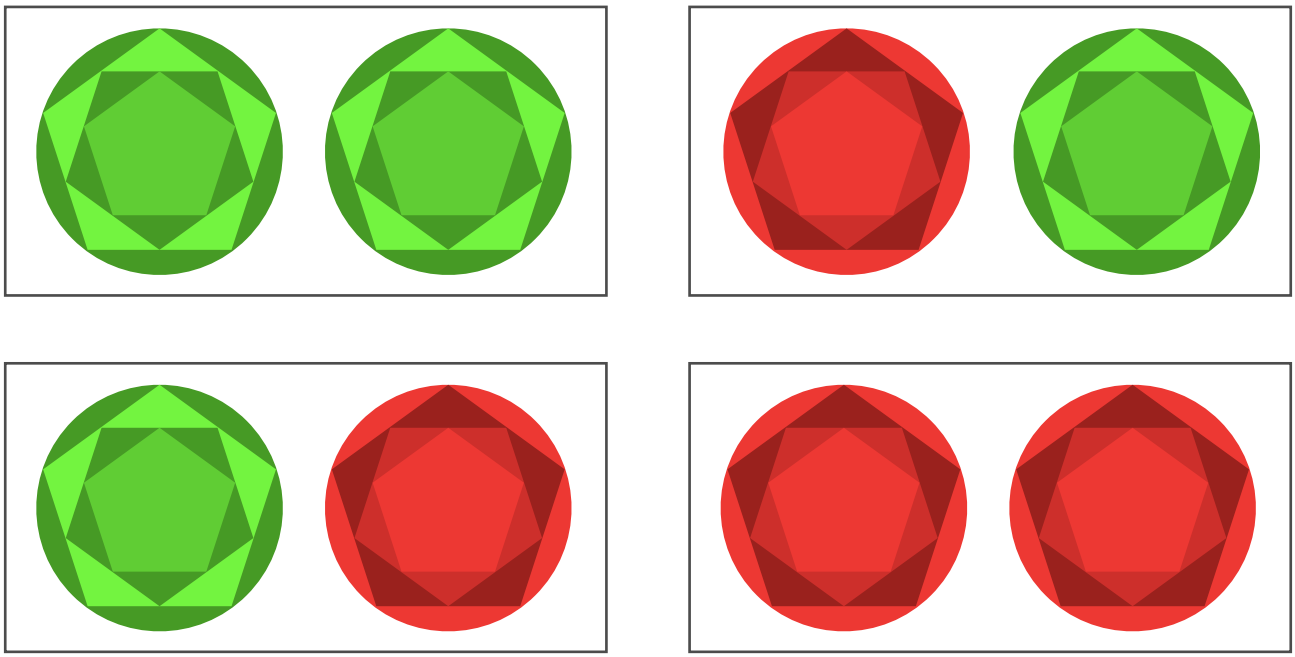
Case for 2 discs:

We have 2 discs, each with a red face on one side and green on the other. There are 4 possibilities illustrated below.



From the 4 possible outcomes only 2 are valid.

