SPH3U

Frictional Forces Worksheet

Analyze the following situations, solving for the missing information. You must show all work including FBDs and units to receive full marks. You will have to complete the diagrams as necessary, adding in the appropriate forces and labeling them correctly.

1. [5 marks] A box of mass 40 kg is pushed horizontally across the floor with a force of 185 N. a) Determine the weight of the box, b) the size of the normal force, c) the size of the frictional force and d) the resulting acceleration of the box. The coefficient of friction is 0.3.

2. [5 marks] A book (m =1.6 kg) is being pushed across a table. A force of 20 N is pushing down on the book, while a force of 200 N is pushing to the left. Determine the acceleration of the book if the coefficient of friction is 0.78.

3. [5 marks] Two children are pushing a 90 kg sled across the ice. One is pushing with a force of 120 N [right] while the other is pushing with a force of 12.5 N [left]. The coefficient of friction is 0.05. Determine the resulting acceleration of the sled.

4. [5 marks] A 23-kg cart has an acceleration of 7.5 m/s^2 [right] when a force of 250 N [right] is applied to it. Determine the coefficient of friction, μ.

5. [5 marks] What force is required to accelerate a 1000kg car from rest to 17 m/s in 3.4 seconds?
   a) (neglect friction)
   b) (if the coefficient of friction is 0.45)