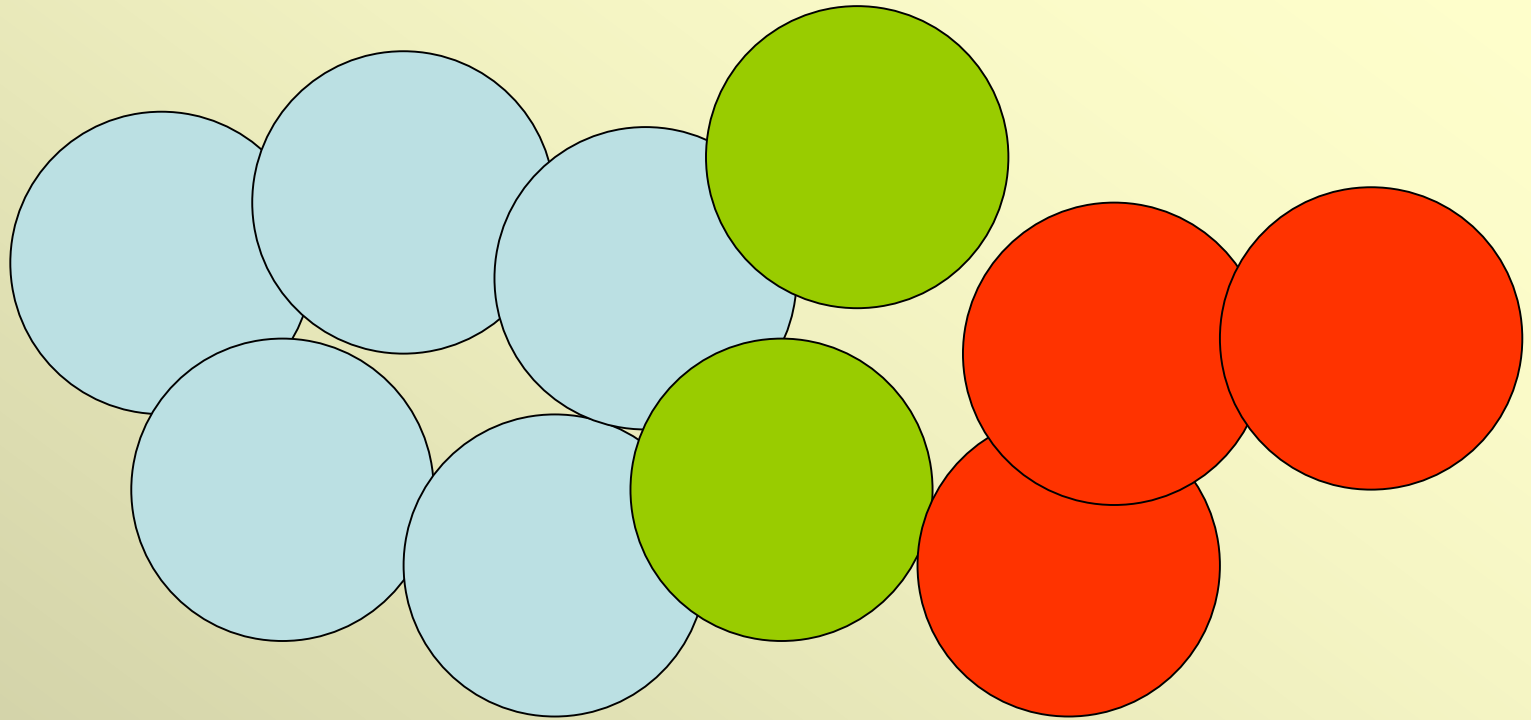


Addition



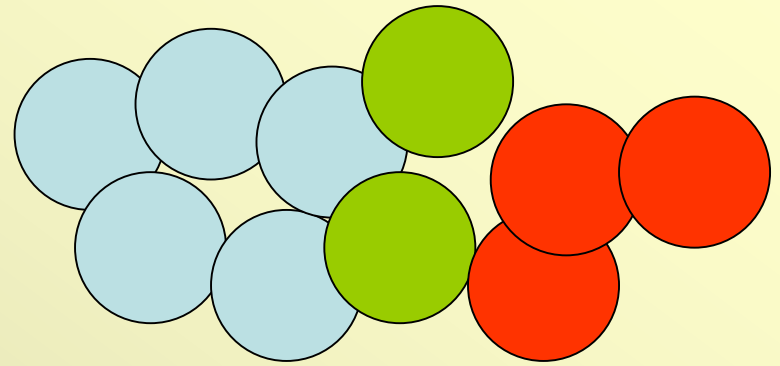
Lucy picks a counter at random from a bag.

What is the probability of taking a blue counter?

What is the probability of taking a green counter?

What is the probability of taking a blue **or** green counter?

Lucy picks a counter at random from a bag.



What is the probability of taking a blue counter? $\frac{5}{10}$

What is the probability of taking a green counter? $\frac{2}{10}$

What is the probability of taking a blue **or** green counter?

$$\frac{5}{10} + \frac{2}{10} = \frac{7}{10}$$

The probabilities of different types of weather in Aberdeen in September are shown in the table:

Bright	0.03
Cloudy	0.17
Dull	0.10
Fog	0.03
Rain	0.37
Showers	0.03
Sunny	0.27
Total	1.00

What is the probability of either Rain or Showers?

Bright	0.03
Cloudy	0.17
Dull	0.10
Fog	0.03
Rain	0.37
Showers	0.03
Sunny	0.27
Total	1.00

What is the probability of either Rain or Showers?

$$0.37 + 0.03 = 0.40$$

The football results for Saturday 14th January resulted in:

Home wins	25
Draws	9
Away wins	9

What is the probability of:

A home win

An away win

Any win?

The football results for Saturday 14th January resulted in:

Home wins	25
Draws	9
Away wins	9

What is the probability of:

A home win $\frac{25}{43}$

An away win $\frac{9}{43}$

Any win? $\frac{34}{43}$

Can you state the rule of
addition?

$$P(A \text{ or } B) = P(A) + P(B)$$

Multiplication

