

Problem Set #1 due beginning of class, Tuesday, Sept 27.

1. I inadvertently walk off a cliff. The process comes to a grim result 3 seconds later when I meet the ground.

Please look at this process closely through all 4 lenses.

a) Momentum:

- i) How does my momentum change during the three seconds and there after?
- ii) Why should this be the case?
- iii) Can you make a rough graph of my momentum as a function of time from 0 seconds to 4 seconds?
- iv) Is momentum conserved during this process? Did I break the law of conservation of momentum?
- v) If it's true that momentum inside of a closed system must be conserved, please describe the full system we're talking about here.

b) Energy:

- i) Please identify energy transitions or state why there are none.
- ii) What is the energy at the very beginning? What is the form of energy at the very end?
- iii) Was energy conserved? Please describe.

c) Forces:

- i) Is there a force or forces acting on me? Please identify.
- ii) I've defined a force as an interaction between two bodies whereby momentum is transferred. Can you identify two bodies? What do we mean by momentum is transferred? What is happening?

d) Kinematics:

- i) Can you describe my motion? What might my speed look like as a function of time. Can you make a speed vs time graph?
- ii) Can you describe my height as a function of time? Can you make a height vs time graph?