

## Crime Scene Investigation (Justify your conclusions using the Physics)

Someone broke the windshield of Mr. Blum's new car ! He is very angry !  
So, he calls the police to discover the culprit...



The car is parked under a tall building, in the surroundings there is a white stone, a broken vase and a soccer ball.

The building's caretaker claims that at 9:10 he heard the sound of breaking glasses; a waste sorting truck was passing nearby, and a courier had just arrived.

Policewoman Annie identifies four suspects: the bully John John, the old lady Mrs Marple, the courier Fast Bill e the waste collector Mr.Green.

Let's hear what they have to say !



**John John** is known for playing football in the surroundings of the building.  
 He says: “I rode to the nearby pub on my scooter, I have the receipt, issued at 9:14 !  
 I wasn’t playing football at that time !”.  
 Annie measures that the pub is 4 Km far from the building. Could it have been John John ?



**Mrs Marple** loves flowers, she lives on the 10th floor of the building, at 40 meters high.  
 Annie suspects that she might have dropped the vase while she was watering the plants.  
 But Mrs Marple screams: “This vase is not mine !”.



The forensic police gives Annie a table with the final speed of an object dropped from different heights, and says that the windshield has been broken by something going faster than 40 m/sec. Is Mrs Marple lying ?

| Height (m) | Final speed (m/sec) |
|------------|---------------------|
| 0          | 0                   |
| 2          | 6,3                 |
| 4          | 8,9                 |
| 6          | 10,9                |
| 8          | 12,5                |
| 10         | 14,0                |

**Fast Bill** was carrying some packages, it looks like the white stone was in one of them !.  
 “It’s true, says Mr Bill, it’s an aquarium stone for the new aquarium I brought to the first floor !”.  
 “The stone fell by accident on the ground when I was unloading, it didn’t touch the car !”

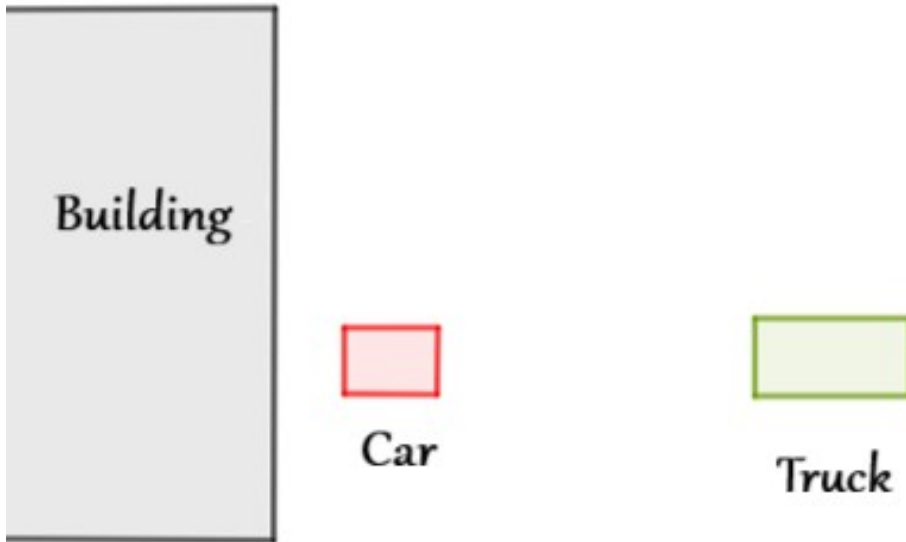


Annie measures that the mass of the white stone is 90 g and it is approximately a sphere with radius 3 cm.  
 Is what Fast Bill says true ?

**Mr Green** says: I was far from the red car, I cannot have touched it by my mechanic arm !



A satellite photo shows the situation at 9:10:



Knowing that the ecological truck is 4,2 m long and the mechanic arm arrives at 8,5 meters, may Mr Green be the one who made the mess ?

So, be Annie, the policewoman: who is lying, and why ???