What is the probability of getting a tail in one toss of a coin?

$$\frac{1}{2}$$



What is the probability of getting two tails in two tosses of a coin?



H	H
H	T
T	H
T	T

What is the probability of getting two tails in two tosses of a coin?

$$\frac{1}{4}$$



What is the probability of getting three tails in three tosses of a coin?



H	H	H
H	H	T
H	T	H
T	H	H
H	T	T
T	H	T
T	T	H
T	T	T

The probability of:

one tail = $\frac{1}{2}$



two tails = $\frac{1}{4}$



three tails = $\frac{1}{8}$



What about four tails in four tosses?



What about four tails in four tosses?



$$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{16}$$

What is the probability of getting a head *and* scoring a six on a dice?



What is the probability of getting a head on a coin
and scoring a six on a dice?

H,1	H,2	H,3	H,4	H,5	H,6
T,1	T,2	T,3	T,4	T,5	T,6

$$\frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$$

Can you state the rule of multiplication?

For independent events

$$P(A \text{ and } B) = P(A) \times P(B)$$

What is the probability of scoring a head or a six?



H,1	H,2	H,3	H,4	H,5	H,6
T,1	T,2	T,3	T,4	T,5	T,6

The probability of scoring a head **or** a six is $\frac{7}{12}$

The probability of scoring a head = $\frac{1}{2}$ or $\frac{6}{12}$

The probability of scoring a six = $\frac{1}{6}$ or $\frac{2}{12}$

The probability of scoring a head **or** a six = $\frac{7}{12}$

But $\frac{6}{12} + \frac{2}{12} = \frac{8}{12}$?

