

NAME:

SECTION:

1. You're sitting on a stool. Draw a free body diagram of the forces between you and the stool. Label the normal and gravitational forces, and give their magnitude. Hint: use Newton's Second Law $\sum_i \mathbf{F}_i = m\mathbf{a}$ to resolve the magnitude of each force along the x and y directions.

2. You're sitting in an airplane which is initially at rest. The airplane then begins to accelerate forward along the runway with acceleration a_x , without taking off. If the chair you're sitting in is angled at exactly 90° , draw a free body diagram of the forces between you and the chair, and find the x and y components of each force. Answer in terms of your mass m , the acceleration of the airplane a , and g .

3. The airplane from **2.** begins to take off with acceleration a_y while maintaining its forward acceleration a_x . Draw a free body diagram of the forces between you and the chair, and again solve for them. If you incline your seat back from 90° by an angle $\theta < 90^\circ$, what are the new forces? Draw a new diagram and solve.