MINI PROJECT

Who Are Better Runners, Men or Women?

An oversimplified answer here would be to say that men are better because in any given event, the men's world record time is less than the women's. For instance, as of the year 2000, the men's and women's world records for the 100-m dash were 9.79 sec and 10.49 sec, respectively. This reasoning, however, ignores the fact that, historically, women have been training and competing on the world stage for far less time than men. Likewise, it's only relatively recently that women have been supported or sponsored to a degree approaching that for men. Indeed, currently, women's records are falling at a faster rate than men's. Complete the following research and calculations, then discuss this issue.

The following table gives the names of athletes who set world records in the 100-m dash over the years 1968–2009. (The table is restricted to times that were recorded electronically, rather than manually; 1968 was the year in which electric timing made its major debut (in the 1968 Olympics in Mexico City).

Selected Record-Setting Performances in 100-m Dash, 1968–2009*

Year	Men	Women
1968	James Hines, USA (10/14/68)	Wyomia Tyus, USA (10/15/68)
1972		Renate Stecher, DDR (East Germany) (9/2/72)
1976		Annegret Richter, FRG (West Germany) (7/25/76)
1977		Marlies Oelsner (Göhr), DDR (7/1/77)
1983	Calvin Smith, USA (7/3/83)	Evelyn Ashford, USA (7/3/83)
1984		Evelyn Ashford, USA (8/22/84)
1988	Carl Lewis, USA (9/24/88)	Florence Griffith-Joyner, USA (7/17/88)
1991	Carl Lewis, USA (8/25/91)	
1994	Leroy Burrell, USA (7/6/94)	
1996	Donovan Bailey, CAN (7/29/96)	
1999	Maurice Greene, USA (6/16/99)	
2005	Asafa Powell, JAM (6/14/05)	
2006	Asafa Powell, JAM (8/18/06)	

(*Continued*)

Year	Men	Women
2007	Asafa Powell, JAM (6/9/07)	
2008	Usain Bolt, JAM (8/16/08)	
2009	Usain Bolt, JAM (8/16/09)	

*In cases in which the record was broken more than once in a given year, only the fastest performance is indicated.

(a) Using the library or the Internet, look up the 100-m times for each athlete in the table.

(b) For the men's records: Let x represent the year, with $x = 0$ corresponding to 1960, and let y represent the record time in that year. Find the regression line $y = f(x)$.

(c) For the women's records: Again, let x represent the year, with $x = 0$ corresponding to 1960, and let y represent the record time in that year. Find the regression line $y = g(x)$.

(d) Solve the equation $f(x) = g(x)$ to compute a projection for the year in which the men's and women's records might be equal. What would that common record be?

4.2 QUADRATIC FUNCTIONS

In the text and exercises for the previous section we saw examples in which data sets and their scatter plots were modeled using a linear function. Clearly, however, linear functions with their straight line graphs cannot be appropriate models for every data set. Consider, for instance, the scatter plot in Figure 1, which shows the daily trading volumes for Amazon.com stock in a particular month. It appears that no line could adequately summarize the situation. Next, in Figure 2, look at the data and scatter plot relating to the spread of AIDS. Here it appears that some sort of curve, rather than straight line, would be better for summarizing the trend in the data. As you'll see in a moment, one type of curve that does fit the data in Figure 2 quite well is obtained by graphing a *quadratic function.*

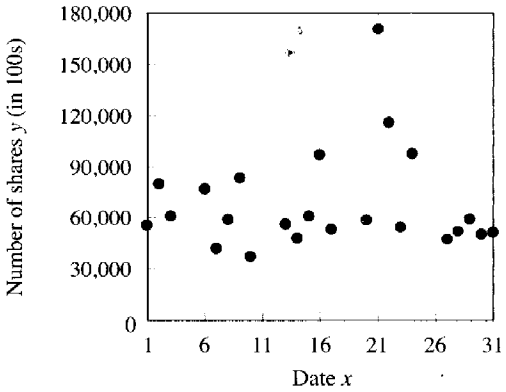

Figure 1
Daily number of shares of Amazon.com stock traded in March 2000. $x = 1$ corresponds to March 1.