Probability = Favourable outcomes / Total number of outcomes

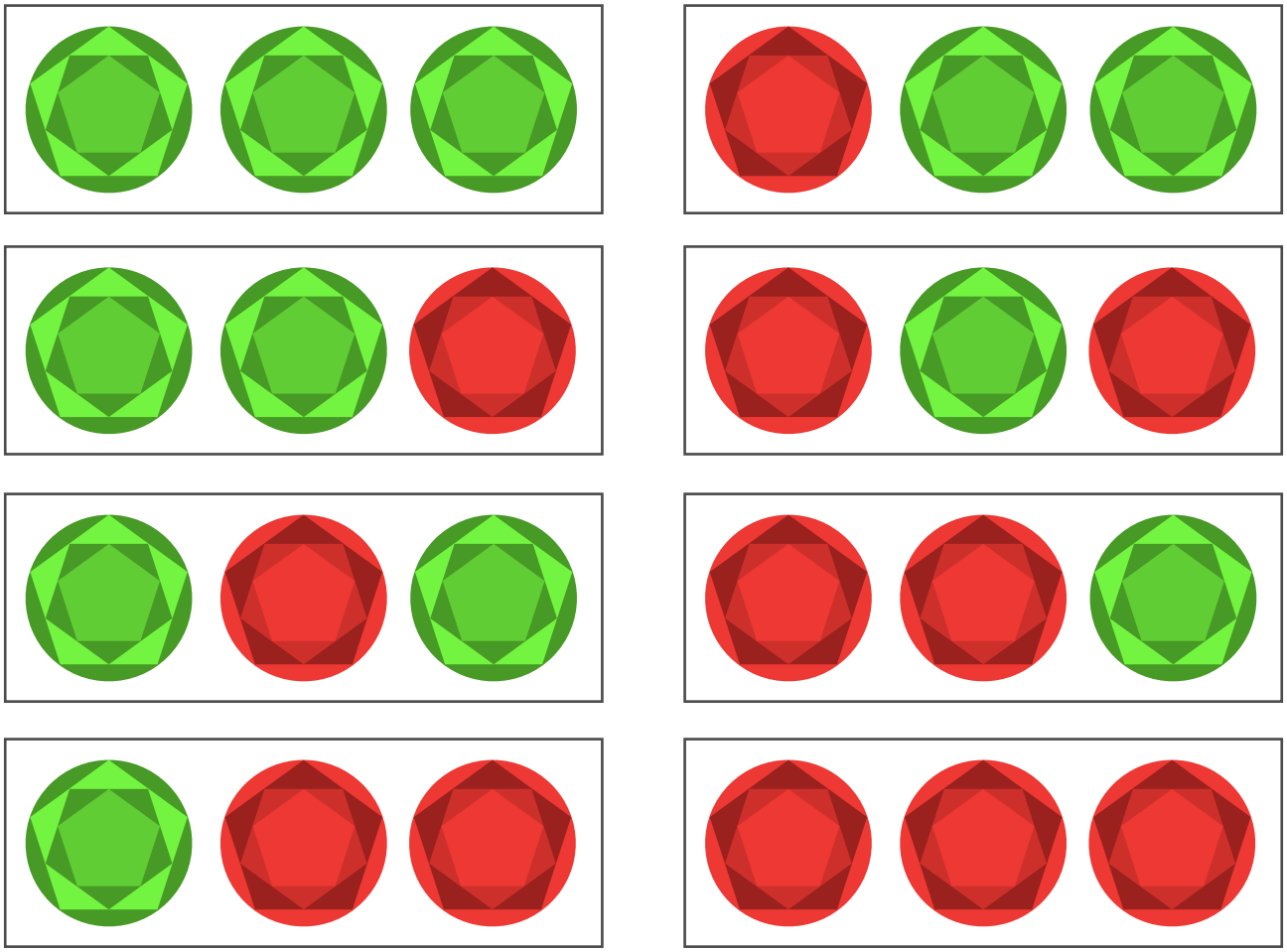
= 2 / 4

= 0.5

= 50 %

Case for 3 discs:

Now we have 3 discs, each with a red face on one side and green on the other. There are now 8 possibilities as illustrated below.



From the 8 possible outcomes still only 2 are valid.