Because one case got counted twice – the ‘head and six’



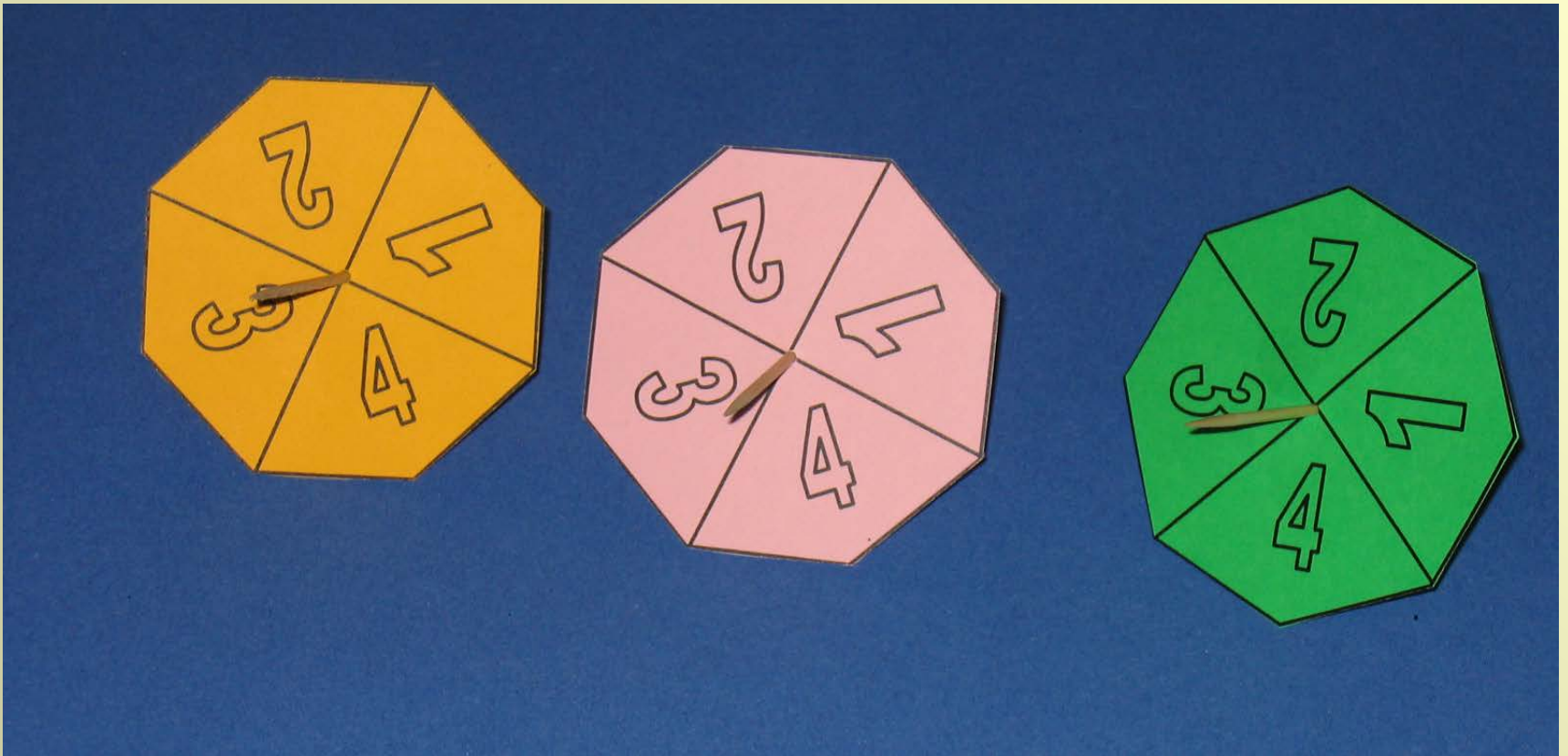
We need to subtract the probability of both happening.

