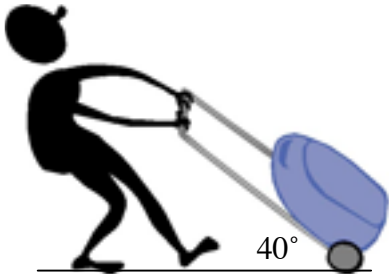
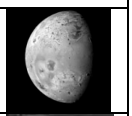
Name:_____

Solve the following problems in the space provided. Use the back of the page if needed. Each problem is worth 20 points. You must show your work in a logical fashion starting with the correctly applied physical principles. The equations you need are on the equation sheet. Your score will be maximized if your work is easy to follow because partial credit will be awarded.

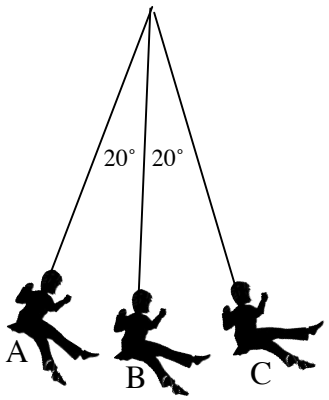
1. The 20.0kg suitcase is pulled with a force of 60.0N at an angle of 40.0° above horizontal. The resulting acceleration is 1.00m/s^2. (a)Show the direction of each force that acts on the suitcase in the drawing at the right. (b)Find the magnitude of each force.



2. Below is a table of some data about four moons of Jupiter discovered by Galileo. Rank these moons in order of the magnitude of their acceleration. That is, rank first the one with the highest acceleration and rank last the one with the smallest acceleration. Explain your reasoning.

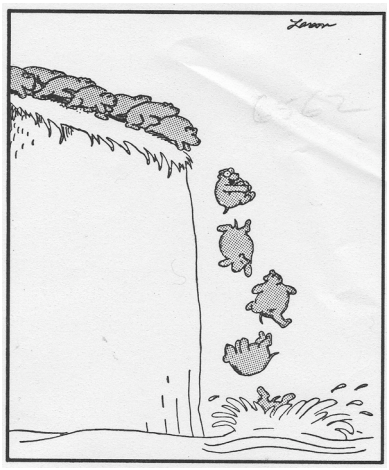
Moon	Orbital Radius (x10^{6}m)	Orbital Speed (x10^{3}m/s)	Image
Io	422	17.3	
Callisto	1883	8.20	
Ganymede	1070	10.9	
Europa	671	13.7	

3. A 30.0kg child on a 2.00m long swing moves back and forth through a 40° angle (20° on each side of the vertical). Find the work done by the tension, the work done by gravity and the total work done on the child as she moves from (a)A to B, (b)B to C, and (c)A to C.



Motion	Work by tension	Work by gravity	Total work
A to B			
B to C			
A to C			

4. The lemmings shown at the right leave the top of a 4.00m high cliff with a speed of 3.00m/s at an angle of 70.0° below horizontal. Find the speed at which they hit the water.



5. A child's toy shown below consists of a spring (k = 2000N/m) that when released from a compression of 3.00cm sends a 75g toy car up a 10.0cm high ramp and launches the car at 4.00m/s at an angle of 30° above horizontal. (a)Name at least two non-conservative forces that might be acting on the car between the time it leaves the spring and the time it leaves the ramp. (b)Find the total work done by all the non-conservative forces.