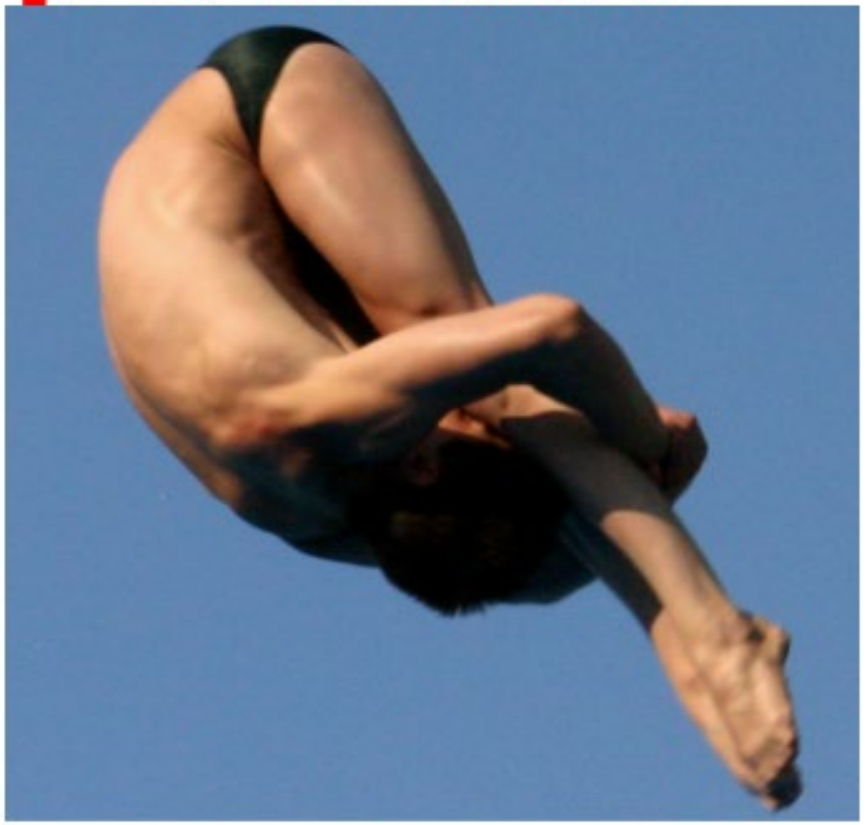
Physics 20 Unit 1 - Vectors

Projectile Motion III - Wrap-Up & Review



Review: The Kickoff.

A punter kicks a football with an initial velocity of 22 m/s [40.0°].

a) How high does it go?

b) How far does it go?

c) What is the ball's final velocity?

Review: The Winning Basket

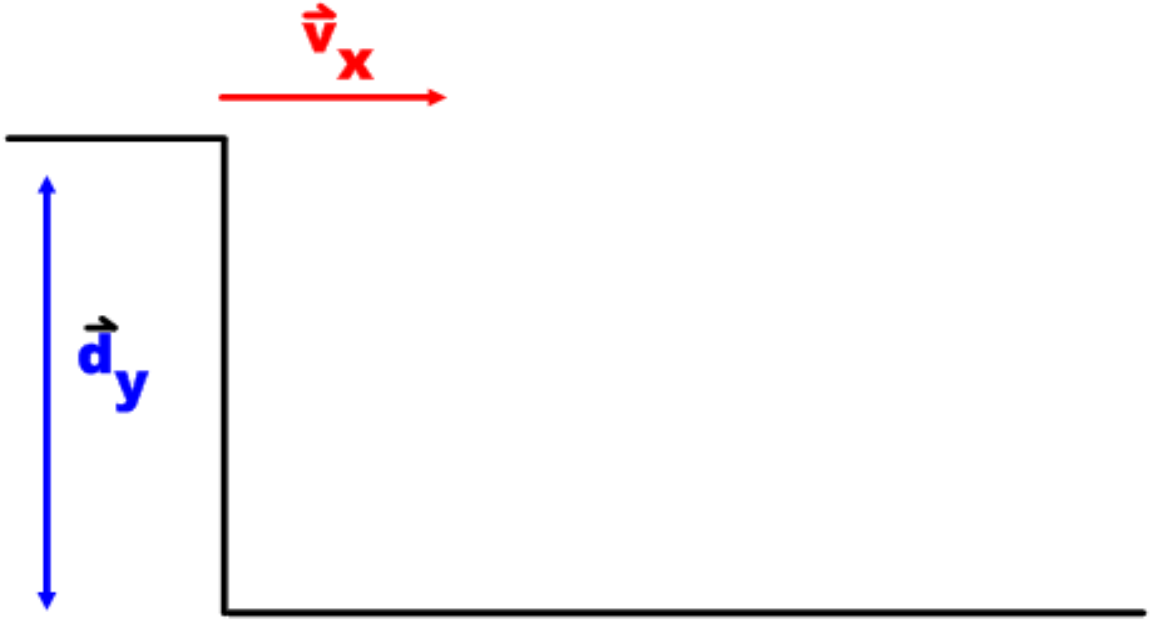
The Miami Heat are down by 2 points with 2.00 s remaining in a basketball game. Chris Bosh comes off the bench and takes a shot with velocity 10.0 m/s [60°]. The ball is released from the height of the basket, 3.05 m above the ground. He makes the basket (of course).