$$\text{So } \frac{6}{12} + \frac{2}{12} - \frac{1}{12} = \frac{7}{12}$$

Addition revisited

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

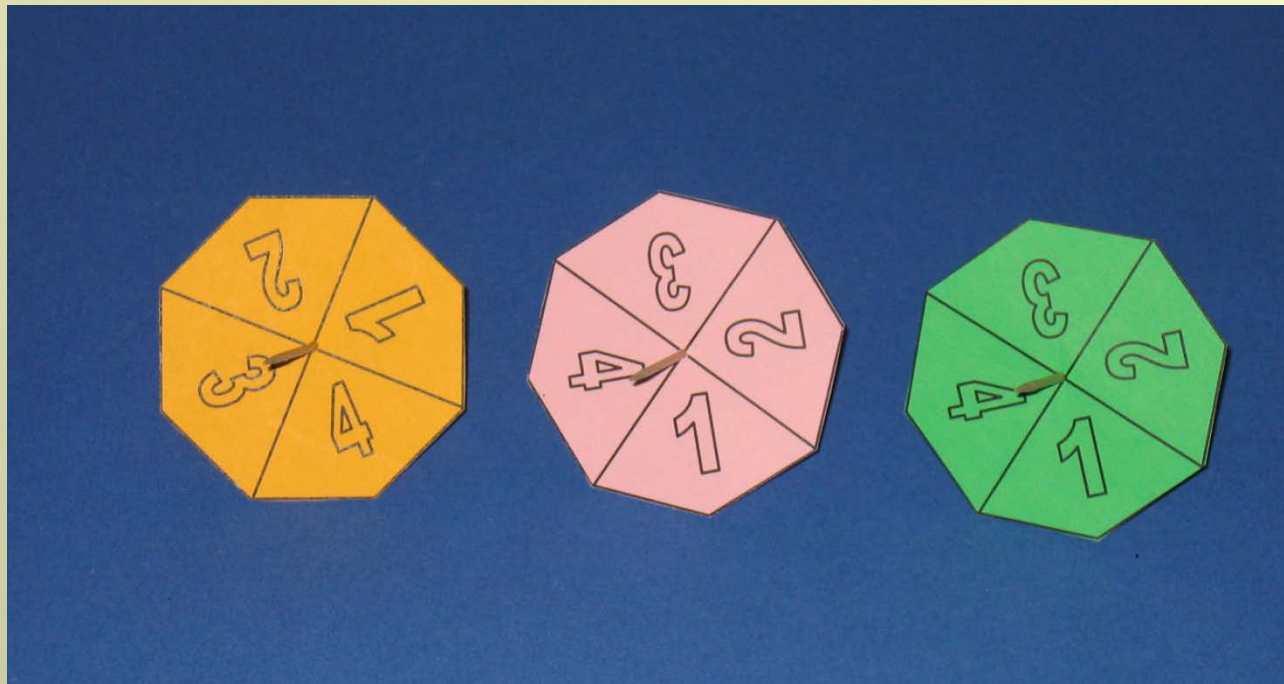
What is the probability of scoring three 4's on these three spinners?



The probability of scoring three 4s in a row is:

$$\frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} = \frac{1}{64}$$

What is the probability of scoring a 4 on the first and no others?

