**DYNAMICS UNIT ASSIGNMENT**

1. Four students are trying to pull out an object stuck in the mud. Two students, with masses of 60.9 kg and 62.1 kg pull west with forces of 86 N and 43 N, respectively. Two students, with masses of 59 kg and 64 kg, pull north with forces of 92 N and 70.5 N, respectively. Determine the magnitude and direction of the acceleration of the object. Be sure to include a free-body diagram as part of your answer.
2. A potato gun uses the force of compressed gas to launch pieces of potato with a velocity of 35 m/s. If the time it takes the gun to accelerate potatoes to this speed is 0.48 s, and the average potato piece has a mass of 215 g, what is the average applied force the potato gun exerts on the potatoes? The coefficient of friction in the tube is 0.021.
3. A student in an elevator, accelerating upwards at a rate of 3.6 m/s2, has a mass of 65 kg. Determine the normal force.
4. A skier with a mass of 75 kg starts with an initial velocity of 1.25 m/s, but begins to move downhill with a net force of 93 N for 8.2 s. The hill levels out for 4.2 s. On this part of the hill, the net force on the skier is 25 N backwards.
5. Calculate the speed of the skier after 8.2 s.
6. Calculate the total distance travelled by the skier before coming to rest. Do not forget the distance covered on the hill and the distance covered after the hill levels out.
7. On a distant planet, a NASA device, with a mass of 650 kg, accelerates horizontally across the surface, at a rate of 1.486 m/s2. The device is designed so that the applied force is equal to 12 times the acceleration due to gravity on the distant planet. If the coefficient of kinetic friction between the device and the surface is 0.00257, determine the acceleration due to gravity on the planet.