a) How much time is left when the shot is made?

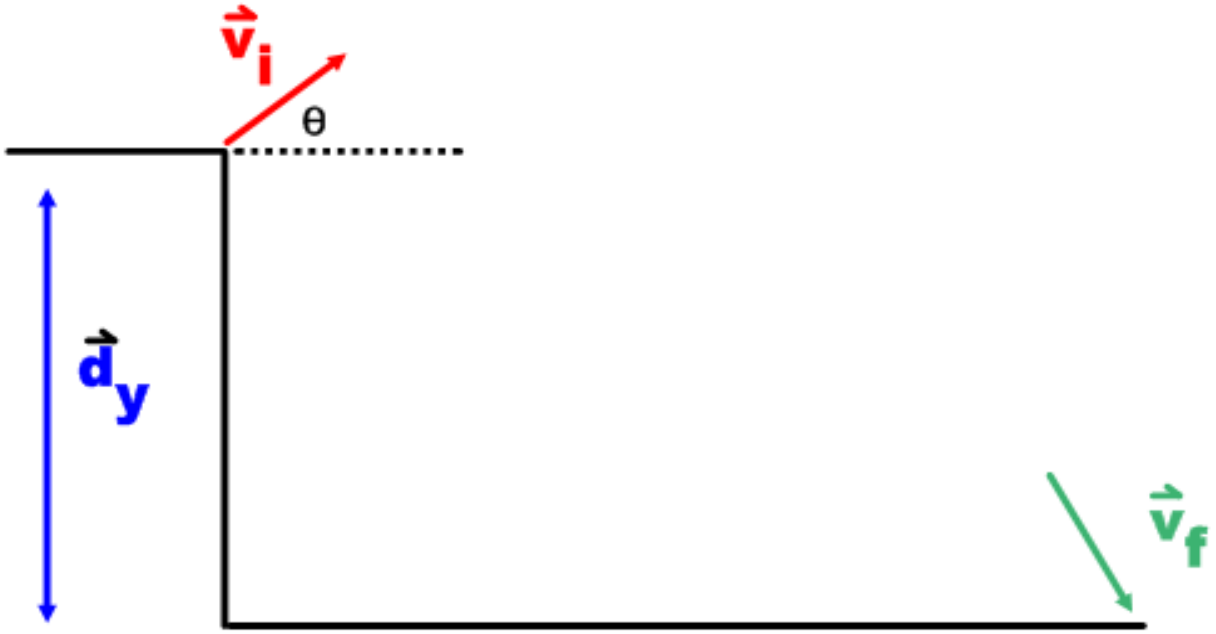
b) Shots made from outside 6.02 m are worth 3-points. Did Bosh's shot qualify as a 3-pointer? Did he win the game?

A Putnam projectile question...

