Worksheet
Objects Moving Across a Horizontal Surface

1 A net force "F" accelerates a mass "m" with an acceleration "a". If both the net force and the mass doubles, what will be the new acceleration?

A) a B) 2a C) a/2 D) a/4

2 A road truck filled with gravel crashes into a small car and does a lot of damage to the car and not much to itself. Which statement below is the true one?

A) force on the car is greater than the force on the truck
B) force on the truck is equal to the force on the car
C) force on the car lasts for a longer time than does the force on the truck
D) force on the car lasts for a shorter time than does the force on the truck

3 Two identical 100 N weights, A and B, are being dragged on the same surface by an applied force of magnitude 100 N. The force on A is horizontal, and the force on B makes an angle of 30^o with the horizontal. Which statement is the correct one?

A) neither block will move because the applied force is the same as the weight
B) the blocks are experiencing identical friction forces
C) the blocks have identical accelerations
D) the friction force experienced by A is twice that of B

4 You are standing in a moving bus with your back to the driver and looking out the rear window. Suddenly you stumble into the seat to your right. Which of the following would be the correct conclusion for you to make?

A) bus speeded up
B) bus slowed down
C) driver swerved the bus to the right
D) driver swerved the bus to the left

5 An object, of mass M, is hanging by a string from the ceiling of an elevator that is accelerating upwards at 0.98 m/s^2. What is the tension in the string?

A) Mg B) 0.9 Mg C) 1.1 Mg D) 2 Mg

6 The combined mass of your sister and her toboggan is 60 kg while the combined mass of your brother and his toboggan is 40 kg. You attach your sister's toboggan to the tail of your brothers and with a rope tied to the front of your brother's toboggan you drag them both at the same time. If you apply a horizontal force of 200 N, what is the tension in the rope between the two toboggans? (assume zero friction)

A) 120 N B) 60 N C) 80 N D) 200 N

7 A 35.0 kg anchor is dragged with a horizontal force of 125 N so that the anchor accelerates at 2.3 m/s^2 for a short period of time. What is the coefficient of kinetic friction? **Include a free-body diagram in your answer. (ANS. 0.13)**

8 Justin is towing a box of graphing calculators along a flat surface for which $\mu_k = 0.10$. The box is attached to a rope at an angle of $30.0°$ to the horizontal, and Justin is pulling with 40.0 N of force.

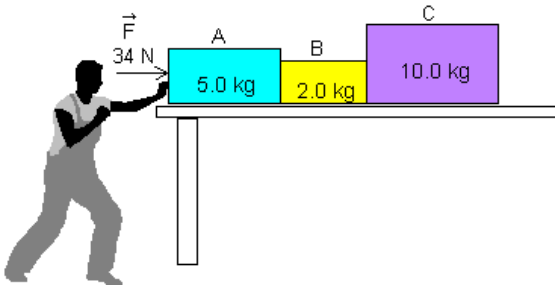
A Sketch the free body diagram.
B Calculate the acceleration of the box of calculators if it has a mass of 5.0 kg. **(ANS. 6.3m/s^2)**

9 After a successful hunt, a 210 kg caribou is loaded aboard a 35 kg sled and the hunter drags the load with a rope over her shoulder. The rope makes an angle of 55^o with the ground. The coefficient of kinetic friction between the sled runners and the snow is 0.32. Determine the force in the rope that

(a) maintains a constant speed of 2.2 m/s. **(ANS. 920 N)**
(b) results in the sled accelerating at 1.0 m/s^2 **(ANS. 1300 N)**

10 A box initially at rest has a mass of 25 kg and is pulled along a table with a force of 250 N [L 35° U]. The coefficient of kinetic friction is 0.24. How far to the left does this force move the box in a time of 2.5 s? **(ANS. 23 m)**

11 Three boxes are touching as shown in the picture. They are pushed by a force of 34 N and move on a frictionless surface. Compute the force with which box C pushes back on box B. **(ANS. 20 N)**



Textbook:

Page 153 – 154: Questions 39 – 41, 43 – 44.
Page 187 – 188: Questions 46 – 49.