

Advance Physics

Ch. 4 Problem Set

1. Draw a force diagram of a box sitting on a table.
2. Draw a force diagram of a box sliding down a slanted board at a constant velocity.
3. Draw a force diagram of a box sliding down a slanted board with constant acceleration.
4. A prospector in Denver figures he should go to Death Valley to sell his gold because it will weigh more there (Why?). But because of the instrument used at Death Valley it winds up he should have stayed at home in Denver. Explain. If he was a prospector on an asteroid how would he get paid?
5. Judge Judy has a complaint that is suing for damages when a bus driver hits the brakes for a cat crossing the street and the brief case of the man in the seat in front of her came flying back and hit her in the head. What is J.J.'s verdict?

6. A truck loaded with sand reaches a speed of 100km/hr. The driver sets metal hook on the gas pedal to hold the truck at this speed. What happens if the sand starts to leak?
  
7. An IMSA soccer player kicks the ball from rest to a speed of 10.0m/s in the time, .20s, it is in contact with his foot. If the ball has a mass of .500kg, what is the average force?
  
8. A freight train with a mass of  $1.5 \times 10^7$ kg exerts a constant pull of  $7.5 \times 10^5$ n. How long will it take to reach 80.0km/hr from rest?
  
9. A .50g bullet leaves the muzzle of a rifle with a speed of 320m/s. What force is exerted on the bullet in the .82m long barrel?
  
10. Two men are pulling stubborn burro facing north by two ropes tied around its halter. The first man is pulling 15.0o west of north with 80.0n of force and the other is pulling 30.0o east of north with 120n of force. What is their resultant force? What is the mule's equilibrant force if it is not moving?

11. A  $1.0 \times 10^3 \text{ kg}$  boat moves through the water with the engine applying a  $2.0 \times 10^3 \text{ N}$  force and the drag due to the water of  $1800 \text{ N}$ . a.) What is the boat's acceleration? B.) If it starts from rest how far will it go in  $10.0 \text{ s}$ ? c.) What will velocity be at the end of the  $10 \text{ s}$ ?
12. Mr. L's car rolled into the NO pond. Some students from 05 and 06 come out and tie two ropes to the car. The girls pull with a force of  $450 \text{ N}$  @  $10.0^\circ \text{ W of N}$  and the boys pull with  $400.0 \text{ N}$  @  $30.0^\circ \text{ E of N}$ . If the car has a mass of  $3000.0 \text{ kg}$  and the drag of the water is  $100.0 \text{ N}$ , what is the acceleration of the car?
13. A  $.50 \text{ kg}$  ball is dropped from  $30.0 \text{ m}$  hits the ground for  $.20 \text{ ms}$  and rebounds to  $20.0 \text{ m}$ . What is the force applied by the ground?
14. A  $150 \text{ N}$  bird feeder is hung by tying it near one end of a clothes line, in such a way the near end makes an angle of  $60^\circ$  and the far end an angle of  $30^\circ$  from the original horizontal. What is the tension on the two parts of the clothes line?

15. A student in SI Physics has placed her air track at an angle of  $40.0^\circ$ . She places a  $5.00\text{kg}$  cart on the track, runs a string up and over a pulley at the top and ties a  $10.0\text{kg}$  mass to the other end of the string. What is the net force on the cart and the resulting acceleration? What is the tension on the string?
16. A student doing work service in the IRC has to move a  $1000.0\text{kg}$  box of books by sliding it across the carpet. If he pushes level with the floor with a  $300.0\text{n}$  force and the resulting acceleration is  $.250\text{m/s}$ , what was the force of friction? What is the coefficient of friction for the carpet and box?
17. On extended weekend a student in 03 is rushing to catch the bus. She has a  $20.0\text{kg}$  suitcase that she is pulling with a  $6.6\text{n}$  force by the handle at an angle  $20.0^\circ$  from the floor. The wheels are broke and do not turn. What is the coefficient of friction between the floor and the broken wheels.?