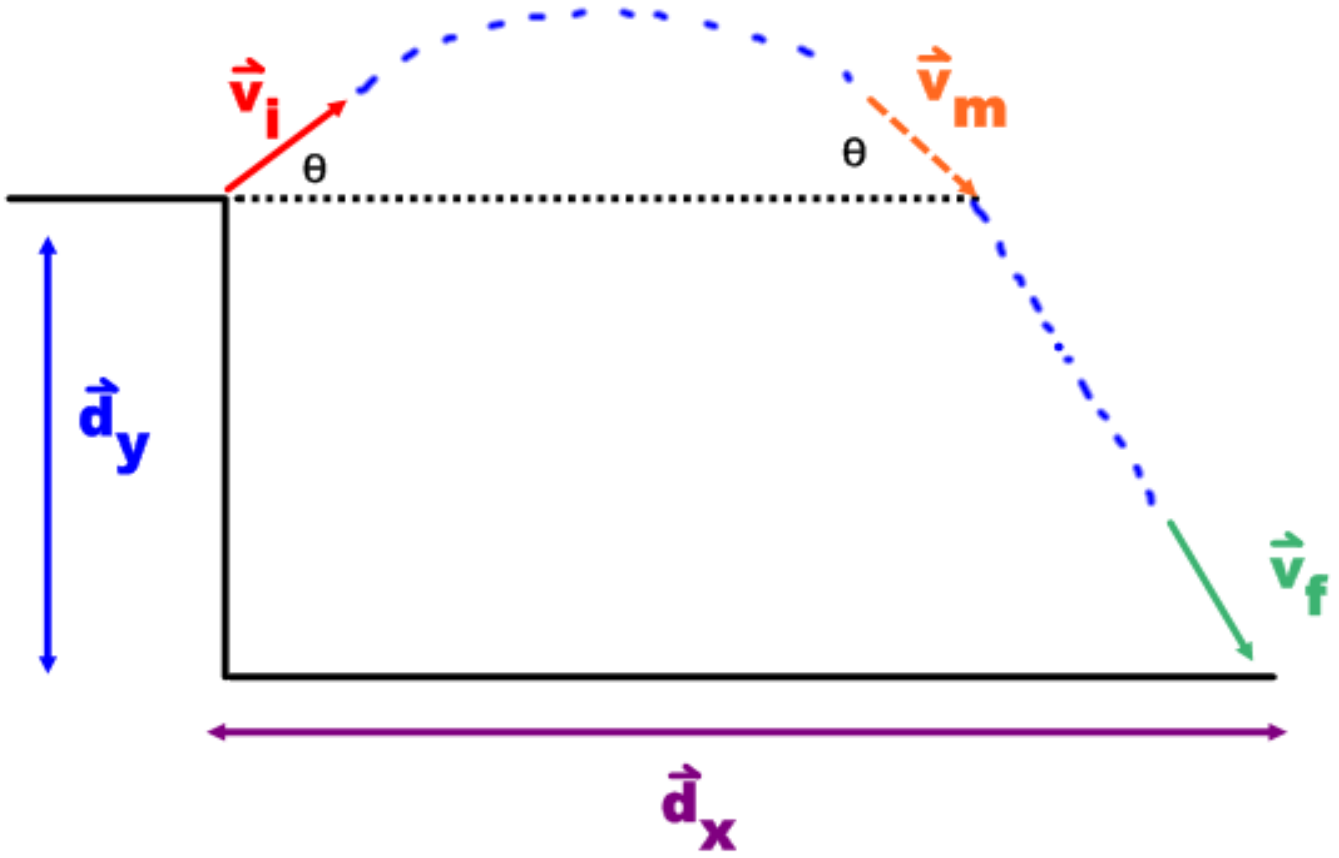
What's better than launching a projectile from a height, $\vec{d}_y$, with a horizontal velocity, $\vec{v}_x$?



Answer: launching a projectile from a height, $\vec{d}_y$ at an angle with velocity, $\vec{v}$!



Conceptual Example:



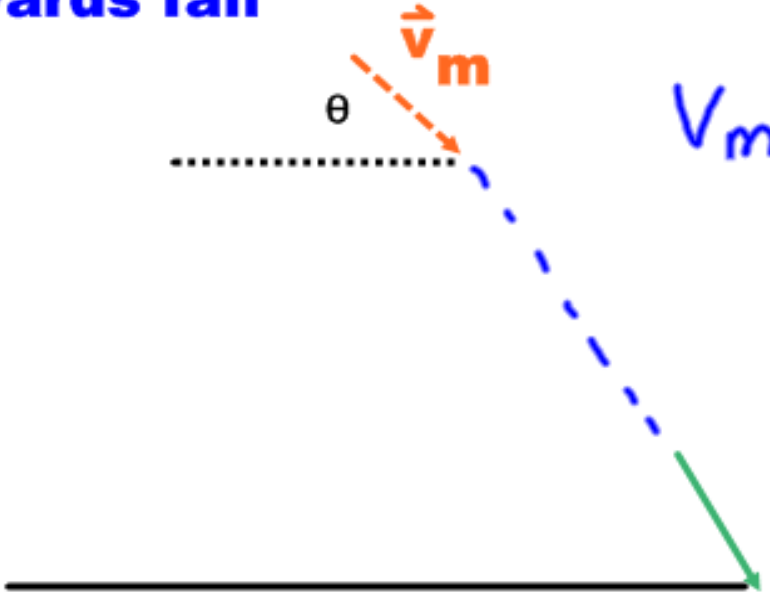
There are two distinct parts to this movement:

