

Physics 1210
Homework 3 Written-out Problems

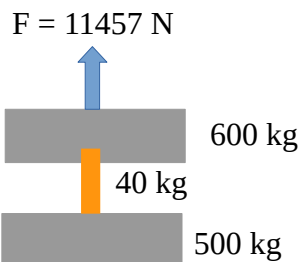
1.

You work in a team in the Wyoming Game and Fish Department that monitors the reintroduction of Colorado River cutthroat trout into Carbon County. Over Winter, you go in spiked shoes out on the Little Snake River to place sensors above the ice to detect the chipped fish below. You have a main shack that is 60 kg and an axillary 20 kg shack that you decide to tow out at the same time. You attach a rope between the shacks and tie a second rope to the main shack that you pull on to move them out. Starting on the frictionless ice, you find that you can accelerate your shack at 1.75 m/s^2 .

- Draw a free body diagram for each of the shacks
- What is the acceleration of the other shack?
- What is the tension in the rope that you are pulling?
- What is the tension in the rope connecting the two shacks?

2.

As part of the construction team for the Snowy Range Road bridge, you had to ensure that safety requirements were met when moving loads with cranes on-site. You routinely oversaw concrete girders being lifted two at a time with a heavy steel wire-rope connecting them as shown in the figure below where the force F is the result of the crane initially lifting the system.



- Draw three free-body diagrams: one for each of the concrete girders and one for the 40 kg rope, for each force indicate what body exerts the force.
- What is the acceleration of the system?
- What is the tension at the top of the rope?
- If one of the safety requirements for cranes is that no loads can ever travel faster than 0.5 m/s , how long does the crane operator have to reduce the applied force to not exceed that speed limit? Assume the operator instantaneously reduces the force to be equal to the system weight.