

CSD2301 Practice

**5. Application of Newton's  
Laws Part 1**

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# Practice Question 1

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For a human body falling through air in a spread-eagle position, the numerical value of the Constant  $D$  is about  $0.25 \text{ kg/m}$ . Using the simple equation from *Young & Freedman*, find the terminal speed for an  $80 \text{ kg}$  skydiver.

## Practice Question 2

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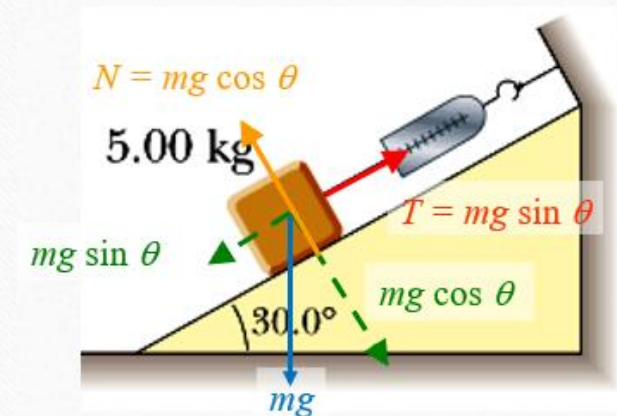
Two 25.0 N weights are suspended at opposite ends of a rope that passes over a light, frictionless pulley. The pulley is attached to a chain that goes to the ceiling. a) What is the tension in the rope? b) What is the tension in the chain?



## Practice Question 3

A street at Holland Drive makes an angle of  $17.5^\circ$  with the horizontal. What force parallel to the street surface is required to keep a truck of loaded mass 1390 kg from rolling down the street?

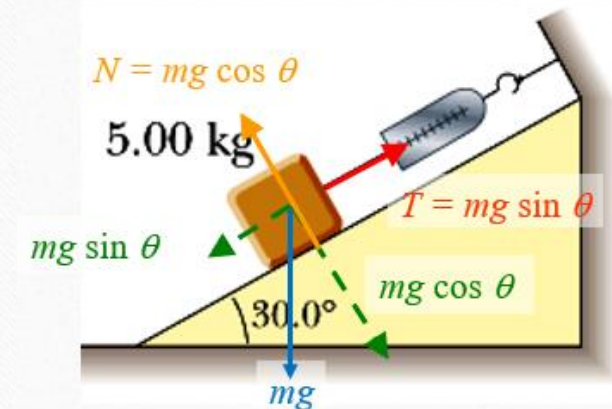
Hint: Rmb this example in Chap 4?



## Practice Question 4

A man pushes on a piano with a mass 180 kg so that it slides at constant velocity down a ramp that is inclined at  $11^\circ$  above the horizontal. Neglect friction acting on the piano. If the force applied by the man is parallel to the incline, calculate the magnitude of this force.

Hint: Rmb this example in Chap 4?





## Practice Question 5

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A worker pushes a box with mass  $11.2\text{ kg}$  on a horizontal surface with a constant speed of  $3.50\text{ m/s}$ . The coefficient of kinetic friction between the box and the surface is  $0.20$ . a) What horizontal force must the worker apply to maintain the motion? b) If the force calculated in part (a) is removed, how far does the box slide before coming to rest?

## Practice Question 6

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An 85 N box of oranges is being pushed across a horizontal floor. As it moves, it is slowing at a constant rate of 0.90 m/s each second. The push force has a horizontal component of 20 N and a vertical component of 25 N downward. Calculate the coefficient of kinetic friction between the box and the floor.



## Practice Question 7

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A 25 kg box of textbooks rests on a loading ramp that makes an angle  $\alpha$  with the horizontal. The coefficient of kinetic friction is 0.25 and the coefficient of static friction is 0.35. a) As the angle  $\alpha$  is increased, find the minimum angle at which the box starts to slip. b) At this angle, find the acceleration once the box has begun to move. c) At this angle, how fast will the box be moving after it has slid 5.0 m along the loading ramp.



## Practice Question 8

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A large crate with mass  $m$  rests on a horizontal floor. The coefficient of kinetic friction between the crate and the floor is  $\mu_k$ . A woman pushes downward at an angle  $\theta$  below the horizontal on the crate with a force  $\vec{F}$ . What magnitude of force  $\vec{F}$  is required to keep the crate moving at constant velocity?

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The End