Module 04 - Lesson 3

Free Body Diagrams

Question 1: A flight-attendant drags a 10-kg suitcase along a level frictionless floor by pulling with a 40-N force at an angle of 30° above the horizontal. Draw a free body diagram of the suitcase.

Question 2: A bird-feeder is hanging from a tree branch as shown in Fig. 1. Draw a free body diagram of the forces acting on the bird feeder.

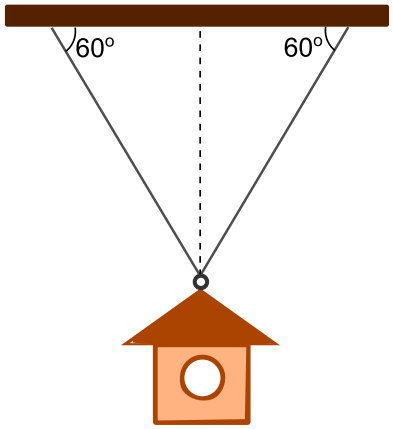

FIG. 1: Bird-feeder hanging from the tree

Problem: Two crates, 1 and 2, are placed side by side on a frictionless horizontal surface, as shown in Fig. 2. The crates have masses m_1 and m_2 and are initially at rest. A horizontal force $\vec{F}$ is applied to crate 1. (a) Draw separate and clearly labelled free body diagrams for the two crates. (b) If the magnitude of the force F is less than the total weight of the crates, will they move? Explain.

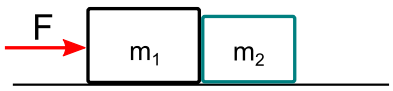

FIG. 2: Crates pushed by a horizontal force