**Linked Segment Practice Questions**

1. Find the locations of the center of mass, the amount of mass and moments of inertia of the foot, leg, and thigh segments. Draw free body diagrams and calculate the joint reaction forces and net joint moments at the ankle, knee and hip given the following data of a man walking in the positive X direction:

Force Platform: Fx = -111 N, Fy = 609 N, and CofP = (0.064, 0.0) m

Joint Markers: MP (0.173, 0.028) m

Heel (-0.001, 0.043) m

Ankle (0.064, 0.066) m

Knee ( 0.090, 0.443) m

Hip (-0.097, 0.897) m

Foot Accelerations: x= -4.39 m/s/s, y = 6.77 m/s/s angular = 52.0 rad/s/s

Leg Accelerations: x = -4.01 m/s/s Y = 2.73 m/S/S angular = -2.78 rad/s/s

Thigh Accelerations: x = -4.94 m/s/s, y = 2.63 m/s/s, angular = -2.87 rad/s/s

Foot Length = 0.206 m, Leg length = 0.43 m, and thigh length = 0.46 m

Whole Body Mass = 64.9 kg

1. Find the locations of the center of mass, the amount of mass and moments of inertia of the foot, leg, and thigh segments. Draw free body diagrams and calculate the joint reaction forces and net joint moments at the ankle, knee and hip given the following data of a man walking in the negative X direction:

Force Platform: Fx = 91.9 N, Fy = 477 N, and CofP = (-0.029, 0.0) m

Joint Markers: MP (-0.393, 0.0496) m

Heel (-0.2365, 0.0404) m

Ankle (-0.287, 0.0995) m

Knee (-0.210, 0.508) m

Hip (-0.1121, 0.802) m

Foot Accelerations: x= 4.39 m/s/s, y = 6.77 m/s/s angular = -52.1 rad/s/s

Leg Accelerations: x = 4.01 m/s/s Y = 2.75 m/S/S angular = 2.78 rad/s/s

Thigh Accelerations: x = 4.05 m/s/s, y = 2.63 m/s/s, angular = -3.58 rad/s/s

Foot Length = 0.206 m, Leg length = 0.43 m, and thigh length = 0.46 m

Whole Body Mass = 64.9 kg



**Answers:**

1. **Ankle: Rx1 = 106.9 N, Ry1 = -593 N, M1 = 8.566 N.m**

**Knee: Rx2 = 94.8 N, Ry2 = -555.2 N, M2 = 61.75 N.m**

**Hip: Rx3 = 62.7 N, Ry3 = -474 N, M3 = 0.58 N.m**

1. **Ankle: Rx1 = -87.77 N, Ry1 = -461.4 N, M1 = -53.04 N.m**

**Knee: Rx2 = -75.68 N, Ry2 = -423.5 N, M2 = -119.8 N.m**

**Hip: Rx3 = -49.4 N, Ry3 = -342.8 N, M3 = -101.1 N.m**