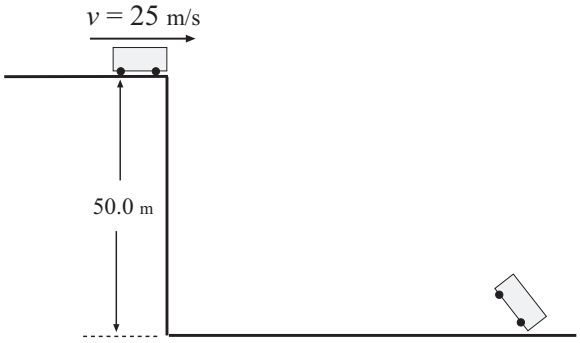
Name_____

Phys 2010 (NSCC), Spring 2007
Problem Set #3

1. A particle moving in two dimensions has an initial velocity in the $+x$ direction, with initial speed $20.0\,\frac{\text{m}}{\text{s}}$ (so $v_{0x} = 20.0\,\frac{\text{m}}{\text{s}}$, $v_{0y} = 0$). It undergoes a constant acceleration with $a_x = 0$ and $a_y = -6.0\,\frac{\text{m}}{\text{s}^2}$. What is the speed of the particle at $t = 4.0$ s?

(Recall the definition of speed: $v = \sqrt{v_x^2 + v_y^2}$.)

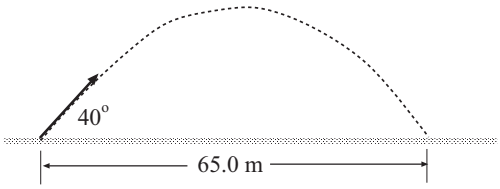
2. A car drives straight off the edge of a cliff that is 50 m high with a speed of $25.0\,\frac{\text{m}}{\text{s}}$ (Its initial velocity is completely *horizontal*.) How long did the car spend in falling? (Use the y equation of motion.)



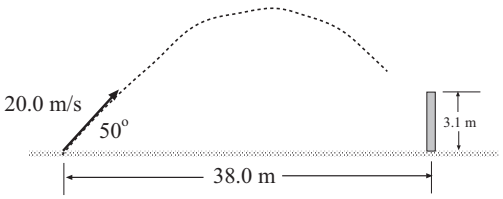
3. For the car in problem 2, how far from the base of the cliff (horizontally) is the point of impact? What was its speed at the time of impact?

4. A projectile is fired from ground level at an angle of 40°. It lands at the same level, with a range of 65 m.

What was the initial speed of the projectile?



5. A place kicker kicks the football from a point 38.0 m from the goal; the ball needs to clear the crossbar, which is 3.10 m high! When kicked, the ball leaves the ground with a speed of 20.0 $\frac{\text{m}}{\text{s}}$ at an angle of 50° from the horizontal.



At what time t was the ball directly over or under the crossbar?

6. In problem 5, what was the height of the ball at the time t that you found? Does the ball make it over the crossbar?

7. A 2.0 kg mass moves in one dimension; it is acted on by two forces, a 12.0 N force in the $+x$ direction and a 15.0 N force in the $-x$ direction.

What is the direction and magnitude of the acceleration of the mass?

8. A 3.0 kg mass starts from rest and accelerated uniformly in the $+x$ direction so that it has moved 19.3 m in 3.00 s

What is the net force which is acting on the mass?