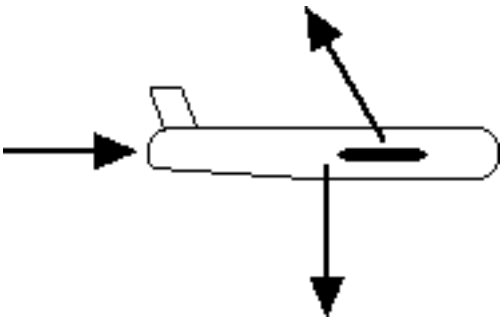
Name:_____

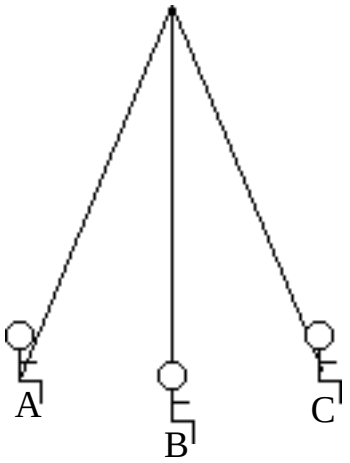
Solve the following problems in the space provided. Use the back of the page if needed. Each problem is worth 20 points. You must show your work in a logical fashion starting with the correctly applied physical principles which are on the last page. Your score will be maximized if your work is easy to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

1. A simple model of the dynamics of an 5000kg airplane flying at constant speed is shown at the right. It consists of three forces; the weight, the forward thrust from the engines, and the lift from the wings. Find the magnitude and direction of the lift force when the thrust is 7000N.

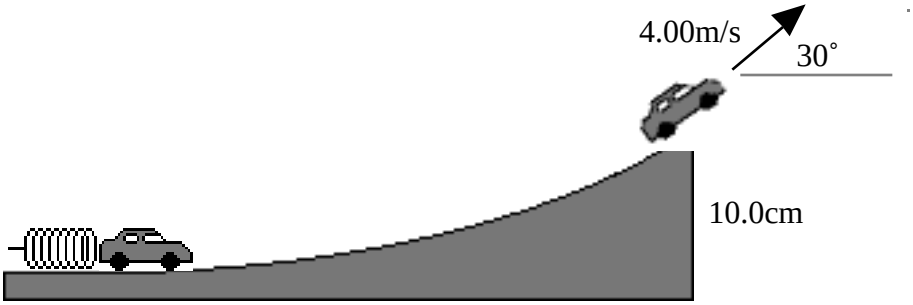


2. A roller coaster car and its riders have a mass of 800kg. They are moving 17.0m/s when they reach the top of a circular loop of radius 20.0m. Find the magnitude and direction of the force exerted by the track on the car at this moment.

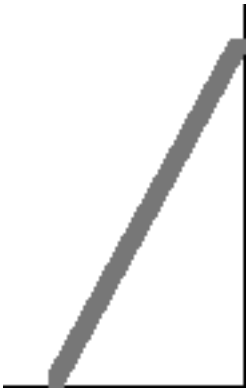
3. A 30.0kg child on a 2.00m long swing moves back and forth through a 45˚ angle (22.5˚ on each side of the vertical). Find the work done by the tension, the work done by gravity and the total work done on the child as she moves from (a)A to B, (b)B to C, and (c)A to C.



4. A child's toy shown below consists of a spring that when released from a compression of 2.50cm 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. Find the spring constant of the spring.



5. A ladder leans against a smooth wall as shown. (a)Show the forces that acts on the ladder in the diagram below. (b)List those forces in the table below. State their type (i.e.. gravitational, tension, friction, normal). (c)State the type of reaction force associated with each of the forces on the ladder and the object that feels each reaction.



force on ladder	type of force	type of reaction	reaction on object