

# PROJECTILE MOTION + WORK-ENERGY

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## Brian Oldfield, Brash Shot-Putting Superstar, Dies at 71

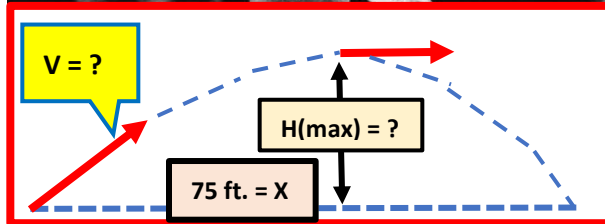


**INTRODUCTION:** This application is a combo of projectile motion and energy conservation concepts.

**QUESTIONS:** (a) Using projectile motion concepts find initial speed of his record 75 ft. (at 45 degrees to horizontal) toss and total time of flight?, (b) Find mass of 16 lb. shot butt? (c) Find initial kinetic energy of shot putt?, (d) Find work Brian did to achieve the initial kinetic energy of shot-putt?, (e) Find kinetic energy of shot-putt at high point in it's parabolic path (see sketch in lower left)?, (f) Find maximum height (H) of shot-putt using energy conservation concepts?

**HINTS:**  $x = v t$ ,  $y = v_o t + \frac{1}{2} g t^2$ ,  $g = 32 \text{ ft./s.}^2$ ,  $KE = \frac{1}{2} m v^2$   
Weight =  $m g$ ,  $U(\text{gravitational potential energy}) = m g h$   
 $W = \Delta K + \Delta U$ , where  $W = 0$ , when considering air friction = 0  
Another way to state energy conservation is: work and energy lost = work and energy gained.

**ANSWERS:** (a)  $v = 49 \text{ ft./s.}$ ,  $t(\text{total}) = 2.165 \text{ s.}$ , (b) 0.5 slugs, (c) 600 J. (d) 600 J., (e) 300 J., (f)  $H = \sim 18.76 \text{ ft.}$



Brian Oldfield competing in 1973, after he joined the professional International Track  
Brian Oldfield, a brash shot-putter who became a superstar in an often-overlooked sport by mastering a technique that let him throw the **16-pound metal ball farther than anyone in his day**, died on Sunday at home in Elgin, Ill. He was 71. Oldfield brought a fresh approach to shot-putting. Between throws he sometimes puffed on a cigarette. At the 1972 Olympic trials, he wore a uniform of Speedo-like shorts and a fishnet top — and beat out Randy Matson, the gold medalist in the 1968 Summer Games, for a spot on the United States team that went to Munich. **But more than anything, he was a huge, easy-to-find physical sight: his head a mop of tousled blond curls and an impossibly thick neck that topped an etched-from-granite physique that stood 6 feet 5 inches and weighed around 275 pounds.** “When God invented man, he wanted him to look like me,” Oldfield reportedly said, reflecting the personality he brought to track and field: a boastful athletic giant known for partying and having fun. “On my baddest day,” he once said, “I’m better than anyone else.” Maybe not. But on his best days, he was superb. After finishing sixth at the Summer Olympics in Munich, Oldfield stopped using the standard shot-putting style that included a 180-degree spin. Instead, **he gyrated one and a half revolutions, or 540 degrees, in tight, rapid circles to generate enormous momentum before unleashing the 16-pound shot.** “Call it the Oldfield Spin or the Ogre’s Orbit,” he said in 1975. “Whatever you call it, it’s mine and it’s the style of the future. No one can touch me unless they adopt that style, and right now I’m miles ahead of everyone else.” Watching that spin led Curry Kirkpatrick of Sports Illustrated to write that Oldfield’s body had wound itself into a “torque of lightning and whirl” that became “the spinning arc of a discus thrower.” In 1975, Oldfield set an indoor world record of 72 feet 6 ½ inches and then **established an outdoor world record of 75 feet**, farther than any shot-putter until then. “Perhaps he is Hercules unchained,”