Probability = Favourable outcomes / Total number of outcomes

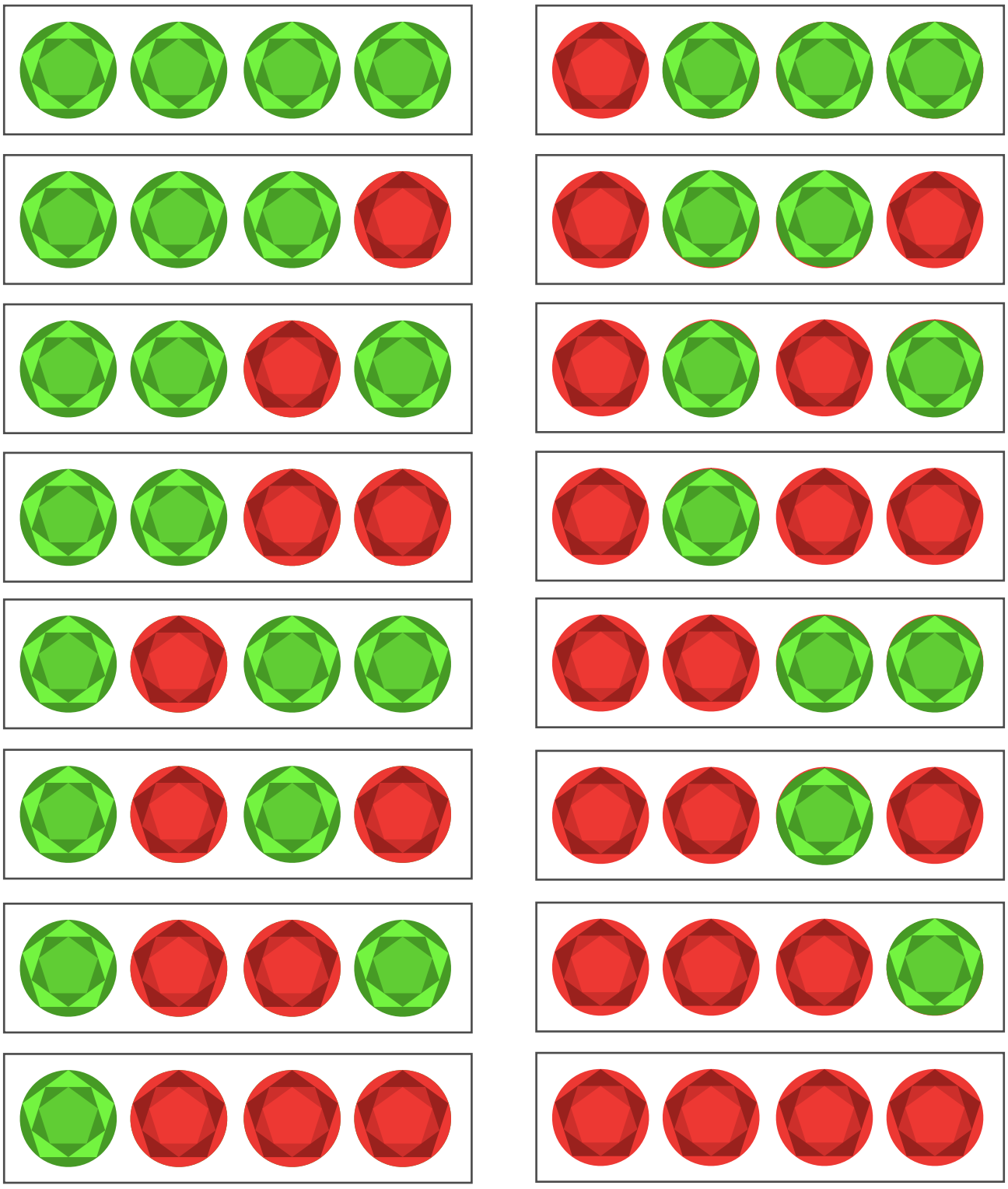
= 2 / 8

= 0.25

= 25 %

Case for 4 discs:

Now we have 4 discs, each with a red face on one side and green on the other. There are now 16 possibilities as illustrated below.



From the 16 possible outcomes still only 2 are valid.

Probability = Favourable outcomes / Total number of outcomes

= 2 / 16

= 0.125

= 12.5%

Case for n discs:

Now we have n discs, each with a red face on one side and green on the other. There are now total 2 possibilities for each disk which is either red or green. Since there are n total disks and we have 2 option for each, we have a total of 2 x 2 x 2 x 2 x ……. x 2 'n' number of times.

Thus we obtain 2^n total outcomes

Since the favourable outcomes are still 2 either all green or all red

Probability = Favourable outcomes / Total number of outcomes

= 2 / 2^n

= 1 / 2^(n-1)

= 100 / 2^(n-1) %