Dynamics on an Inclined Plane

1. Consider the mass to the right. The incline is 12o and the mass is 650g.

***m***

a. Draw the FBD.

b. Find FN.

c. If the mass is at equilibrium find **F**f.

2. Consider the mass to the right. The incline is 28o and the mass is 4.2kg.

***m***

a. draw the FBD

b. Find FN.

c. If the mass is at equilibrium find **F**f.

d. Assuming the mass is stationary find the minimum value of

the coefficient of friction between the mass and the plane.

3. Consider the mass to the right, initially at rest. The incline is 31o and the mass is 1.25kg.

The coefficient of static friction between the block and the plane is 0.55.

The coefficient of kinetic friction between the block and the plane is 0.45

***m***

a. Draw the FBD

b. Find FN.

c. Does the block slide?

d. If the block slides find the acceleration.

4. Consider the mass to the right. The incline is 51o, and the mass is 4.2kg. The coefficient of static friction between the block and the ramp is 0.77. The coefficient of kinetic friction is 0.69.

a. Find FN.

b. The block is released from rest. Does it slide down the ramp?

***m***

c. Find the acceleration of the block.

5. The coefficient of friction between the mass and the ramp below is 0.40. Find the acceleration of the mass.

650

V0=12m/s

21o

6. A 9230kg truck has a 630kg load resting on the back. The

load is not secured to the truck.

A. As the truck drives up the hill at a constant 60.0km/h

find the force of friction acting on the load.

B. As the truck accelerates up the hill at 1.24m/s2 find the

force of friction acting on the load.

C. As the truck slows to a stop at a rate of 4.40m/s2 find the

force of friction acting on the load.

E. If the coefficient of static friction between the load and the truck-bed is 0.774, Find:

i. the maximum acceleration uphill (speeding up)

ii. the maximum acceleration downhill (slowing down)

such that the box does not slip.

7. The block and ramp are accelerating together, to the right at 4.0m/s2.

What is the normal force acting on the 42kg block?

42kg

4.0m/s2

36o