

Please answer the following questions completely on a separate piece of paper, using diagrams, formulas, etc. These questions are taken directly from the textbook and answers are available online or in the back of the text. The focus of this task is the solving procedure. I want to see your thinking/reasoning through the use of diagrams, equations, mathematics and even small notes to yourself, don't forget direction and magnitudes.

Success Criteria

1. Draw a FBD, choose your positive directions
2. Write an  $F_{\text{net}}$  equation based on the DIAGRAM
3. Substitute values and  $F=ma$  into the  $F_{\text{net}}$  equation

28. A trap door that opens in the middle is stuck half open with a box sitting on it (**Figure 3**). Draw a free-body diagram for the box. (3.1) (3 marks)

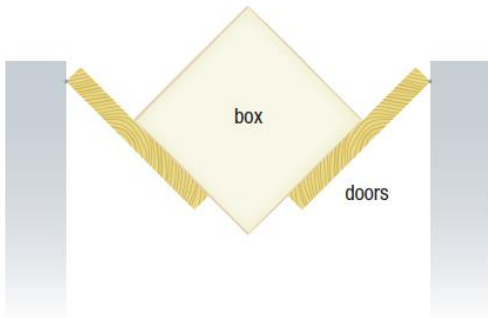


Figure 3

30. Four children are playing tug-of-war. The two children on the right pull with forces of magnitude 84 N and 86 N, and one of the children on the left is able to pull with a force of magnitude 83 N. If the rope remains stationary, how hard is the second child on the left pulling? (3.2) (3 marks)
61. A boy and a girl are standing on skateboards. The boy pushes off the girl to the left with a force of magnitude 74 N. The mass of the boy is 62 kg and the mass of the girl is 59 kg. Ignore friction. (3.4) (4 marks)
- (a) State the action and reaction forces in this situation.
  - (b) Determine the magnitude and direction of the acceleration of each skateboarder.
70. A student has tied together two sleds with a rope. Two of his friends, with masses of 55.0 kg and 60.0 kg, are riding in the sleds, one in each (55.0 kg in the back, 60.0 kg in front). The student uses another rope to pull the sleds with a horizontal force of magnitude 230 N. The sleds accelerate with a magnitude of  $1.02 \text{ m/s}^2$ . The front sled experiences a force of friction of magnitude 58.8 N; assume that the masses of the sleds are negligible. (3.5) (8 marks)
- (a) What is the frictional force on the back sled?
  - (b) What is the tension in the rope connecting the sleds?
  - (c) The student pulling the sleds starts from rest, runs for 3.00 s, and then lets the sleds go. How far will the sleds travel during the ENTIRE trip?