

Will there be a Triple Crown Winner this year?



*Javier Castellano on Mage at Kentucky Derby 2023*

On May 6<sup>th</sup>, *Mage* won the Kentucky Derby. There are 2 more thoroughbred horse races that he has to enter and win in order to win the Triple Crown of thoroughbred Racing ... the Preakness and the Belmont. Can he do it? What are his chances?

The three races that make up the Triple Crown are the (1) Kentucky Derby, the (2) Preakness Stakes, and the (3) Belmont Stakes.

Kentucky Derby races began in 1875; Preakness races began in 1870; and the Belmont began in 1867. But in all of those years since these races began only 13 horses have won all three.

Triple Crown winners

Year	Winner	Jockey
2018	Justify	Mike E. Smith
2015	American Pharoah	Victor Espinoza
1978	Affirmed	Steve Cauthen
1977	Seattle Slew	Jean Cruguet
1973	Secretariat	Ron Turcotte
1948	Citation	Eddie Arcaro
1946	Assault	Warren Mehrtens
1943	Count Fleet	Johnny Longden
1941	Whirlaway	Eddie Arcaro
1937	War Admiral	Charles Kurtsinger
1935	Omaha	Willie "Smokey" Saunders
1930	Gallant Fox	Earl Sande
1919	Sir Barton	Johnny Loftus

Even though all three races have been in existence since 1875, let's start considering our data when the first horse won all three races in 1919 ... Sir Barton won.

1. How many years have elapsed between 1919 and now?

There are different ways to look at what might be the most usual gap between winners. We could figure out the gap that occurs most often (mode); or what the mean number of years of a gap is; or what is the most central measurement (median) of the various gaps.

2. Which average measurement makes the most sense to you about how often a horse and rider win the Triple Crown? Please explain why you believe this.

Year of win	Years between wins
2018	
2015	
1978	
1977	

1973	
1948	
1946	
1943	
1941	
1937	
1935	
1930	
1919	

We say that the empirical probability of an event happening is a calculation based on the results of real life trials not on the theoretical math probabilities.

To calculate the empirical probability of an event, you count the number of successful events and divide by the number of times the trials took place.

$$P = \frac{\text{Number of successful outcomes in a series of real trials}}{\text{Number of trials}}$$

3. In all of the years since 1919, what is the empirical probability that a horse has won the Triple Crown winner this year?

Of course there have been some horses that have won two of these races but not all three. Horses that have won Kentucky Derby and Preakness but not the Belmont are often called "near misses".

1932	Burgoo King
1936	Bold Venture
1944	Pensive
1958	Tim Tam
1961	Carry Back
1964	Northern Dancer
1966	Kauai King
1968	Forward Pass
1969	Majestic Prince
1971	Canonero II
1979	Spectacular Bid
1981	Pleasant Colony

1987	Alysheba
1989	Sunday Silence
1997	Silver Charm
1998	Real Quiet
1999	Charismatic
2002	War Emblem
2003	Funny Cide
2004	Smarty Jones
2008	Big Brown
2012	I'll Have Another
2014	California Chrome

4. What is the empirical probability that *Mage* will be one of these near miss horses?
5. Lastly, what is the empirical probability that *Mage* will either be a near miss horse or win the Triple Crown?

Of course there is a lot more to making an educated guess about who will win the Preakness this week.

6. What other considerations would you like to understand before you decide who to root for?