Name: DISC: Score: / 20

Instructions:

|  |  |  |  |
| --- | --- | --- | --- |
| Q1 | Q2 | Q3 | Q4 |
|  |  |  |  |
| 10 | 5 | 5 | 5 |

* Do your own work.
* Answer the questions below in the space provided.
* Make sure you show all your work and any equations that you use.
* Please place a box around your answers.
* Remember to give the correct units with all numerical answers

1. You drop a ball from the roof of the John Hancock Center (height at the roof: 344 m). The ball is of mass .
   1. Which kind of energy does the ball have just before you drop it:
      1. Potential Energy ().

Selection:

* + 1. Kinetic Energy ()
    2. Neither
  1. Calculate the potential energy of the ball at the roof of the building.

Potential Energy (3 pts):

* 1. Find the velocity of the ball just as it hits the ground (ignore air resistance).

Velocity (3 pts):

* 1. Does the force of gravity do work () on the ball? Explain your answer.

Answer (3 pts):

1. Impulse changes momentum (. So momentum and force are related. You throw a ball of mass straight at the wall of your dorm room. The ball travels with . Change in momentum is .
   1. The ball bounces straight off the wall ( Calculate :

Answer (3 pts):

* 1. If the ball interacts with the wall for 0.1 s, how large is the force experienced by the ball in the collision?

Answer (2 pts):

1. A block of mass rests on a frictionless floor. It suddenly explodes breaking into two pieces: piece 1, and piece 2, . The pieces travel in opposite directions along the floor.
   1. Which of the following is conserved:
      1. Momentum:

Selection:

* + 1. Kinetic energy:
  1. Using conservation of momentum () and , find , the *speed* of part 2.

Answer (2 pts):

* 1. Which part has the *larger* kinetic energy:

Solution (2 pts):

* + 1. Part 1
    2. Part 2