1. Stock Projectile Motion (parabola)

$\vec{v}_m$ = mid-velocity

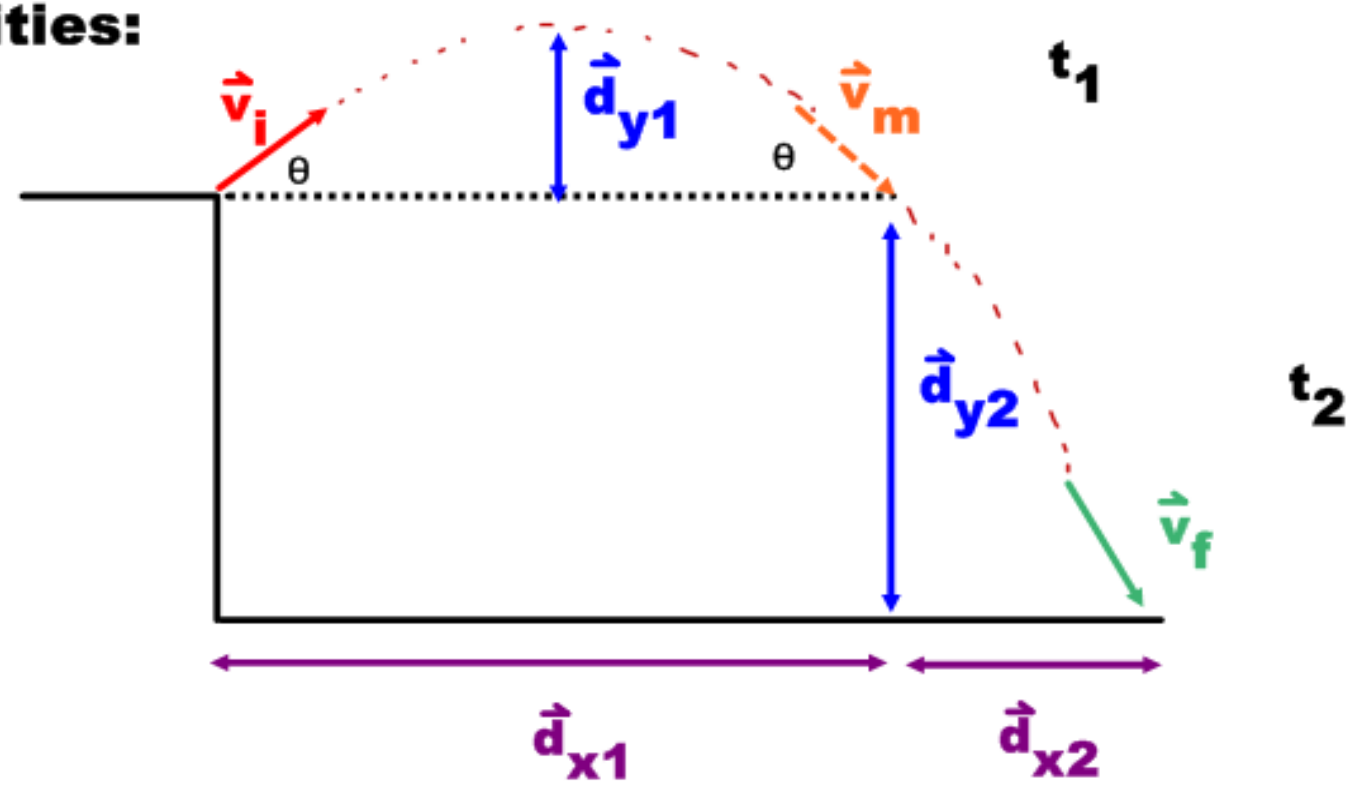
Where $\vec{v}_i = -\vec{v}_m$

2. A downwards fall



$V_m = V_i$ downward fall

Both parts of this movement have their own unique quantities:



But share some quantities:

- **The final velocity of part 1 (i.e. $\vec{v}_m$) is the same as the initial velocity for part 2.**
- **The $\vec{v}_x$ stays the same throughout.**

Diver Down!

A diver jumps off a platform of height 20 m at an angle of [30^{o}]. The initial velocity of the diver is 5.0 m/s.

a) How long, in total, is the diver in the air for?

HINT

1. Find t_1 with full time eqn.

2. find t_2 with $a = (v_f - v_i)/t$

b) How far from the platform should the pool be in order for the diver to hit it?