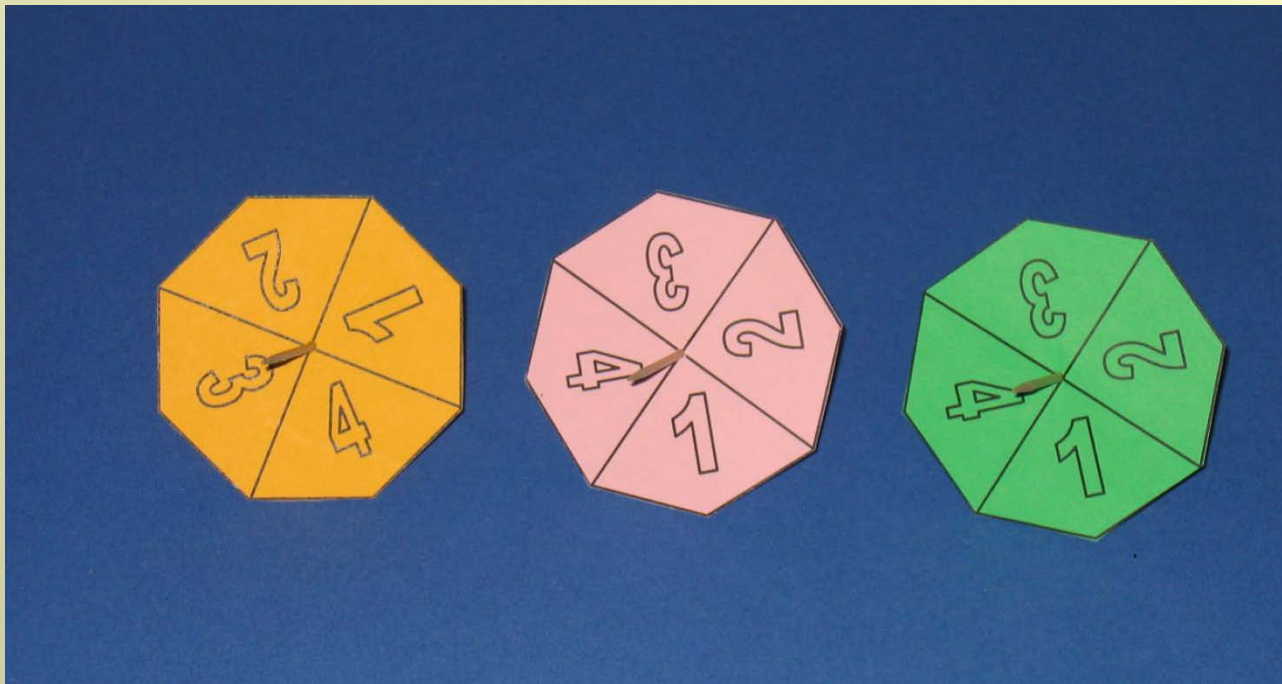


The probability of scoring a 4 on the first and no others is:

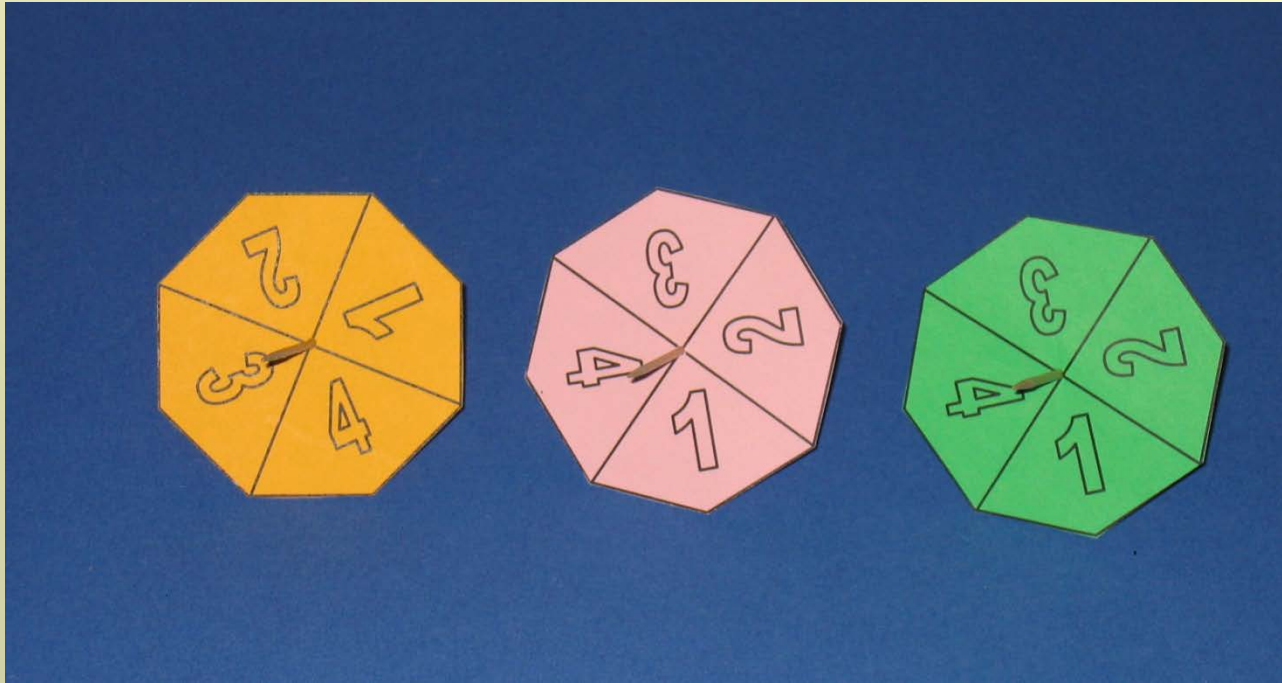
$$P(4) \times P(\text{not } 4) \times P(\text{not } 4) =$$

