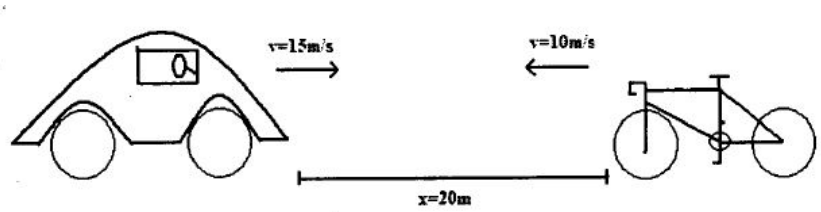
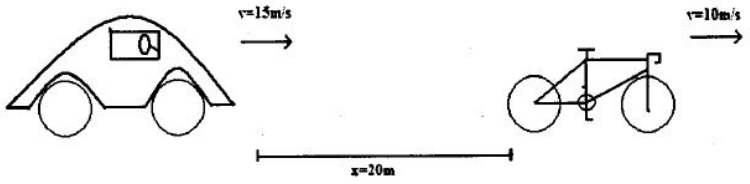
QP47

This problem is intended to help you answer the question of whether it is safer to ride your bike against or with traffic.
Suppose you are riding your bike against the flow of traffic (see below) at a speed of $v_b = 10\,m/s$ and a car comes around a blind curve directly towards you at a speed of $v_c = 15\,m/s$ only $x_0 = 20\,m$ ahead of your current position. Assume both you and the car begin braking instantaneously at this point, and both your bike and the car can each decelerate at a maximum rate of $5\,m/s^2$.



a) (4 points) Will you hit the car and if so what are the speeds of your bike and the car at impact? If you find you will not hit the car, how close did you come to colliding with the car (in meters)?

Now suppose you are riding your bike with the flow of traffic (see below) still at a speed of $v_b = 10\,m/s$. A car comes from behind you around a blind curve at a speed of $v_c = 15\,m/s$ only $x_0 = 20\,m$ from your current position. Since the car is behind you, and you do not see it, you continue riding at $v_b = 10\,m/s$. The car brakes immediately upon seeing you and it can again decelerate at a rate of $5\,m/s^2$.



b) (4 points) Will the car hit you in this situation?

c) (2 points) What is the minimum deceleration the car needs to avoid hitting your bike?