

# Physic<sup>2</sup> 121: Fundament<sup>o</sup>Is of Phy<sup>2</sup>ics I

October 9, 2006

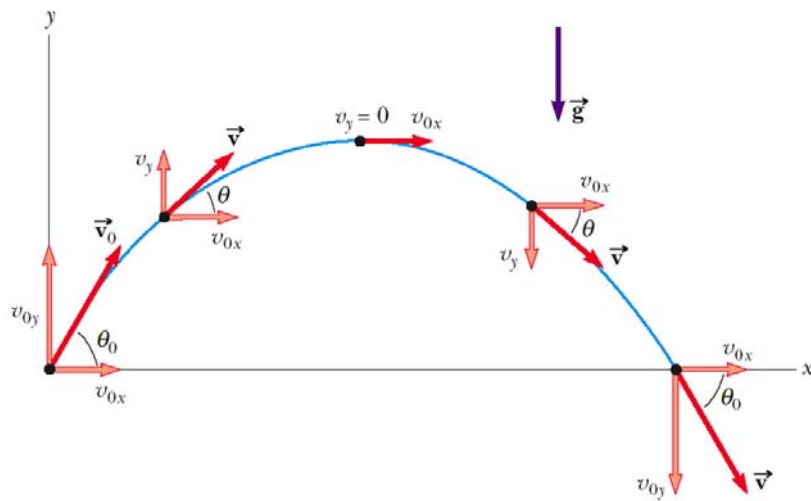


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PHYS 121

# Projectile Motion



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## Some Details About the Rules

- **x-direction**

- $a_x = 0$

- $v_{x0} = v_o \cos \theta_o = v_x = \text{constant}$

- $x = v_{x0}t$

- This is the only operative equation in the x-direction since there is uniform velocity in that direction

## More Details About the Rules

- **y-direction**
  - $v_{y0} = v_o \sin \theta_o$
  - free fall problem
    - $a = -g$
  - take the positive direction as upward
  - uniformly accelerated motion, so the motion equations all hold

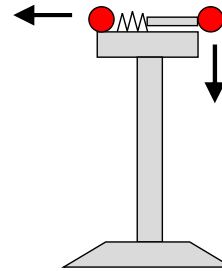


## Shoot and Drop



- A ball is shot sideways by a spring at the same time a ball is dropped.
- Which ball will hit the ground first?

1. the one shot?
2. the one dropped?
3. both the same?



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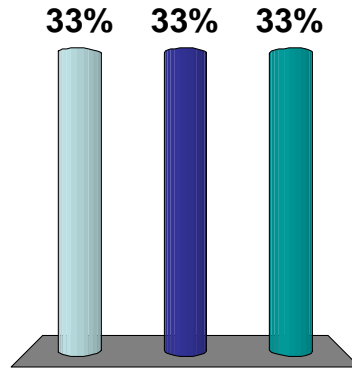
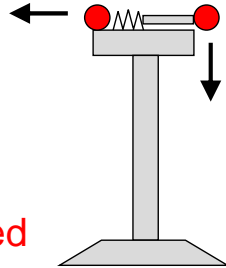


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The one shot

The one dropped

Both the same

1	2	3	4	5															
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## Hunter and the Monkey

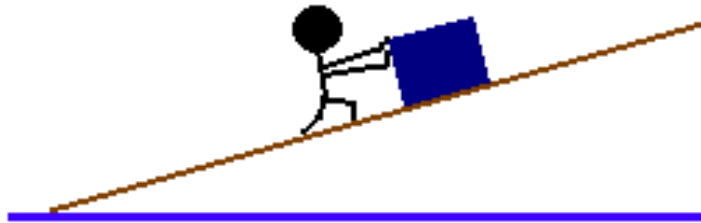
- A hunter is trying to shoot a monkey that is hanging in a tree. The clever hunter aims his gun directly at the monkey. The crafty monkey sees this and lets go of the tree and drops at the exact moment that the gun fires.



Q: Who's really more clever?

## Bob and the Ramp

- Bob is pushing a crate up a ramp. He exerts a force of 100 N on the crate. The crate has a mass of 10 kg. The ramp is at an angle of  $30^\circ$ , and the coefficient of kinetic friction between the ramp and the box is 0.2.
- Q: What is the acceleration of the crate?



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