Phys100 Midterm exam

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Name and id:

Note: Exam is 90 min. Each question 20 points. Take gravity constant $g = 9.80m/s^2$.

1. A rock is dropped in a well and 3.4s later it is heard after it hits the bottom. What is the depth of the well? sound velocity is 340m/s.

2. A plane 1000m above ground moving 70m/s to north direction. There is a wind 10m/s to the West direction. A package is dropped from the plane. Where will it drop?(Choose a coordinate where the origin is when package left the plane)

3. A block of mass $10kg$ is on a table is connected to a bucket. Static friction coefficient for table is $\mu_s = 0.45$ and kinetic friction coefficient is $\mu_k = 0.2$. Sand starts to fill the bucket and stops when it starts moving. What will be the acceleration of the system just after it starts moving?
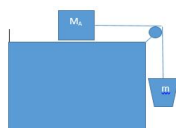

Figure 1:

4. A $2kg$ block sits on $8kg$ block on the table. No friction between the block and the table or between the blocks. What will be the force applied to bottom block so that the top blocks accelerates $2m/s^2$ to the right? Draw free body diagram and comment on what would happen if there is friction.

Figure 2:

5. Gravitational constant at the surface of earth is $9.80m/s^2$. What will it be if you go up $340km$ above ground? Earth radius is approximately $6800km$.