The physics of shot putting

Throwing a shot put involves much technique and strength, but also a few physics concepts. To find the optimal angle to create the most distance with the shot is one objective. Another objective is to find the difference between force and speed (how hard vs. how fast) to determine the best typical throw.

The shot put field event originated in the Olympics. It was a test of strength between various athletes. The athlete who could heave the shot the farthest was the champion.

Originally the shot put was a large stone. Since then it has become a 16-pound ball made of a metal not softer than brass. Most of the times it is filled with lead.

In older times, the athlete must stand on a wooden rectangle to throw. If he went outside of it, he fouled and his throw was discounted. At the time, a standing throw was the only way to put. Since, the rectangle has become a seven-foot circle. The glide has since been developed. It is used to gain momentum and create more force. Another type of throw has also been made. The rotational throw generates more force because of a longer push with the shot put.

Obviously, the best angle for a throw will result in a farther throw. However, many throwers will tell that throwing at the best angle is not always easiest. It is more simple to throw at a personal angle, because of muscle memory and strength in the push muscles. But if one was to achieve an amazing throw, he/she would have to take it into account.

It is generally considered that an angle of 45 degrees will achieve a maximum distance. It has been found however that it is best for shot putters to launch at angles of 40 degrees or less. Apparently, many shot putters throw at lower angles, such as 35 degrees, which is easier for chest muscles to produce. Air resistance affects the shot and decreases the optimal angle.

(Taken from http://clackhi.nclack.k12.or.us/Physics/projects/Final%20Project-2005/5-FinalProject/shotPut/Shotput%20Physics.htm)

EXCERCISES

1 **True or false?**

a. The Shot Put is a modern sport. T F

b. The best throwing angle is at 45 degrees. T F

c. Throwing at the best angle is the easiest way to put the shot. T F

d. At the beginning the Shot Put was a test of strength between athletes. T F

2 **Complete.**

Shot Put techniques are strongly .... with physics. The main ..... of this sport are .....: the first one is to find the ..... angle for the put in order to ..... the shot as far as ..... The second objective is to find the ..... between force and ..... to determine the best ..... throw.

throw • two • connected • objectives • speed • possible • optimal • typical • difference

3 **Match questions and answers.**

QUESTIONS		ANSWERS	
A	What did the first shot putting athletes throw?	1	It is a technique that began when the seven-foot circle took the place of the wooden rectangle.
B	When did the glide start to be used?	2	They usually throw at 35 degrees even though the best throwing angle is at 45 degrees.
C	At which angle do athletes usually throw the shot?	3	They simply threw a stone.

A	B	C .....