

PROJECTILE MOTION

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Stephen Curry has made a record 288 3-pointers this season, eclipsing the 286 he made last season.

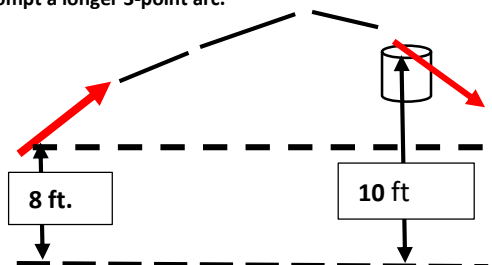
INTRODUCTION: Stephen Curry is a great basketball player. He gets most of his 3 point throws. In projectile motion friction is considered negligible at low speeds. Three big concepts about projectiles are: $V_{HORIZONTAL}$ = constant , $V_{VERTICAL}$ behaves as any free falling object, time to move horizontally = time to move vertically. Usually two unknowns exist in projectile solutions. Thus, the need is to generate two equations. It is best To break your solution into two parts: horizontal part and vertical part. This set up is because no acceleration exists in the horizontal direction. Acceleration only exists in the vertical direction.

Curry's Game Now

. If you have somehow missed watching the Golden State Warriors this season, you might have a quaint notion of how basketball is played. You might believe, for instance, that **3-point shots are difficult**. Or that **players should generally avoid hoisting jumpers 35 feet from the basket**. Or that, in the **N.B.A.**, a team cannot clinch a playoff berth in February, with six weeks left in the season. None of that is true anymore, thanks to one player: **Stephen Curry, a butterfly with a jump shot who is reshaping people's understanding of the game**. He is an outlier. He has caused a tipping point in basketball. The biggest disrupter in sports is on display in — where else? — the Bay Area. In recent days, Curry has broken the league record for 3-pointers in a season — which he did for the first time three seasons ago — and the Warriors (53-5) still have 24 games left to play, starting Tuesday night at home against the Atlanta Hawks. **He has made 288 3-pointers this season, eclipsing the 286 he made last season. (So he is now No. 1**, No. 2 and, you guessed it, No. 3 on the single-season list, with 272 during 2012-13.) But the Curry phenomenon is different because of his size — **he is a sinewy 6 feet 3 inches, 190 pounds — and because of the way in which he dominates games by scoring far from the basket, somehow stretching the court beyond its conceivable limits.**



Just as Babe Ruth inspired changes to ballparks, Curry could prompt a longer 3-point arc.



QUESTIONS: (a) If Curry shoots a ball from 35 ft. = X at a height of 8 ft. and 45° at the 10 ft. high basket rim, find initial speed of ball and time of flight? (b) Find maximum height of ball relative to floor? (c) Find vertical component of velocity as the ball goes through the hoop? (d) Find velocity and angle of ball as it goes through the hoop?

X QUESTION SET: (e) to (h) Same questions as (a) to (d) , but ball shot 22 ft horizontally from basket. 22 ft. is the three point line.

HINTS: $X = V_{AVE} t$, $V = V_o + a t$, $Y = V_o t + \frac{1}{2} a t^2$, $V^2 = V_o^2 + 2 a X$

ANSWERS: (a) $V = 34.47 \text{ ft./s.}$, $t = 1.436 \text{ s.}$, (b) $h_{MAX} = 17.3 \text{ ft.}$
(c) -21.58 ft./s. , (d) $32.55 \text{ ft./s. @ } 41.54^\circ \text{ below horizontal.}$

X ANSWERS: (e) $V = 27.83 \text{ ft./s.}$, $t = 1.118 \text{ s.}$, (f) $h_{MAX} = 14.05 \text{ FT}$
(g) -16.1 ft./s. , (h) $25.42 \text{ ft./s. @ } 39.29^\circ \text{ below horizontal.}$