$$\frac{1}{4} \times \frac{3}{4} \times \frac{3}{4} = \frac{9}{64}$$

What is the probability of scoring exactly one 4 with three spinners?

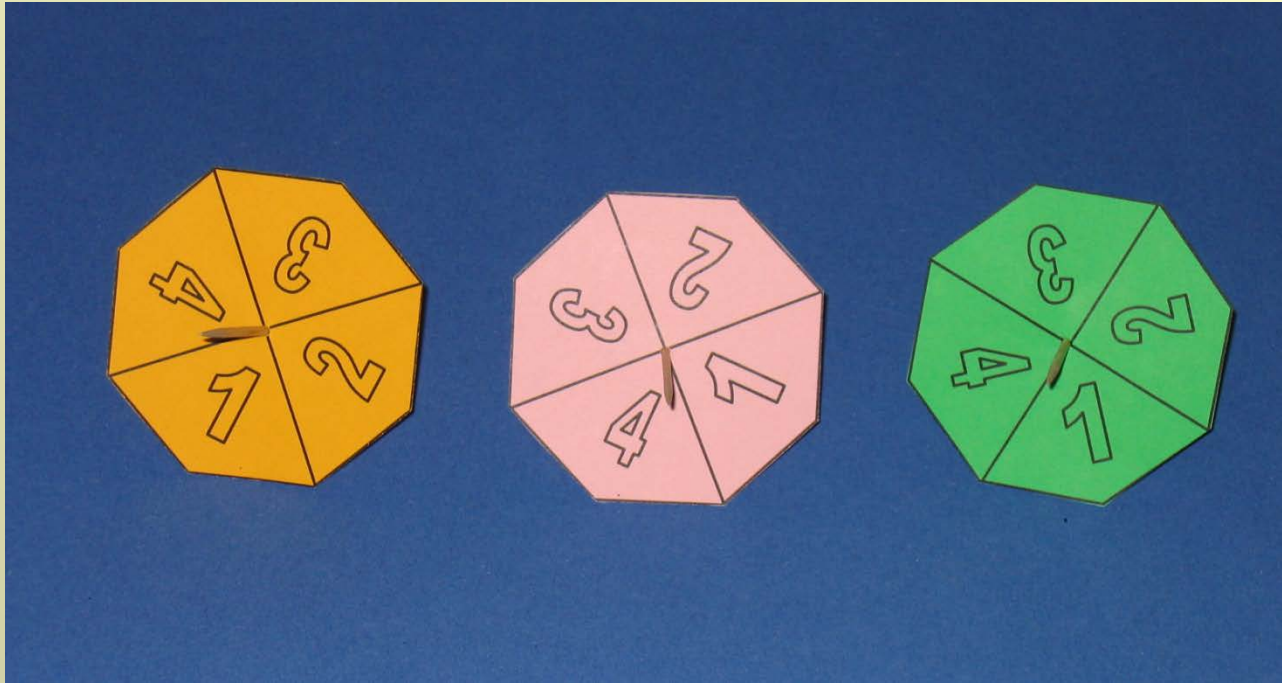


We could have: 4 - not 4 - not 4



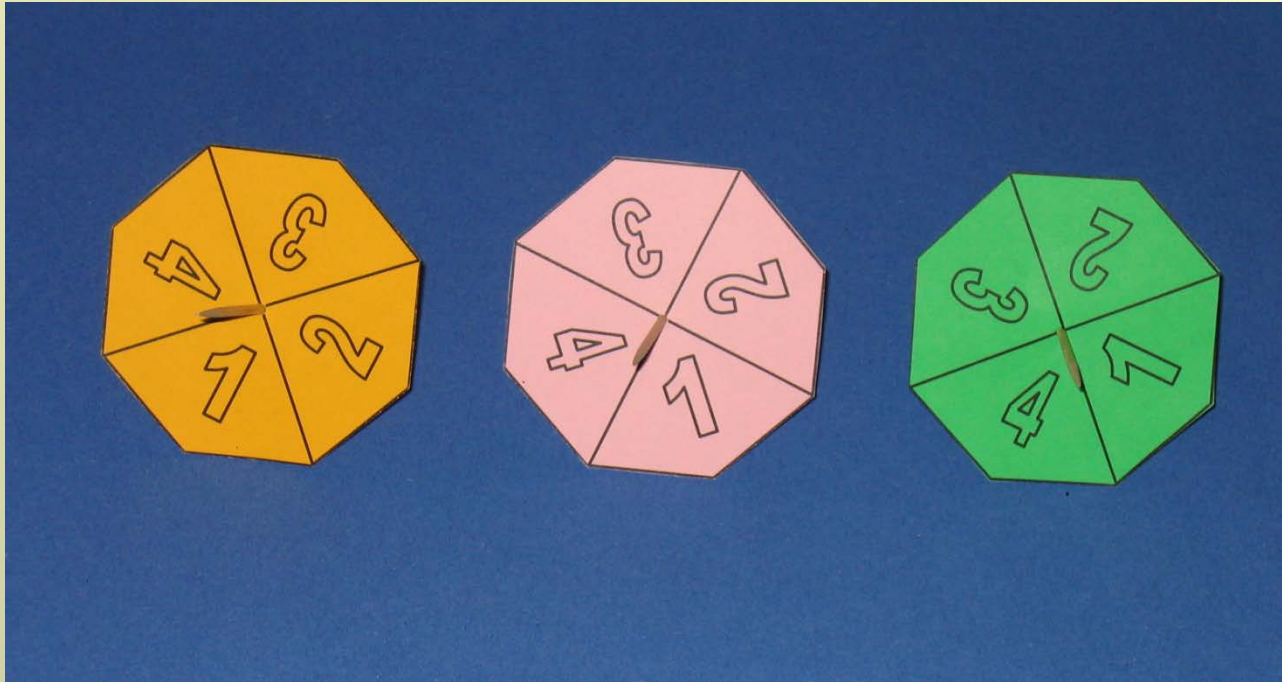
$$\frac{1}{4} \times \frac{3}{4} \times \frac{3}{4} = \frac{9}{64}$$

or we could have: not 4 - 4 - not 4



$$\frac{3}{4} \times \frac{1}{4} \times \frac{3}{4} = \frac{9}{64}$$

or we could have: not 4 - not 4 - 4



$$\frac{3}{4} \times \frac{3}{4} \times \frac{1}{4} = \frac{9}{64}$$

So the probability of just one four in three spinners is the sum of the three possible cases:

$$\frac{9}{64} + \frac{9}{64} + \frac{9}{64} = \frac{27}{64}$$