

SCRIBBLE

Flip a coin until you get 3 heads in a row. How many flips did it take? 13

Repeat the above trial 4 or 5 times and record the following

The most flips it took to get 3 heads in a row: 13

The fewest flips it took to get 3 heads in a row: 3

Coin flip				
<u>Trial one</u>	<u>Trial two</u>	<u>trial three</u>	<u>trial four</u>	<u>trial five</u>
1. heads	1. heads	1. heads	1. heads	1. heads
2. heads	2. tails	2. heads	2. heads	2. tails
3. tails	3. heads	3. tails	3. heads	3. heads
4. tails	4. heads	4. heads		4. heads
5. heads	5. tails	5. heads		5. tails
6. tails	6. tails	6. heads		6. heads
7. heads	7. tails			7. heads
8. tails	8. heads			8. heads
9. heads	9. tails			
10. tails	10. heads			
11. heads	11. heads			
12. heads	12. heads			
13. heads				

The average number of flips we'd expect to need in order to get 12 heads in a row is 4096 flips. Our reasoning is that an unbiased coin would have a 50% chance of flipping heads and a 50% chance of flipping tails. The probability of flipping heads 12 times in a row is $(0.5)^{12}$. Using the expected value formula gives us $(1/\text{probability of success}) = \text{average number of coin flips needed}$ which equals $(1/(0.5)^{12}) = 4096$.