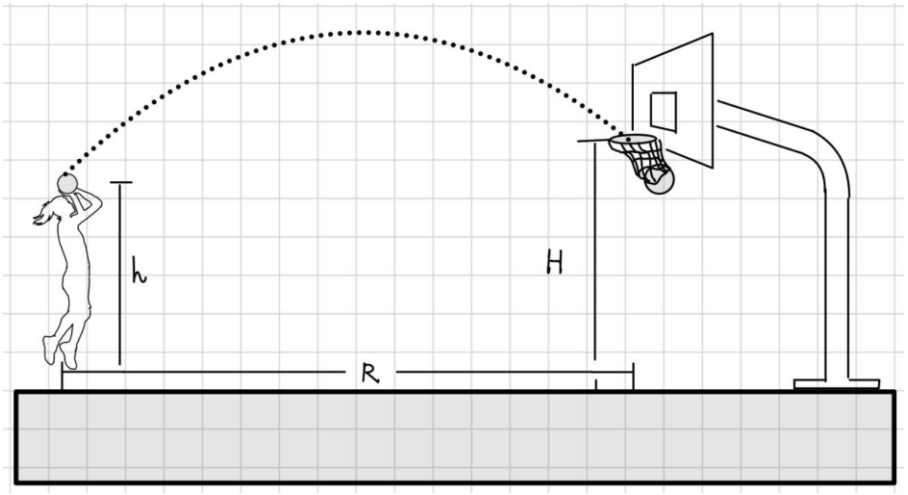
Name: _____

HW 3: Chapter 3

1. Projectile Motion I

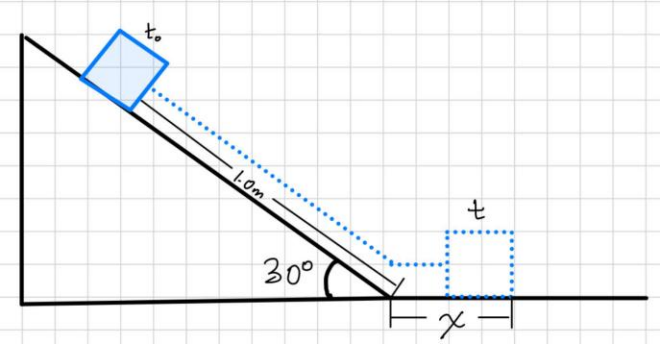
Caitlin Clark of the WNBA's Indiana Fever takes a last-second shot from a horizontal distance of R = 10.0 meters from the basket. The basketball leaves her hands at a height of h = 2.8 meters above the court. The rim of the basket is H = 3.1 meters high. She releases the ball at an angle of 40.0° above the horizontal. What initial velocity must the ball have to go through the hoop?

(Assume projectile motion with no air resistance and use $g = 9.81\ m/s^2$.)



2. Block Sliding on an Incline onto a Flat Surface

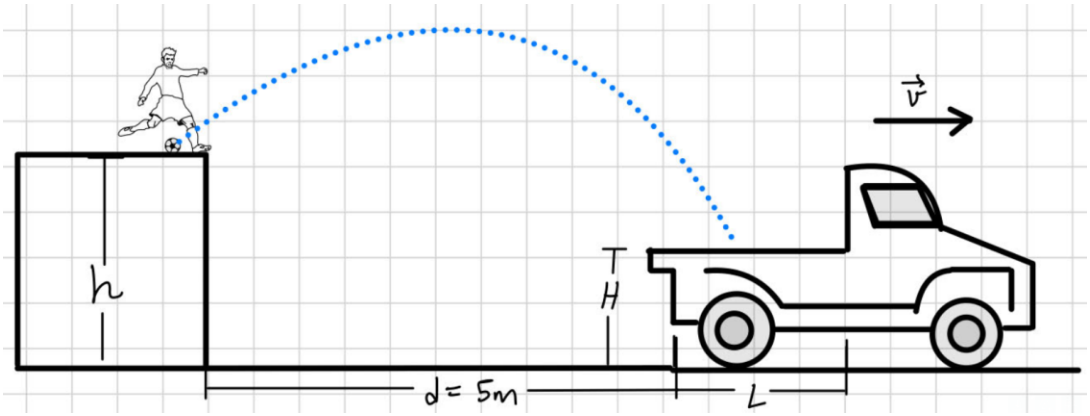
A block starting from rest at $x_0 = t_0 = 0$, begins sliding down a frictionless incline that is 30^0 sitting on a frictionless surface. It reaches the end of the incline but continues sliding onto the horizontal surface a distance x where it gradually comes to rest due to a known constant deceleration of $a = -0.5\ m/s^2$. **Calculate what x is. What is the full horizontal range the block traveled including the ramp and surface?**



Hint: Solve in two phases.

3. Projectile Motion II

A ball is kicked at an angle of $\theta = 45^o$ from a platform that is $h = 5.0\ m$ above the ground. At the same instant, a truck begins moving directly away from the kicker at a constant velocity $v = 9\ m/s$. The truck bed is $H = 1.5\ m$ high and $L = 2.5\ m$ long. The initial horizontal distance between the **back** of the truck and the **kicker** is $d = 5.0\ m$. The ball is kicked with an initial speed of $v_o = 12\ m/s$. At what time does the ball reach the height of the truck bed? At that moment, does it land in the truck bed?



4. Relative Velocity

A pilot must fly due north to reach her destination. The plane has an air speed of $v_{PA} = 300\ km/h$ (its speed in still air). However, a wind is blowing from the northeast at $v_{AG} = 90\ km/h$.

a) What is the speed of the plane relative to the ground (v_{PG})?
b) In what direction must the pilot head the plane to maintain a due north course