**General Physics B 1- Homework Set 1**

**Due on 10/07/2022, 5:00PM sharp. Please hand in your homework via eLearn.**

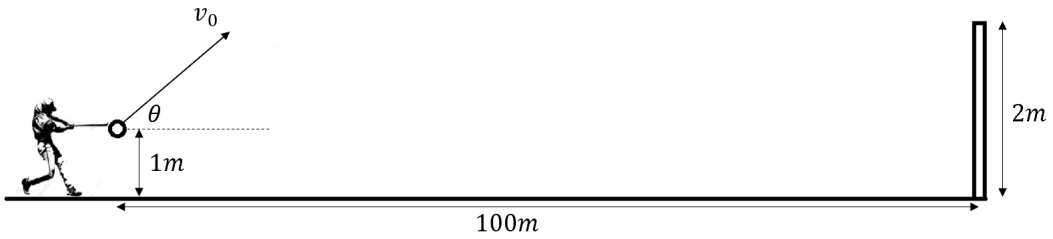
**1 points for each problem. Total:5 points.**

### 1.Safety Distance on a Highway

On a dry road, a car with good tires may be able to brake with a constant deceleration of $5m/s^2$. Now a car break down at the middle of a high way. The driver wants to put a warning sign at the back of the car. Assuming other drivers start to brake their car right after passing the warning sign. If the speed limit of the road is $100km/hr$, how far should the driver put the warning sign? (1point)

### 2. Projectile Motion - Home Run of Baseball

As shown in the figure, a baseball player hit the ball at $1m$ height and the launching angle $\theta$ =30°. The home run fence is $100m$ away from the home base, and the fence is $2m$ high. Assuming the air drag force can be neglected. What is the minimum initial velocity $v_0$ of the ball to be a homerun (that is, the baseball can pass right above the home run fence)? (1point)




### 3.Relative Motion

Ship A is located 4.0 km north and 2.5 km east of ship B. Ship A has a velocity of 20 km/h toward the south, and ship B has a velocity of 30 km/h in a direction 37° north of east. Assuming the unit-vector toward the east $\hat{i}$ and the unit-vectortoward the north is $\hat{j}$. (a) Write an expression (in terms of $\hat{i}$ and $\hat{j}$) for the position of A relative to B as a function of t, where t = 0 when the ships are in the positions described above. (0.5point) (b) What is that least separation of the these two ship? (0.5point)

### 4.Weight Difference Due to Uniform Circular Motion ot the Earth

When you stand on a scale, the scale reading shows the force with which it's pusing. A person stand on a scale at Earth's north pole and the scale reads $50.00kg$. What is the reading if the same person stand on the same scale at Earth's equator? (1point) Assuming the radius of the earth is $6400km$, the tangant velocity at Earth's equator is $465m/s$, and $g = 9.8m/s^2$

### 5.Spring Force Between Blocks

A 2.0kg mass and a 3.0kg mass are on a horizontal frictionless surface connected by a massless spring with spring constant $k = 180N/m$. A $15N$ force is applied to the larger mass, as shown in the following figure. How much does the spring stretch from its equilibrium length? (1point)