

### Quiz #5: Applying Newton's Laws

**Problem 1** (1.5 points)

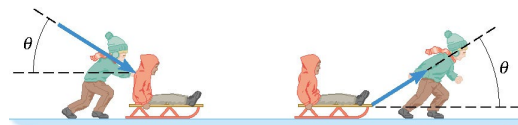
Consider a person standing in an elevator that is moving upward with constant velocity. The upward normal force  $N$  exerted by the elevator floor on the person is

- a) larger than
- b) identical to
- c) smaller than

the downward weight  $w$  of the person.

**Problem 2** (1.5 points)

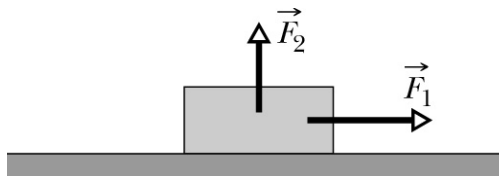
A person has a choice of either pushing or pulling a sled at constant velocity, as the drawing illustrates. Friction is present. If the angle  $\theta$  is the same in both cases, does it require more force to push or pull? Account for your answer.



**Problem 3** (3 points)

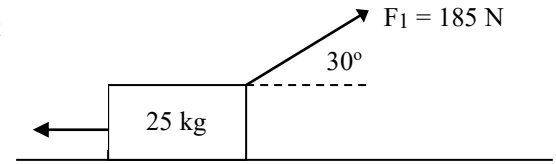
In the figure below, a horizontal force  $F_1$  of magnitude 10 N is applied to a box on a floor, but the box does not slide. Then, as the magnitude of a vertically applied force  $F_2$  is increased from zero but before the box begins to slide, do the following quantities increase, decrease, or remain the same: (a) the magnitude of the frictional force on the box; (b) the magnitude of the normal force on the box; (c) the maximum value  $f_{s, \max}$  of the static frictional force on the box?

- a)
- b)
- c)



**Problem 4** (4 points)

A 25 kg crate is being pulled to the right along a rough surface by a 185 N force acting at a  $30^\circ$  angle as shown in the figure. There is also a 95 N force acting to the left. Friction is present and the coefficient of kinetic friction is  $\mu_k = 0.40$ .



a) What is the normal force on the crate?

b) What is the magnitude of the acceleration of the crate?