

F μ N with Friction (with Apparent Weight)

Name _____

Use $g = 9.80 \text{ m/s}^2$. Use the puzzle-solving strategy papers to solve these puzzles and ignore air drag unless indicated otherwise.

1.1) A 95.0 kg person stands on a scale in an elevator. What is the apparent weight when the elevator is (a) accelerating upward at 1.80 m/s^2 , (b) moving at constant velocity, and (c) accelerating downward at 1.30 m/s^2 ?

1.2) A rocket blasts off from rest and attains a speed of 45 m/s in 15 s. An astronaut has a mass of 57 kg. What is the astronaut's apparent weight during takeoff?

1.3) A 55 kg person crouches on a scale and jumps straight up. As the person springs up, the reading on the scale suddenly rises to 622 N. What is the acceleration of the person at this instant?

2.1) A person exerts a horizontal force of 267 N in attempting to push a freezer across a room, but the freezer does not move. What is the static frictional force that the floor exerts on the freezer?

2.2) A block of weight 45.0 N rests on a horizontal table. A horizontal force of 36.0 N is applied to the block. The coefficients of static and kinetic friction are 0.650 and 0.420, respectively. Will the block move, and if so, what will be the block's acceleration?

2.3) A 60.0 kg crate sits on a dock in a shipping yard. The coefficients of static and kinetic friction are 0.760 and 0.410, respectively. What horizontal force is required to just start the crate moving and to slide the crate across the dock at constant speed?

3.1) A cup of coffee is sitting on a table in an airplane that is flying at a constant altitude and velocity. The coefficient of static friction between the cup and the table is 0.30. Suddenly the plane accelerates horizontally. What is the maximum acceleration that the plane can have without the cup sliding backward on the table?

3.2) A 92 kg baseball player slides into second base. The coefficient of kinetic friction between the player and the ground is $\mu_k = 0.61$. What is the magnitude of the frictional force? If the player comes to rest after 1.2 s, what is her initial speed?

3.3) A 6.00 kg box is sliding across the horizontal floor of an elevator. ($\mu_k = 0.360$) Determine the kinetic frictional force that acts on the box when the elevator is (a) stationary, (b) accelerating upward with an acceleration of 1.20 m/s^2 , and (c) accelerating downward at 1.20 m/s^2 .